DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 243

SURFACE WATER SUPPLY OF THE UNITED STATES

1907–8

PART III. OHIO RIVER BASIN

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

A. H. HORTON, M. R. HALL, AND
R. H. BOLSTER

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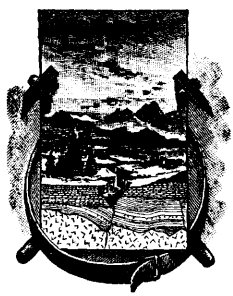

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SURFACE WATER SUPPLY OF THE OHIO RIVER BASIN, 1907–8.

By A. H. HORTON, M. R. HALL, and R. H. BOLSTER.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of flow measurements made on certain streams in the United States. The work was performed by the water-resources branch of the United States Geological Survey, either independently or in cooperation with organizations mentioned herein. These investigations are authorized by the organic law of the Geological Survey (Stat. L., vol. 20, p. 394), which provides, among other things, as follows:

> Provided that this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

Inasmuch as water is the most abundant and most valuable mineral in nature, the investigation of water resources is included under the above provision for investigating mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

The various appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor do they include all the river systems or parts thereof that might purposefully be studied. The scope of the work is limited to that which can be provided with the appropriations available. The field covered and the character of the work are believed to be the best that could be accomplished under the controlling conditions. It would undoubtedly be of more scientific importance and ultimately of more practical value if the money now applied to wide areas were concentrated on a few small basins. Such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be maintained during a period of years sufficient to cover all stages, in order that within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum may be determined. The length of such a period manifestly varies for different streams and can not be absolutely determined. Experience has shown that the records should cover from five to ten years, or for some streams twenty years or more, the limit being determined by the relative importance of the stream and the interdependence of the results and other long-time records on adjacent streams.

In the performance of this work the Geological Survey endeavors to approach as nearly as possible the highest degree of precision which a rational expenditure of time and a judicious expenditure of a small amount of money will allow. In all engineering work there is a point of refinement beyond which it is needless and wasteful to proceed, and this principle applies with especial force to stream-flow measurements. It is confidently believed that with some unavoidable exceptions the stream-flow data presented in the publications of the Survey are sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of many stations. All persons are cautioned to exercise the greatest care in the utilization of such incomplete records.

Records of varying lengths have been obtained at about 1,400 different points in the United States, and in addition the surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, has been investigated. During 1907 and 1908 regular gaging stations were maintained by the Survey and cooperating organizations at about 740 points in the United States, and in addition numerous miscellaneous measurements were made. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country.

These data will be made available in the regular surface water-supply papers and in special papers from time to time.

PURPOSES OF THE WORK.

Among the purposes for which the results contained in this volume are requisite are navigation, irrigation, domestic water supply, water power, swamp and overflow land drainage, and flood prevention. The demands of all these interests are immediate.

Navigation.—The Federal Government has expended more than $250,000,000 for the improvement of inland navigation and prospective expenditures will approximate several times this amount. It is obvious that the determination of stream flow is necessary to the intelligent solution of the many problems involved.

Irrigation.—The United States is now expending $42,000,000 on federal irrigation systems, and this amount is far exceeded by the private expenditures of this nature in the arid West. The integrity of any irrigation system is based absolutely on the amount of water available. Therefore investigations of stream flow in that portion of the country are of first importance in the redemption of the lands, as well as constituting an insurance of federal and private investments.

Domestic water supply.—The highest use of water is that of domestic supply, and while the federal interest in this aspect of the matter is less direct than in the aspects already named this use of water nevertheless has so broad a significance with respect to the general welfare that the Federal Government is ultimately and intimately concerned.

Water power.—The time is rapidly approaching when the development of the water power of the country will be an economic necessity. Our stock of coal is being rapidly depleted and the cost of steam power is increasing accordingly. Industry will cease its growth if cheap power is not available, and in that event the United States as a nation will cease to progress. Water power is the only avenue now open. When the electric transmission of power was accomplished, the relation of our water powers to national economy changed entirely. Previous to the day of electric transmission the importance of a water power was largely confined to the locality at which it was generated, but it has now become a public utility in which the individual citizen is vitally interested. Inasmuch as the amount of water power that may be made available is dependent on the flow of rivers, the investigation of flow becomes a prerequisite in the judicious management of this source of energy.

Drainage of swamp and overflowed lands.—More than 70,000,000 acres of the richest land in this country are now practically worthless, or of precarious value, by reason of overflow and swamp con-

ditions. When this land is drained it becomes exceedingly productive and its value increases many fold. Such reclamation would add to the national assets at least $700,000,000. The study of run-off is the first consideration in connection with drainage projects. If by the drainage of a large area into any particular channel that channel becomes so gorged with water which it had not hitherto been called upon to convey that overflow conditions are created in places where previously the land was not subject to inundation, then drainage results merely in an exchange of land values. This is not the purpose of drainage improvement.

Flood prevention.—The damage from floods in the United States exceeds $100,000,000 annually and in the year 1908 the aggregate damage, based on reliable data, approximated $250,000,000. Such an annual tax on the property of great regions should be reduced in the orderly progress of government. It goes without saying that any consideration of flood prevention must be based on a thorough knowledge of stream flow, both in the contributing areas which furnish the water and along the great lowland rivers.

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey since its inception have appeared in the annual reports, bulletins, and water-supply papers. Owing to natural processes of evolution and to changes in governmental requirements, the character of the work and the territory covered by these different publications has varied greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into twelve parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface water supply for 1907 and 1908. The dividing line between the North Atlantic and South Atlantic drainage areas lies between York and James rivers.

Papers on surface water supply of the United States, 1907–8.

Part.	No.	Title.	Part.	No.	Title.
I	241	North Atlantic coast.	VI	246	Missouri River basin.
II	242	South Atlantic coast and eastern Gulf of Mexico.	VII	247	Lower Mississippi River basin.
			VIII	248	Western Gulf of Mexico.
III	243	Ohio River basin.	IX	249	Colorado River basin.
IV	244	St. Lawrence River basin.	X	250	Great Basin.
V	245	Upper Mississippi River and Hudson Bay basin.	XI	251	California.
			XII	252	North Pacific coast.

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey exclusive of all special papers. Numbers of reports are inclusive and dates also are inclusive so far as the data are available.

Stream-flow data in reports of the United States Geological Survey.

[Ann.=Annual Report; B.=Bulletin; W. S.=Water-Supply Paper.]

Report.	Character of data.	Year.
10th Ann., pt. 2	Descriptive information only	
11th Ann., pt. 2	Monthly discharge	1884 to Sept., 1890.
12th Ann., pt. 2	do	1884 to June 30, 1891.
13th Ann., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th Ann., pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B. 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th Ann., pt. 2	Descriptive information only	
B. 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W. S. 11	Gage heights (also gage heights for earlier years)	1896.
18th Ann., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for earlier years).	1895 and 1896.
W. S. 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W. S. 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th Ann., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W. S. 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W. S. 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th Ann., pt. 4	Monthly discharge (also for many earlier years)	1898.
W. S. 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st Ann., pt. 4	Monthly discharge	1899.
W. S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d Ann., pt. 4	Monthly discharge	1900.
W. S. 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W. S. 75	Monthly discharge	1901.
W. S. 82 to 85	Complete data	1902.
W. S. 97 to 100	do	1903.
W. S. 124 to 135	do	1904.
W. S. 165 to 178	do	1905.
W. S. 201 to 214	Complete data, except descriptions	1906.
W. S. 241 to 252	Complete data	1907–8.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119. The first table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1908. Wherever the data for a drainage basin appear in two papers the number of one is placed in parentheses and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas rivers.

Numbers of water-supply papers containing results of stream measurements, 1899–1908.

	1899.[a]	1900.[b]	1901.	1902.	1903.	1904.	1905.	1906.	1907–8.
Atlantic coast and eastern Gulf of Mexico:									
New England rivers	35	47	65,75	82	97	124	165	201	241
Hudson River to Delaware River, inclusive	35	47,(48)	65,75	82	97	125	166	202	241
Susquehanna River to York River, inclusive	35	48	65,75	82	97	126	167	203	241
James River to Yadkin River, inclusive	(35),36	48	65,75	(82),83	(97),98	126	167	203	242
Santee River to Pearl River, inclusive	36	48	65,75	83	98	127	168	204	242
St. Lawrence River	36	49	65,75	(82),83	97	129	170	206	244
Hudson Bay	.....	.....	66,75	85	100	130	171	207	245
Mississippi River:									
Ohio River	36	48,(49)	65,75	83	98	128	169	205	243
Upper Mississippi River	36	49	65,75	83	98,(99)	128, (130)	171	207	245
Missouri River	(36),37	49,(50)	66,75	84	99	130, (131)	172	208	246
Lower Mississippi River	37	50	(65), 66,75	(83),84	(98),99	(128), 131	(169), 173	(205), 209	247
Western Gulf of Mexico	37	50	66,75	84	99	132	174	210	248
Pacific coast and Great Basin:									
Colorado River	(37), 38	50	66,75	85	100	133, (134)	175, (177)	211 (213)	249, (251)
Great Basin	38, (39)	51	66,75	85	100	133, (134)	176, (177)	212, (213)	250, (251)
South Pacific coast to Klamath River, inclusive	(38), 39	51	66,75	85	100	134	177	213	251
North Pacific coast	38	51	66,75	85	100	135	(177) 178	214	252

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

Numbers of water-supply papers containing data covering portions of drainage basins.

No.	River basin.	Tributaries included.
35	James	
36	Missouri	Gallatin.
37	Colorado	Green, Gunnison, Grand above junction with Gunnison.
38	Sacramento	Except Kings and Kern.
39	Great Basin	Mohave.
48	Delaware	Wissahickon and Schuylkill.
49	Ohio	Scioto.
50	Missouri	Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte.
65	Lower Mississippi	Yazoo.
82	James	
	St. Lawrence	Lake Ontario, tributaries to St. Lawrence River proper.
83	Lower Mississippi	Yazoo.
97	James	
98	Lower Mississippi	Do.
99	Upper Mississippi	Tributaries from the west.
128	Lower Mississippi	Yazoo.
130	Upper Mississippi	Tributaries from the west.
131	Missouri	Platte, Kansas.
134	Colorado	Data near Yuma, Ariz., repeated.
	Great Basin	Susan, Owens, Mohave.
169	Lower Mississippi	Yazoo.
177	Colorado	Below junction with Gila.
	Great Basin	Susan repeated, Owens, Mohave.
	North Pacific coast	Rogue, Umpqua, Siletz.
205	Lower Mississippi	Yazoo, Homochitto.
213	Colorado	Data at Hardyville repeated; at Yuma, Salton Sea.
	Great Basin	Owens, Mohave.
251	Colorado	All stations in Colorado and Great Basin drainages lying in California repeated.
	Great Basin	

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined on the

basis of drainage area, local changes in name and lake surface being disregarded. After all stations from the source to the mouth of the main stem of the river have been given, the tributaries are taken up in regular order from source to mouth. The tributaries are treated the same as the main stream, all stations in each tributary basin being given before taking up the next one below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated above, and in the records for large lakes, where it is often clearer to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

DEFINITION OF TERMS.

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 abbreviation for cubic foot per second and is the rate of discharge 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 by the use of the factors given in the following table of equivalents.

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

The "miner's inch" is the rate of discharge of water that passes through an orifice 1 inch square under a head which varies locally. It is 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.

CONVENIENT EQUIVALENTS.

The following is a list 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-feet.
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 one 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.

1⅓ horsepower equal about 1 kilowatt.

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

EXPLANATION OF TABLES.

For each drainage basin there is given a brief description of general conditions covering such features as area, source, tributaries, topography, geology, conditions of forestation, rainfall, ice conditions, irrigation, storage, power possibilities, and other special features of importance or interest.

For each regular current-meter gaging station are given in general, and so far as available, the following data: Description of station, list of discharge measurements, table of daily gage heights, rating table, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height and rating tables are omitted and a table of daily discharge is substituted. For stations where the flow is computed by shifting-channel methods, a table of daily discharge is given in place of rating tables, which are not used in these methods of computation.

In addition to statements regarding the location and installation of current-meter stations the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting conditions of flow, and backwater; also full information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of 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. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights during ice conditions, backwater from obstructions, etc., are published as recorded, with suitable footnotes. The rating is not applicable for such periods unless the proper correction to the gage heights is known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which the rating tables and monthly-discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is published to enable engineers to determine the daily discharge by its application to the table of gage heights or to check results in the table of monthly discharge.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the period when the water surface was at crest height and the corresponding discharge consequently 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 in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 13, are based.

FIELD METHODS OF MEASURING STREAM FLOW.

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 or dam; (3) by measurements of the velocity of the current and of the area of the cross section. The method chosen depends on 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. It is seldom used by the United States Geological Survey. For full information regarding this method the reader is referred to the various text-books on hydraulics.

Weir method.—Relatively few stations are maintained at weirs or dams by the United States Geological Survey. Standard types of

sharp-crested and broad-crested weirs within the limits for which accurate coefficients have been experimentally obtained give very accurate records of discharge if properly maintained. At practically all broad-crested weirs, however, there is a diversion of water either through or around the dam, usually for the purpose of development of water power. The flow is often complicated and the records are subject to errors from such sources as leakage through the dam, backwater at high stages, uncertainty regarding coefficient, crest which is not level, obstructions from logs or ice, use of flashboards, old turbines with imperfect ratings, and many others depending on the type of development and the uses of the diverted water.

In general, records of discharge at dams are usually accurate enough for practical use if no others are available. It has been the general experience of the United States Geological Survey, however, that records at current meter gaging stations under unobstructed channel conditions are more accurate than those collected at dams, and where the conditions are reasonably favorable are practically as good as those obtained at sharp-crested weirs.

The determination of discharge over the different types of weirs and dams is treated fully in "Weir experiments, coefficients, and formulas" (Water-Supply Paper 200[a]) and in the various text-books on hydraulics. "Turbine water-wheel tests and power tables" (Water-Supply Paper 180) treats of the discharge through turbines when used as meters. The editions of both of these water-supply papers are practically exhausted. They can, however, be consulted at most of the larger libraries of the country or they can be obtained from the Superintendent of Documents, Washington, D. C., at a cost of 20 cents for No. 180 and 35 cents for No. 200. Remittances must be made by postal money order, express order, or New York draft.

Velocity method.—Streams in general present throughout their courses to a greater or less extent all conditions of permanent, semi-permanent, and varying conditions of flow. In accordance with the location of the measuring section with respect to these physical conditions, current-meter gaging stations may in general be divided into four classes—(1) those with permanent conditions of flow; (2) those with beds which change only during extreme high water; (3) those with beds which change frequently but which do not cause a variation of more than about 5 per cent of the discharge curves from year to year; and (4) those with constantly shifting beds. In determining the daily flow different office methods are necessary for each class. The field data on which the determinations are based and the methods of collecting them are, however, in general the same.

[a] Water-Supply Paper 200 is a revision of No. 150, the edition of which is exhausted.

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. They are located, as far as possible, at such points that the relation between gage height and discharge will always remain constant for any given stage. The experience of engineers of the Geological Survey has been that permanency of conditions of flow is the prime requisite of any current-meter gaging station when maintained for several years unless funds are available to cover all changes in conditions of flow. A straight, smooth section without cross currents, backwater, boils, etc., at any stage is highly desirable, but on most streams is not attainable except at the cost of a cable equipment. Rough, permanent sections, if measurements are properly made by experienced engineers, taking measuring points at a distance apart of 2 to 5 per cent or less of the total width, will within reasonable limits yield better results for a given outlay of money than semi-permanent or shifting sections with smooth, uniform current. So far as possible stations are located where the banks are high and not subject to overflow at high stages and out of the influence of tributary streams, dams, or other artificial obstructions which might affect the relation between gage height and discharge.

A gaging station consists essentially of a gage for determining the daily fluctuations of stage of the river and some structure or apparatus from which discharge measurements are made, usually a bridge or cable.

The two factors required to determine the discharge of a stream past a section perpendicular to the mean direction of the current are the area of the cross section and the mean velocity of flow normal to that section.

In making a measurement with a current meter a number of points, called measuring points, are measured off above and in the plane of the measuring section at which observations of depth and velocity are taken. (See Pl. I, *B*.) These points are spaced equally for those parts of the section where the flow is uniform and smooth and are spaced unequally for other parts according to the discretion and judgment of the engineer. In general the points should not be spaced farther apart than 5 per cent of the distance between piers, nor farther apart than the approximate mean depth of the section at the time of measurement.

The measuring points divide the total cross section into elementary strips at each end of which observations of depth and velocity are made. The discharge of any elementary strip is the product of the average of the depths at the two ends times the width of the strip times the average of the mean velocities at the two ends of the strip. The sum of the discharges of the elementary strips is the total

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

B. BRIDGE STATION AND CROSS SECTION OF STREAM.

Illustrating 0.2 and 0.8 depth method.

discharge of the stream. (For a discussion of methods of computing the discharge of a stream see Engineering News, June 25, 1908.)

Depths for the determination of the area are usually obtained by sounding with the current meter and cable. In rough sections or swift current an ordinary weight and cable are used, particular care being taken that all observations shall be in the plane of the cross section.

Two methods of determining the velocity of flow of a stream are in general use—the float method and the current-meter method.

The float method with its various modifications of surface, subsurface, and tube or rod floats is now considered obsolete in the ordinary practice of the United States Geological Survey. The use of this method is limited to special conditions where it is impracticable to use the current meter, such as in places where large quantities of ice or débris which may damage the meter are flowing with the current, and for miscellaneous measurements or other work where a high degree of accuracy is not necessary. Tube floats are very satisfactory for use in canals with regular bottoms and even flow of current. Measurements by the float method are made as follows: The velocity of flow of the stream is obtained by observing the time which it takes floats set free at different points across the stream to pass between two range lines about 200 feet apart. The area used is the mean value obtained from several cross sections measured between the two range lines. The chief disadvantages of this method are difficulty in obtaining the correct value of mean area for the course used and uncertainty regarding the proper coefficient to apply to the observed velocity. For further information regarding this method the reader is referred to Water-Supply Paper 95 and to the various text-books covering the general subject of stream flow.

The Price current meter is now used almost to the exclusion of other types of meters by the United States Geological Survey in the determination of the velocity of flow of water in open channels, a use for which it is adapted under practically all conditions. Plate II shows in the center the new type of penta-recording current meter equipped for measurements at bridge and cable stations. On the sides of the same type of meter is shown equipped for wading measurements to record by the acoustic method on the left and by the electric method on the right. Briefly, the meter consists of six cups attached to a vertical shaft which revolves on a conical hardened steel point when immersed in moving water. The number of revolutions is indicated electrically. The rating, or relation between the velocity of the moving water and the revolutions of the wheel, is determined for each meter by drawing it through still water for a given distance at different speeds and noting the number of revolutions for each run. (See Pl. I, *A*.) From these data a rating table is prepared

which gives the velocity per second of moving water for any number of revolutions in a given time interval. The ratio of revolutions per second to velocity of flow in feet per second is very nearly a constant for all speeds and is approximately 0.45.

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

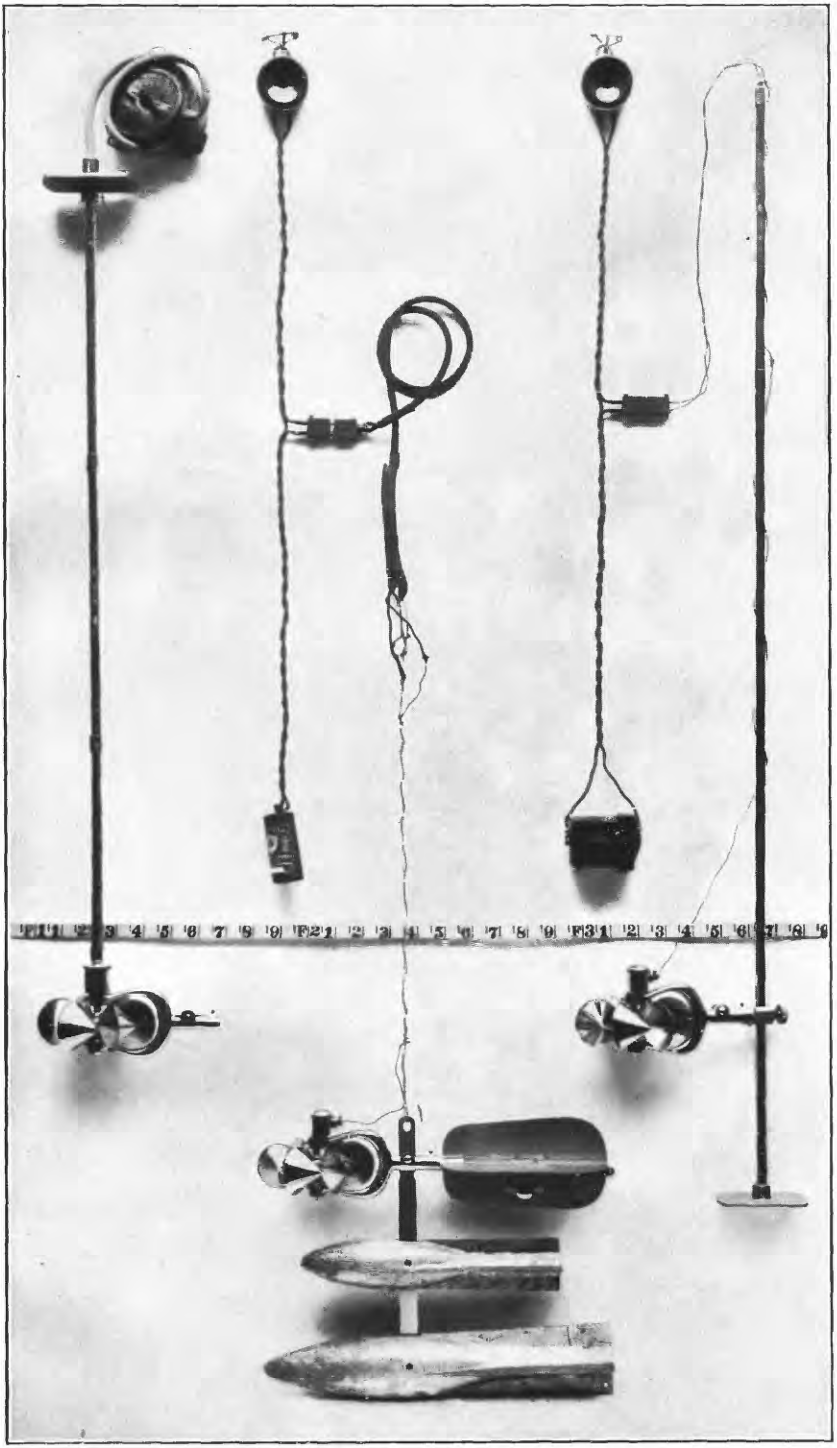
The two principal multiple-point methods in general use are the vertical velocity curve and 0.2 and 0.8 depth.

In the vertical velocity curve method a series of velocity determinations are made in each vertical at regular intervals, usually about 10 to 20 per cent of the depth 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 vertical is then obtained by dividing the area bounded by this velocity curve and its axis by the depth. This method of obtaining the mean velocity in the vertical is probably the best known, but on account of the length of time required to make a complete measurement its use is largely 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 depth, and the mean of the velocities at these two points is taken as the mean velocity for that vertical. (See Pl. I, *B*.) 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 depth will give (closely) the mean velocity in the vertical. Actual observations under a wide range of conditions show that this multiple-point method gives the mean velocity very closely for open-water conditions and that in a completed measurement it seldom varies as much as 1 per cent from the value given by the vertical velocity curve method. Moreover, the indications are that it holds nearly as well for ice-covered rivers. It is very extensively used in the regular practice of the United States Geological Survey.

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 or must be assumed.

Extensive experiments by means of vertical velocity curves show that the thread of mean velocity generally occurs between 0.5 and 0.7 total depth. In general practice the thread of mean velocity is considered to be at 0.6 depth, and at this point the meter is held in most of the measurements made by the single-point method. A large number of vertical velocity curve measurements, taken on many streams and under varying conditions, show that the average



PRICE PENTA-RECORDING CURRENT METERS.

coefficient for reducing the velocity obtained at 0.6 depth to mean velocity is practically unity. The variation of the coefficient from unity in individual cases is, however, greater that in the 0.2 and 0.8 method and the general results are not as satisfactory.

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 the 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 in general from about 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 in the correct position for the other methods.

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. In using the Price meter great care should be taken that the vertical movement of the meter is not rapid enough to vitiate the accuracy of the resulting velocity.

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 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 the 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, and the thickness and character of the ice. 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 187.

OFFICE METHODS OF COMPUTING AND STUDYING DISCHARGE AND RUN-OFF.

At the end of each year the field or base data for current-meter gaging stations, consisting of daily gage heights, discharge measurements, and full notes, are assembled. The measurements are plotted on cross-section paper and rating curves are drawn wherever feasible. The rating tables prepared from these curves are then applied to the tables of daily gage heights to obtain the daily discharges, and

from these applications the tables of monthly discharge and run-off are computed.

Rating curves are drawn and studied with special reference to the class of channel conditions which they represent. (See p. 17.) The discharge measurements for all classes of stations when plotted with gage heights in feet as ordinates and discharges in second-feet as abscissas define rating curves which are more or less generally parabolic in form. In many cases curves of area in square feet and mean velocity in feet per second are also constructed to the same scale of ordinates as the discharge curve. These are used mainly to extend the discharge curves beyond the limits of the plotted discharge measurements, and for checking purposes to avoid errors in the form of the discharge curve and to determine and eliminate erroneous measurements.

For every published rating table the following assumptions are made for the period of application of the table: (*a*) That the discharge is a function of and increases gradually with the stage; (*b*) that the discharge is the same whenever the stream is at a given stage, and hence such changes in conditions of flow as may have occurred during the period of application are either compensating or negligible, except that the rating as stated in the footnote of each table is not applicable for known conditions of ice, log jams, or other similar obstructions; (*c*) that the increased and decreased discharge due to change of slope on rising and falling stages is either negligible or compensating.

As already stated, the gaging stations may be divided into several classes, as indicated in the following paragraphs:

The stations of class 1 represent the most favorable conditions for an accurate rating and are also the most economical to maintain. The bed of the stream is usually composed of rock and is not subject to the deposit of sediment and loose material. This class includes also many stations located in a pool below which is a permanent rocky riffle that controls the flow like a weir. Provided the control is sufficiently high and close to the gage to prevent cut and fill at the gaging point from materially affecting the slope of the water surface, the gage height will for all practical purposes be a true index of the discharge. Discharge measurements made at such stations usually plot within 2 or 3 per cent of the mean-discharge curve and the rating developed from that curve represents a very high degree of accuracy. For illustrative example of a station of this type see figure 1 and Water-Supply Paper 241.

Class 2 is confined mainly to stations on rough mountainous streams with steep slopes. The beds of such streams are as a rule comparatively permanent during low and medium stages and when the flow is sufficiently well defined by an adequate number of discharge

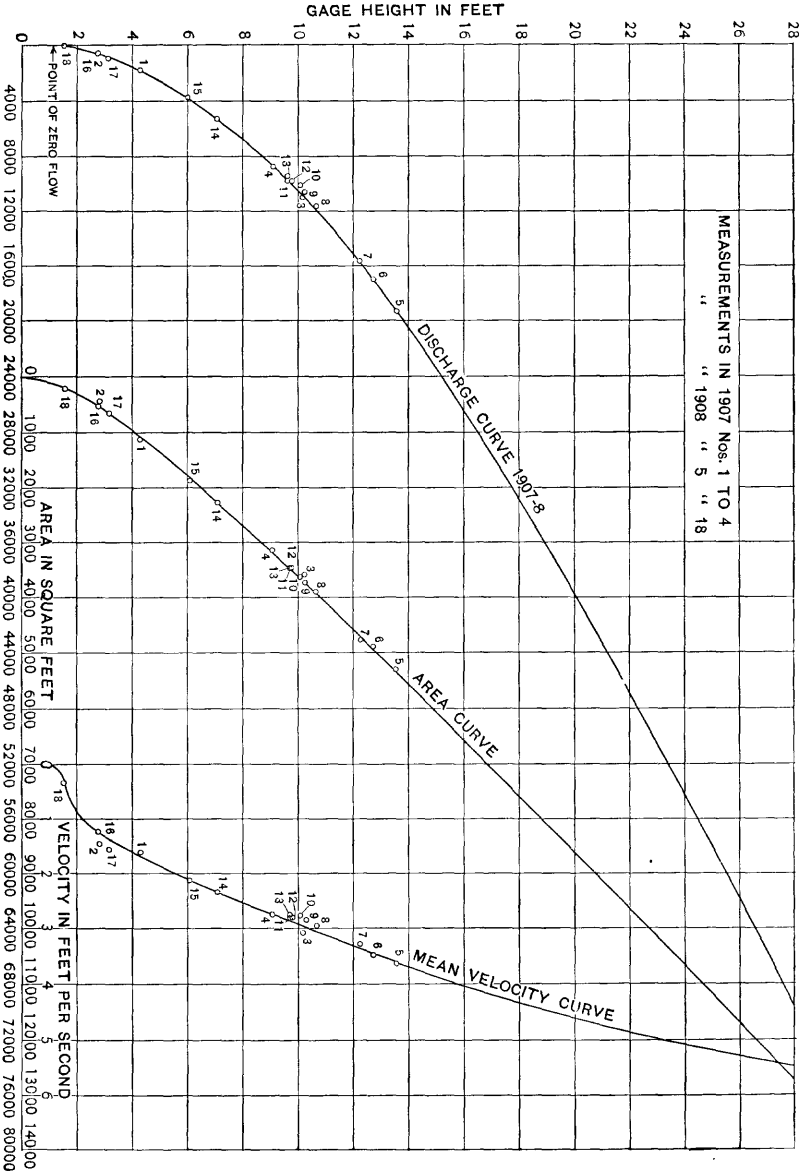


FIGURE 1.—Discharge, area, and mean velocity curves for Kiskiminetas River at Avonmore, Pa.

measurements before and after each flood the stations of this class give nearly as good results as those of class 1. As it is seldom possible to make measurements covering the time of change at flood stage, the assumption is often made that the curves before and after the flood converged to a common point at the highest gage height recorded during the flood. Hence the only uncertain period occurs during the few days of highest gage heights covering the period of actual change in conditions of flow. For illustrative examples of stations of this type see Water-Supply Paper 246.

Class 3 includes most of the current-meter gaging stations maintained by the United States Geological Survey. If sufficient measurements could be made at stations of this class results would be obtained nearly equaling those of class 1, but owing to the limited funds at the disposal of the Survey this is manifestly impossible, nor is it necessary for the uses to which discharge data are applied. The critical points are as a rule at relatively high or low stages. The percentage error, however, is greater at low stages. No absolute rule can be laid down for stations of this class. Each rating curve must be constructed mainly on the basis of the measurements of the current year, the engineer being guided largely by the past history of the station and the following general law: If all measurements ever made at a station of this class are plotted on cross-section paper, they will define a mean curve which may be called a standard curve. It has been found in practice that if after a change caused by high stage, a relatively constant condition of flow occurs at medium and low stages, all measurements made after the change will plot on a smooth curve which is practically parallel to the standard curve with respect to their ordinates or gage heights. This law of the parallelism of ratings is the fundamental basis of all ratings and estimates at stations with semipermanent and shifting channels. It is not absolutely correct but, with few exceptions, answers all the practical requirements of estimates made at low and medium stages after a change at a high stage. This law appears to hold equally true whether the change occurs at the measuring section or at some controlling point below. The change is of course fundamentally due to change in the channel caused by cut, or fill, or both, at and near the measuring section. For all except small streams the changes in section usually occur at the bottom. The following simple but typical examples illustrate this law:

(*a*) If 0.5 foot of planking were to be nailed on the bottom of a well-rated wooden flume of rectangular section there would result, other conditions of flow being equal, new curves of discharge, area, and velocity, each plotting 0.5 foot above the original curves when referred to the original gage. In other words, this condition would be analogous to a uniform fill or cut in a river channel which either

reduces or increases all three values of discharge, area, and velocity for any gage height. In practice, however, such ideal conditions rarely exist.

(*b*) In the case of a cut or fill at the measuring section there is a marked tendency toward decrease or increase, respectively, of the velocity. In other words, the velocity has a compensating effect and if the compensation is exact at all stages the discharge at a given stage will be the same under both the new and the old conditions.

(*c*) In the case of uniform change along the crest of a weir or rocky controlling point, the area curve will remain the same as before the change, and it can be shown that here again the change in velocity curve is such that it will produce a new discharge curve essentially parallel to the original discharge curve with respect to their ordinates.

Of course in actual practice such simple changes of section do not occur. The changes are complicated and lack uniformity, a cut at one place being largely offset by a fill at another and vice versa. If these changes are very radical and involve large percentages of the total area—as, for example, on small streams—there may result a wide departure from the law of parallelism of ratings. In complicated changes of section the corresponding changes in velocity which tend to produce a new parallel discharge curve may interfere with each other materially, causing eddies, boils, backwater, and radical changes in slope. In such extreme conditions, however, the measuring section would more properly fall under class 4 and would require very frequent measurements of discharge. Special stress is laid on the fact that in the lack of other data to the contrary the utilization of this law will yield the most probable results.

Slight changes at low or medium stages of an oscillating character are usually averaged by a mean curve drawn among them parallel to the standard curve, and if the individual measurements do not vary more than 5 per cent from the rating curve the results are considered good for stations of this class.

For illustrative example of a station of this type see Water-Supply Paper 242.

Class 4 comprises stations that have soft, muddy, or sandy beds. Good results can be obtained from such sections only by frequent discharge measurements, the frequency varying from a measurement every two or three weeks to a measurement every day, according to the rate of diurnal change in conditions of flow. These measurements are plotted and a mean or standard curve drawn among them. It is assumed that there is a different rating curve for every day of the year and that this rating is parallel to the standard curve with respect to their ordinates. On the day of a measurement the rating curve for that day passes through that

measurement. For days between successive measurements it is assumed that the rate of change is uniform, and hence the ratings for the intervening days are equally spaced between the ratings passing through the two measurements. This method must be modified or abandoned altogether under special conditions. Personal judgment and a knowledge of the conditions involved can alone dictate the course to pursue in such cases. For illustrative example of a station of this type, showing the Bolster method of determining the daily discharge graphically, see Water-Supply Papers 247 and 249.

The computations have, as a rule, been carried to three significant figures. Computation machines, Crelle's tables, and the 20-inch slide rule have been generally used. All computations are carefully checked.

After the computations have been completed they are entered in tables and carefully studied and intercompared to eliminate or account for all gross errors so far as possible. Missing periods are filled in, so far as feasible, by means of comparison with adjacent streams. The attempt is made to complete years or periods of discharge, thus eliminating fragmentary and disjointed records. Full notes accompanying such estimates follow the monthly discharge tables.

For most of the northern stations estimates have been made of the monthly discharge during frozen periods. These are based on measurements under ice conditions wherever available, daily records of temperature and precipitation obtained from the United States Weather Bureau climate and crop reports, observers' notes of conditions, and a careful and thorough intercomparison of results with adjacent streams. Although every care possible is used in making these estimates they are often very rough, the data for some of them being so poor that the estimates are liable to as much as 25 to 50 per cent error. It is believed, however, that estimates of this character are better than none at all, and serve the purpose of indicating in a relative way the proportionate amount of flow during the frozen period. These estimates are, as a rule, included in the annual discharge. The large error of the individual months has a relatively small effect on the annual total, and it is for many purposes desirable to have the yearly discharge computed even though some error is involved in doing so.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are largely compensating, the mean rating curve, when well defined, is

much more accurate than the individual measurements. Numerous tests and experiments have been made to test the accuracy of current-meter work. These show that it compares very favorably with the results from standard weirs, and, owing to simplicity of methods, usually gives results that are much more reliable than those from stations at dams, where uncertainty regarding the coefficient and complicated conditions of flow prevail.

The work is, of course, dependent on the reliability of the observers. With relatively few exceptions, the observers perform their work honestly. Care is taken, however, to watch them closely and to inquire into any discrepancies. It is, of course, obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in a period of one month, although a single day's reading may, when taken by itself, be considerably in error.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the rating tables and an accuracy column is inserted in the monthly discharge table. In the rating tables "well defined" indicates in general that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

USE OF THE DATA.

In general the policy is followed of making available for the public the base data which are collected in the field each year by the Survey engineers. This is done to comply with the law, but also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to year nearly always throw new light on data already collected and

published, and hence allow more or less improvement in the computed results of earlier years. It is therefore expected that the engineer who makes serious use of the data given in these papers will verify all ratings and make such adjustments in earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for five or ten year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The values in the table of monthly discharge are so arranged as 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. This is particularly true of the maximum and minimum figures, which in the very nature of the method of collecting these data are liable to large errors. The maximum value should be increased considerably for many stations in considering designs for spillways, and the minimum value should be considered for a group of, say, seven days and not for one day.

The rating table, provided the engineer accepts it, is published primarily to allow him to apply it directly to the daily gage heights and rearrange the daily discharges in order of magnitude or by some other method.

COOPERATION AND ACKNOWLEDGMENTS.

Assistance has been rendered and records furnished by the following persons to whom special acknowledgment is due: Members of the United States Corps of Engineers; United States Weather Bureau; the Water Supply Commission of Pennsylvania; the North Carolina Geological Survey; the Geological Survey of Alabama; and to Dr. C. A. Schenck. The State of Illinois has paid for the stream gaging work performed in that State, the appropriation therefor being in charge of the Internal Improvement Commission, Isham Randolph, chairman.

DIVISION OF WORK.

The field data for Allegheny River at Redhouse, N. Y., have been collected under the direction of H. K. Barrows, district engineer, assisted by C. C. Covert, and C. R. Adams.

The field data for the Ohio River drainage basin, with the exception of Allegheny River at Redhouse, N. Y., and the Tennessee River drainage basin, have been collected under the direction of J. C. Hoyt, engineer, and A. H. Horton, district engineer, assisted by Robert Follansbee, R. H. Bolster, F. F. Henshaw, W. G. Hoyt, William O'Neill, Max Chapman, R. G. Knight, A. T. Barrows, H. D. Padgett, C. E. Langley, and R. J. Taylor. Stations in Pennsylvania are now maintained and the stream-flow data collected by the Water Supply Commission of Pennsylvania.

The field data in the Tennessee River drainage basin have been collected under the direction of M. R. Hall, district engineer, assisted by Warren E. Hall, W. A. Lamb, F. P. Thomas, O. P. Hall, B. M. Hall, jr., and F. A. Murray.

The ratings, special estimates, and studies of the completed data were made by M. R. Hall, A. H. Horton, R. H. Bolster, and F. F. Henshaw. The computations and preparation of the completed data for publication were made under the direction of R. H. Bolster, assistant engineer, assisted by F. F. Henshaw, G. C. Stevens, H. D. Padgett, G. L. Parker, J. G. Mathers, and M. I. Walters. The report has been edited by Mrs. B. D. Wood.

OHIO RIVER DRAINAGE BASIN.

GENERAL DESCRIPTION.

The drainage basin of Ohio River lies in the central part of the eastern half of the United States. The river is formed by the junction of Allegheny and Monongahela rivers at Pittsburg, Pa. From there it flows in a general southwesterly direction and joins the Mississippi at Cairo, Ill. The principal tributaries, beginning at the sources and following down the right or northern bank, are as follows: Allegheny, Beaver, Muskingum, Scioto, Miami, and Wabash rivers. On the left bank are Monongahela, Little Kanawha, Kanawha, Guyandotte, Big Sandy, Licking, Kentucky, Green, Cumberland (Pl. III), and Tennessee rivers. The total length of the river is 967 miles; the total drainage area is about 210,000 square miles.

The drainage basin of Ohio River comprises greater or less areas in the following States: New York, Pennsylvania, Maryland, West Virginia, Virginia, North Carolina, Georgia, Alabama, Tennessee, Kentucky, Ohio, Indiana, and Illinois. The northern boundaries are about 40 miles south of Buffalo, N. Y., the southern boundaries are within 300 miles of the Gulf of Mexico, and its eastern boundaries are about 225 miles from the Atlantic Ocean. The sources of the tributaries from the north lie in the glaciated area; the sources of the southern tributaries are located on the steep and rocky slopes of the western side of the Appalachian Mountains.

The topography varies from flat and rolling in the western and northern portions to rough and mountainous in the southern and eastern sections. 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. 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, and for a similar widening in the southwestern portion of Indiana. 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 it has a width of perhaps 4 miles, but below the mouth of Salt River it narrows abruptly to a width of about 1 mile, and remains narrow for nearly 100 miles. Beyond this narrow stretch it broadens out to a width of 6 or 8 miles, which it maintains for much of its course to Cairo, the only exception being found at the point where it passes the elevated ridge below Shawneetown. Here 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 in depth. The broad portions at Louisville and in the lower parts of its course are but 100 to 150 feet in depth. The work done

CUMBERLAND RIVER FALLS, WHITLEY COUNTY, KY., IN 1896.

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 Ohio 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 geologically recent union of the several independent drainage systems.

Between Pittsburg and Wheeling the bed of the river is coarse gravel and bowlders and in places rock. Below Wheeling the gravel becomes finer, the bowlders fewer, and bars of river sand appear. Below the mouth of the Kanawha the river becomes more distinctly a river with sand in bed, although there are some gravel bars above Louisville.

The average width between banks does not increase materially from Pittsburg to Cincinnati. In the long pool above the falls of the Ohio at Louisville the average width is much greater than that above Cincinnati, while just below the falls there is a considerable narrowing. Below this the average width continues to increase toward the mouth of the river. The maximum width between banks is found about 20 miles above the mouth, where the width is considerably over a mile. There are many islands in the river, over 50 above Louisville and about 30 below, varying in size from a few acres to 5,000 acres. Many of them are cultivated and all are practically permanent in position.

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. The elevation of normal low water at Davis Island dam at Pittsburg, Pa., is 692 feet, low water elevation at Cairo is 273 feet, a total fall of 419 feet or an average fall of about 0.43 feet to the mile.

The northern and western portions of the drainage basin is a deforested area; the southern and eastern portions may be called partially forested, as large areas in the Appalachian Mountains at the sources of some of the southern tributaries are still covered with a heavy growth of trees; as the tributaries are descended the cleared areas increase until the forested area is small.

The mean annual rainfall is about 45 inches, ranging from 35 inches along the northern boundary of the basin to 70 inches in the southeastern part at the sources of Tennessee River. The winter conditions in general are mild; ice does not form very thick—on some tributaries hardly at all; the snowfall is light and does not last long. The headwaters of the Allegheny are an exception to these general conditions, for in that section the winter conditions are severe.

This drainage basin affords numerous sites for reservoirs, especially on the southern tributaries. From topographic maps covering part of the drainage basin of the Ohio River a large number of favorable reservoir sites were located, the capacity of some of which is enormous. Careful surveys would undoubtedly show many suitable sites for dams that would impound large reservoirs above them.

There are a great many opportunities for water-power development in this drainage basin. At the present time large developments are under way on some of the southern tributaries. At the dams on the Ohio constructed for the aid of navigation there is available a large amount of power that might be utilized, and if the Ohio should be completely canalized nearly all the total fall of the river would be available for water-power development except at high stages. The abundance of cheap fuel in those sections where power is most in demand has worked against the development of water power, but as

the supplies of coal and gas diminish attention will be directed to the development of the large amount of water power available in this basin.

Ohio River is the main tributary of the Mississippi as far as the flow of the river is concerned. The mean annual flow is about 300,000 cubic feet per second, which is much more than the discharge of St. Lawrence River at Ogdensburg, N. Y., although the drainage area of the St. Lawrence is nearly twice that of the Ohio. The maximum flow of the Ohio is in the neighborhood of 1,500,000 cubic feet per second, being about 30 times the low-water flow. A comparison of this river with the upper Mississippi and Missouri shows that although its drainage area is one-third that of the combined Mississippi and Missouri the mean and low water flow is 1.3 times as great as their combined flow, and its maximum flow is 1.5 times as great. This is accounted for by the greater rainfall and by the character of the drainage basin of the Ohio.

Navigation in the Ohio is stopped not only by low stages of the river, but also occasionally by ice, averaging ten to twelve days per year. The losses of steamboats, barges, and flatboats due to ice are at times very great. Sometimes the ice forms and passes off without occasioning serious loss; sometimes there may be more than one serious break-up during the same winter.

The United States Weather Bureau and the U. S. Engineer Corps have maintained a number of gages on Ohio River at various places. Measurements have been made by the engineers of the United States Geological Survey on Ohio River at Wheeling, W. Va.

ALLEGHENY RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Allegheny River, which unites with Monongahela River at Pittsburg to form the Ohio, drains the western slopes of the Allegheny Mountains. The Allegheny is the larger stream, as its drainage area is nearly 50 per cent greater than that of the Monongahela.

The drainage basin of the Allegheny lies in the States of Pennsylvania and New York. The river rises in the central part of Potter County, in the northern part of Pennsylvania, flows in a general northwesterly direction across the state line into New York to about the central part of Cattaraugus County; thence it flows southwestward back into Pennsylvania. At Franklin, in Venango County, the river turns and flows southeastward to the mouth of Mahoning Creek, in Armstrong County; thence it turns to the southwest, and at Pittsburg joins Ohio River. The important tributaries, beginning at the source and following down the right bank, are as follows: Oswayo, Olean, Conewango, Brokenstraw, Oil, and French creeks; on the left

bank are: Potato, Tunugwant, and Tionesta creeks, Clarion River, Red Bank, Mahoning, and Crooked creeks, and Kiskiminetas River. The total length of the river is about 290 miles (map measurement); the total drainage area is about 11,100 square miles.

The drainage basin is somewhat regular in shape, being about 2½ times as long as it is wide. Below Franklin, Pa., the river flows near the western boundary of its basin. The surrounding country is extremely rough and broken, being made up of high hills or mountains separated by deep valleys. As the limits of the basin to the west of the main river are approached the mountainous character is lost, though the surface is still rolling and hilly. The northwestern boundary of the basin is about 8 miles from Lake Erie at one point, lying within about 40 miles of Buffalo.

The bed of the stream is composed chiefly of gravel, varying from small pebbles to cobblestones. The banks are composed of sand, gravel, or clay. The drainage area is underlain by shales, and the depth of the soil is, except in stream valleys, small. This basin is exceptionally rich in natural resources, there being abundant supplies of coal, oil, gas, limestone, glass sand, and building stones. Pittsburg is at the center of a great manufacturing and shipping district.

The elevation of the sources of the river is about 2,500 feet; at Olean, N. Y., the elevation is 1,420 feet; at Franklin, Pa., the elevation is 960 feet; at Pittsburg, the elevation is 707 feet.

This basin was at one time covered with timber, the principal varieties being pine and hemlock. At the present time, however, only light forests and brush are found at the headwaters of the tributaries, the pine and hemlock having been cut off some time ago, and the basin would probably be considered a deforested area.

The mean annual rainfall is about 40 inches. The winter conditions are severe. Snowfall is heavy in the upper part of the basin and lasts for long periods, and ice forms about 2 feet in thickness. The heavy ice during the spring floods is very destructive. Jams frequently occur which cause considerable damage from backwater.

The basin affords good opportunities for storage reservoirs. Careful surveys would undoubtedly show a number of excellent sites for reserviors of large capacity.

The fall of the main stream and tributaries is above the average, and if it were situated in a district where fuels were more expensive the stream would undoubtedly be largely used for power. When the price of coal advances so that water power may compete with steam, the water power on this stream will be more extensively developed.

The Cuba reservoir, which feeds the Erie Canal through Genesee River, lies on the divide between the Allegheny and Genesee drainage basins. Part of the overflow from this reservoir passes into the Allegheny, the rest passes into Genesee River. Allegheny River is

subject to very severe floods, which cause heavy losses to manufacturing and other interests along the river. The river is navigable for part of the year for small steamers to Franklin, 123 miles above the mouth.

The following gaging stations have been maintained in this drainage basin:

Allegheny River at Redhouse, N. Y., 1903–1908.
Allegheny River at Kittanning, Pa., 1904–1908.
Chautauqua Lake outlet near Jamestown, N. Y., 1895.
Chadakoin River near Jamestown, N. Y., 1904–1905.
Kiskiminetas River at Avonmore, Pa., 1907–1908.
Kiskiminetas River at Salina, Pa., 1904–1906.
Blacklick Creek at Blacklick, Pa., 1904–1908.

ALLEGHENY RIVER AT REDHOUSE, N. Y.

This station, which is located at the Redhouse highway bridge, near the stations of the Erie and Pennsylvania railroads and about 5 miles below Salamanca, N. Y., and nearly 13 miles above the point where the river leaves New York State, was established September 4, 1903, to obtain general statistical data regarding the flow of the Allegheny, and is maintained in cooperation with the New York state engineer's department.

At Olean, N. Y., the wasteway from the Cuba reservoir enters the stream through Olean Creek. This reservoir is located on the divide between Oil Creek, tributary to Allegheny River, and Genesee River. The storage is commonly turned into Genesee River through the abandoned summit level of Genesee Valley Canal, but may be diverted into Oil Creek through the guard lock at the head of the canal. There are no lakes and no artificial storage tributary to the stream above the gaging station. Conewango Creek, the outlet of Chautauqua Lake, is tributary to the Allegheny and enters the stream in the State of Pennsylvania.

The datum of the gage has remained the same during the maintenance of the station. Conditions for obtaining the accurate discharge are good, and an excellent rating curve has been developed. Moderate ice conditions usually prevail during the winter months.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Allegheny River at Redhouse, N. Y., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907. Mar. 16	C. C. Covert	366	2,390	7.00	8,970
1908. Oct. 20	C. R. Adams	355	840	2.70	145

Daily gage height, in feet, of Allegheny River at Redhouse, N. Y., for 1907 and 1908.

[Observers, R. W. Crain and Ora A. Gates.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	4.25	.....	6.4	5.8	4.4	5.5	3.2	2.7	3.2	3.6	3.8
2	.....	4.2	3.5	5.7	5.6	5.15	5.5	3.2	2.7	3.1	3.6	3.8
3	.....	4.2	.....	5.3	5.2	6.1	5.3	3.2	2.8	3.0	3.5	3.7
4	.....	4.25	.....	5.0	6.1	5.5	5.0	3.2	2.8	5.0	5.2	3.6
5	.....	4.25	.....	5.0	6.5	5.4	4.5	3.1	2.9	4.5	5.0	3.5
6	.....	3.9	.....	4.8	5.8	6.6	4.3	3.0	2.8	3.9	4.7	3.4
7	.....	4.0	.....	4.6	5.4	6.3	4.2	3.0	2.8	4.9	4.5	3.4
8	.....	4.1	.....	4.5	6.2	5.5	4.1	3.0	2.9	5.5	5.4	3.3
9	.....	3.85	3.2	4.6	6.0	5.1	3.9	3.0	2.8	5.0	5.3	3.5
10	.....	3.75	3.2	4.5	5.6	4.8	3.8	3.0	2.8	5.2	4.8	3.7
11	.....	.....	3.3	4.5	5.3	4.6	3.6	2.9	3.0	5.2	4.7	5.0
12	.....	.....	3.3	4.5	5.1	4.4	5.95	2.9	3.3	4.9	4.5	5.6
13	.....	.....	3.7	4.6	4.9	4.2	5.6	2.9	3.2	4.8	4.3	5.4
14	.....	.....	5.55	4.6	4.6	4.2	4.5	2.9	3.1	4.7	4.2	5.3
15	.....	.....	7.1	4.5	4.4	4.2	4.1	2.8	3.0	4.5	3.9	5.2
16	.....	3.6	7.15	4.4	4.6	3.9	3.9	2.8	2.9	4.5	3.8	4.8
17	5.1	.....	7.55	4.4	4.7	3.8	3.8	2.8	2.9	4.8	3.8	4.7
18	4.95	.....	7.8	4.3	4.6	3.7	3.8	2.8	2.9	4.7	3.7	4.3
19	5.3	.....	7.6	4.2	4.6	3.7	3.6	2.8	3.0	4.5	3.8	4.2
20	7.1	.....	7.9	4.2	5.5	3.7	3.5	2.8	3.0	4.4	3.7	4.2
21	6.9	.....	7.5	4.1	5.6	3.7	3.4	2.9	3.1	5.0	3.7	4.0
22	6.15	.....	7.1	4.0	5.3	3.7	3.4	2.8	3.0	4.9	3.6	4.5
23	5.8	3.2	7.7	3.9	5.0	4.4	3.3	2.8	3.0	4.7	3.7	5.6
24	5.25	.....	7.7	6.85	4.7	5.1	3.3	2.8	3.0	4.3	3.7	5.5
25	5.2	.....	7.4	7.3	4.5	5.0	3.3	2.8	3.0	4.0	3.6	5.0
26	5.1	.....	7.1	7.4	4.4	5.0	3.3	2.8	2.9	3.8	3.5	4.8
27	4.95	.....	7.5	7.7	5.6	4.6	3.5	2.8	2.9	3.6	3.6	5.6
28	4.55	.....	8.35	7.1	5.9	4.3	3.4	2.8	2.9	4.0	3.7	7.9
29	4.5	.....	7.95	6.6	5.3	4.1	3.2	2.7	3.5	3.8	3.8	7.5
30	4.4	.....	7.35	6.2	4.9	4.2	3.2	2.7	3.4	3.8	4.0	7.2
31	4.2	.....	6.8	.....	4.6	.....	3.1	2.7	.....	3.7	.....	6.8
1908.												
1	6.4	4.0	5.3	8.0	5.1	6.2	3.7	3.5	3.0	2.7	2.7	2.7
2	6.1	.....	5.4	7.6	6.0	6.0	3.6	3.5	3.0	2.8	2.7	2.7
3	5.9	.....	5.6	7.4	6.5	5.5	3.6	3.5	2.9	2.8	2.7	2.7
4	5.7	.....	6.4	7.0	6.5	5.1	4.8	3.5	2.9	2.8	2.7	.....
5	5.4	.....	6.3	6.8	6.3	4.8	4.0	3.4	2.9	2.7	2.8	2.7
6	5.1	.....	6.3	6.5	6.4	4.6	3.8	3.4	2.9	2.7	2.8	.....
7	4.8	.....	6.2	6.3	7.2	4.5	3.7	3.4	2.8	2.7	2.8	.....
8	4.6	4.2	6.2	6.4	8.1	4.4	3.6	3.4	2.8	2.7	2.7	.....
9	4.5	.....	6.0	6.4	7.9	4.2	3.4	3.4	2.8	2.7	2.7	.....
10	4.5	.....	5.8	6.3	7.6	4.0	3.3	3.3	2.8	2.7	2.7	.....
11	4.4	.....	5.4	6.3	7.0	3.9	3.2	3.3	2.7	2.7	2.8	.....
12	5.0	.....	5.8	6.2	6.4	3.8	3.2	3.3	2.7	2.7	2.8	2.7
13	6.3	.....	6.2	5.0	6.0	3.6	3.1	3.3	2.7	2.7	2.8	.....
14	5.7	.....	6.3	4.9	5.6	3.5	3.1	3.3	2.7	2.7	2.9	.....
15	5.3	10.2	7.8	4.9	5.8	5.65	3.0	3.2	2.7	2.7	2.8	.....
16	5.0	10.8	11.2	5.1	6.4	5.5	3.0	3.2	2.7	2.7	2.8	.....
17	4.9	9.1	10.0	4.9	6.6	4.5	3.0	4.1	2.7	2.7	2.9	.....
18	4.8	8.9	8.9	4.9	6.4	3.8	3.1	4.3	2.7	2.7	2.9	.....
19	4.7	8.3	8.5	5.3	6.2	3.7	3.1	3.9	2.7	2.7	3.0	3.7
20	4.6	7.8	9.5	7.3	6.0	3.6	3.0	3.4	2.7	2.7	3.0	.....
21	4.6	7.4	8.5	6.4	6.0	3.5	3.5	3.3	2.7	2.7	3.0	.....
22	4.5	7.0	8.0	6.0	5.6	3.5	3.8	3.3	2.7	2.7	3.0	.....
23	4.5	6.6	7.4	5.9	5.4	3.8	4.0	3.3	2.7	2.7	2.9	.....
24	4.4	6.2	6.9	5.8	5.1	6.25	4.8	3.2	2.7	2.7	2.9	.....
25	4.3	5.9	6.5	5.7	5.0	5.6	5.0	3.2	2.7	2.7	2.9	.....
26	.....	5.7	7.2	5.5	5.2	4.5	5.7	3.2	2.7	2.7	2.9	3.4
27	.....	5.6	7.5	5.3	5.6	4.0	5.0	3.1	2.7	2.7	2.8	3.6
28	.....	5.4	8.6	5.2	5.6	3.8	4.5	3.1	2.7	2.7	2.8	3.7
29	.....	5.4	8.6	5.1	6.0	3.7	4.1	3.1	2.7	2.7	2.8	3.7
30	.....	.....	9.0	5.0	6.0	3.7	3.8	3.0	2.7	2.7	2.8	3.6
31	.....	.....	8.6	.....	6.2	.....	3.6	3.0	.....	2.7	.....	3.8

NOTE.—Ice conditions prevailed from about February 11 to March 13, 1907, and January 26 to February 14 and December 4 to 26, 1908.

Rating table for Allegheny River at Redhouse, N. Y., for 1907 and 1908.

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	145	4.00	1,471	5.30	3,820	7.20	9,400
2.80	220	4.10	1,605	5.40	4,065	7.40	10,080
2.90	295	4.20	1,745	5.50	4,315	7.60	10,790
3.00	380	4.30	1,891	5.60	4,570	7.80	11,530
3.10	470	4.40	2,043	5.70	4,830	8.00	12,300
3.20	560	4.50	2,200	5.80	5,100	8.20	13,120
3.30	655	4.60	2,365	5.90	5,375	8.40	13,960
3.40	755	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	10.00	21,100
3.80	1,216	5.10	3,350	6.80	8,090	11.00	26,200
3.90	1,341	5.20	3,580	7.00	8,740	12.00	31,800

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1903 to 1908 and is well defined.

Monthly discharge of Allegheny River at Redhouse, N. Y., for 1907 and 1908.

[Drainage area, 1,640 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	.....	1,740	5,630	3.43	3.95	B.
February	1,820	a 400	1,000	.610	.64	C.
March	13,800	a 450	6,100	3.72	4.29	A.
April	11,200	1,340	4,030	2.46	2.74	A.
May	7,150	2,040	3,800	2.32	2.68	A.
June	7,460	1,100	2,700	1.65	1.84	A.
July	5,520	470	1,720	1.05	1.21	A.
August	560	145	303	.185	.21	A
September	866	145	360	.220	.25	A.
October	4,320	380	2,160	1.32	1.52	A.
November	4,060	866	1,710	1.04	1.16	A.
December	11,900	655	3,290	2.01	2.32	A.
The year	13,800	145	2,730	1.67	22.81	
1908.						
January	6,840	a 1,100	3,000	1.83	2.11	A.
February	25,100	a 500	5,890	3.59	3.87	B.
March	27,300	3,820	10,300	6.28	7.24	A.
April	12,300	2,920	5,820	3.55	3.96	A.
May	12,700	3,130	6,340	3.87	4.46	A.
June	6,240	866	2,400	1.46	1.63	A.
July	4,830	380	1,290	.787	.91	A.
August	1,890	380	743	.453	.52	A.
September	380	145	191	.116	.13	A.
October	220	145	152	.093	.11	A.
November	380	145	241	.147	.16	A.
December	1,220	a 100	357	.218	.25	C.
The year	27,300	a 100	3,060	1.87	25.35	

a Ice conditions; only roughly approximate.

NOTE.—Discharge during the frozen period 1907 based on discharge of Allegheny River at Kittanning, Pa., drainages in the Susquehanna River basin, and climatological reports. Discharge January 1–16, 1907, based on discharge of Allegheny River at Kittanning, Pa., and Susquehanna River at Binghamton, N. Y.

Discharge January 1–16, 1907, 7,100 second-feet; February 11–28, 1907, 681 second-feet; March 1–13, 1907, 477 second-feet.

Discharge during the frozen periods 1908 estimated on the basis of the discharge of Allegheny River at Kittanning Pa., Susquehanna River drainages and climatological reports.

Discharge January 26–31, 1908, 1,400 second-feet; February 1–14, 1908, 729 second-feet; December 4–26, 1908, 228 second-feet.

ALLEGHENY RIVER AT KITTANNING, PA.

This station was established by the United States Geological Survey August 18, 1904, at the Market Street Bridge in the city of Kittanning, Pa. It is now maintained by the Water Supply Commission of Pennsylvania, who furnish the records of gage heights and discharge measurements. It was established to obtain general comparative and statistical data regarding the flow of Allegheny River for the study of flood prevention at Pittsburg and on Ohio River, also for the determination of the regimen of flow for power and navigation projects and for the prevention of pollution.

There are no important tributaries in the immediate vicinity of Kittanning. Crooked River enters Allegheny River from the east 4 miles below and Kiskiminetas River enters from the east over 12 miles below the station.

The datum of the gage has remained constant since the installation of the station. There is obstruction from ice during short periods each winter. Conditions of flow are practically constant and an excellent low and medium stage rating curve has been developed. At high stages numerous measurements have been made. There is, however, a marked difference between the discharge at a given high gage height for rising and falling stage due to increase and decrease of slope. The difference in some cases amounts to as much as 15 per cent, and since the variation differs for each flood it is difficult to determine the daily discharge at high stages with accuracy.

Discharge measurements of Allegheny River at Kittanning, Pa., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec. ft.*
May 30	A. H. Horton	861	7,270	8.00	25,300
September 11[a]	do	648	3,320	3.24	4,150
1908.					
August 23	R. H. Bolster	613	2,710	2.67	2,690
September 25	C. E. Ryder	466	1,710	1.37	847

[a] Surface measurement.

Daily gage height, in feet, of Allegheny River at Kittanning, Pa., for 1907 and 1908.

[Observer, S. B. Cochrane.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907. [a]												
1	8.4	5.1	4.2	9.4	8.0	5.9	4.7	2.8	1.7	3.2	5.2	4.1
2	10.5	5.2	4.6	8.3	7.5	6.0	6.9	2.8	1.9	3.2	4.9	4.8
3	9.6	5.4	5.8	7.6	7.2	7.5	7.0	4.6	2.4	3.2	6.1	4.6
4	9.5	5.6	6.0	6.9	7.8	8.3	6.3	4.0	2.0	4.2	9.8	4.1
5	12.9	5.0	6.1	6.7	8.5	7.9	5.6	2.4	2.2	7.35	9.3	4.2
6	12.4	5.1	6.8	6.7	9.0	8.8	5.2	3.2	2.0	6.6	9.3	4.0
7	11.2	4.8	5.6	6.6	8.7	9.9	4.6	2.8	1.9	6.7	8.9	3.9
8	10.9	4.5	5.2	6.4	8.0	9.3	4.4	2.7	1.8	6.8	8.2	3.7
9	13.7	4.3	4.8	6.2	8.6	8.0	4.0	2.6	2.0	5.8	8.6	4.6
10	12.8	4.4	4.7	6.3	8.1	6.9	3.8	2.4	2.0	6.9	8.4	5.2
11	11.3	4.7	4.6	6.1	7.3	6.3	3.7	2.3	3.0	6.9	8.3	6.0
12	10.3	4.5	4.7	5.9	6.8	7.0	3.7	2.3	4.0	5.5	8.1	7.1
13	10.0	4.8	8.6	5.9	6.3	6.4	3.8	2.0	3.8	5.0	7.8	8.0
14	9.7	4.3	14.0	5.6	6.2	7.9	6.0	2.1	3.5	5.6	7.6	6.6
15	10.9	4.2	15.9	6.2	5.6	7.5	5.3	1.8	2.9	6.2	7.5	6.4
16	10.1	5.0	14.2	5.9	5.9	6.6	4.5	1.8	2.7	5.9	7.4	6.1
17	9.2	4.5	13.0	5.7	7.3	5.8	3.9	2.0	2.7	5.3	7.0	6.1
18	8.1	4.6	13.1	5.6	7.2	5.3	4.4	1.8	3.3	4.7	6.6	6.0
19	9.4	4.6	12.7	5.5	6.6	4.8	4.3	1.9	3.9	4.2	6.2	5.9
20	13.5	5.1	13.8	5.3	6.4	4.6	3.9	1.8	3.6	3.9	5.8	5.8
21	13.6	5.5	13.3	5.2	7.2	4.5	3.5	1.7	3.5	3.6	5.4	4.5
22	12.7	5.5	11.8	5.0	6.8	4.6	3.0	1.7	3.6	3.7	5.1	4.7
23	10.3	5.6	10.6	4.8	6.3	4.8	3.0	1.8	3.4	3.8	4.7	5.7
24	8.1	5.0	10.8	6.2	5.9	4.6	3.0	1.8	3.1	3.7	4.5	15.0
25	7.0	4.6	10.3	9.5	5.6	5.0	3.2	1.7	2.8	3.7	4.4	15.3
26	6.5	4.0	9.4	9.9	5.4	5.6	3.1	1.9	2.5	3.5	4.4	13.2
27	6.7	4.4	10.4	12.0	5.9	5.4	4.2	1.9	2.3	3.4	4.1	11.6
28	5.9	4.2	12.8	10.9	10.0	5.3	3.7	1.8	2.3	4.4	4.3	10.2
29	5.6	.....	13.5	9.6	9.1	4.8	3.4	1.5	2.8	5.9	4.5	11.4
30	5.6	.....	12.5	8.5	7.7	4.6	3.3	1.8	3.3	6.4	4.9	11.2
31	5.3	.....	10.8	.....	6.6	.....	3.0	1.6	.....	5.9	.....	11.1
1908. [b]												
1	10.4	6.9	5.4	10.9	7.4	8.3	3.7	3.5	1.77	1.57	1.57	1.77
2	9.8	8.2	12.5	9.0	8.4	7.9	3.6	3.2	1.67	1.67	1.57	1.77
3	8.4	8.2	14.7	8.6	10.2	7.1	3.9	3.0	1.57	1.67	1.57	1.87
4	7.6	8.2	12.1	8.2	10.8	6.6	3.7	3.0	1.57	1.67	1.47	1.87
5	7.1	8.2	11.4	7.8	11.0	6.0	6.9	2.8	1.47	1.57	1.47	1.87
6	6.8	8.3	12.9	7.3	11.0	5.3	5.0	2.6	1.37	1.57	1.37	1.87
7	6.2	8.3	16.4	7.6	11.2	5.2	4.5	3.0	1.47	1.57	1.37	1.87
8	5.3	8.2	14.9	8.6	13.1	5.0	4.2	3.3	1.57	1.47	1.37	1.87
9	5.3	8.1	13.5	9.6	12.6	4.9	3.8	3.3	1.67	1.47	1.47	1.87
10	5.2	8.0	11.8	10.2	11.0	5.2	3.3	3.3	1.77	1.47	1.47	1.87
11	4.1	8.0	9.8	9.6	10.3	4.8	3.4	3.3	1.67	1.47	1.57	2.0
12	6.3	.....	10.4	8.5	9.3	4.8	3.6	3.0	1.67	1.47	1.57	2.0
13	7.2	.....	12.9	8.2	8.8	4.6	3.6	2.9	1.57	1.47	1.67	2.0
14	10.9	11.0	14.5	8.0	7.9	4.6	3.5	2.6	1.57	1.47	1.77	2.1
15	9.6	18.9	15.4	8.1	7.1	4.4	3.7	2.2	1.47	1.37	1.67	2.1
16	8.5	24.3	16.8	8.4	8.5	4.2	3.7	2.1	1.47	1.47	1.57	2.2
17	7.5	18.7	16.5	8.2	12.1	4.2	4.6	2.0	1.47	1.47	1.67	2.4
18	6.8	15.4	16.9	8.0	10.6	4.0	5.2	2.0	1.47	1.47	1.67	4.9
19	6.4	12.8	18.7	8.6	10.6	3.8	5.3	2.3	1.47	1.47	1.67	6.4
20	6.0	10.9	17.6	9.9	12.1	3.6	5.4	2.6	1.37	1.47	1.67	6.5
21	5.8	9.8	13.9	10.4	11.2	3.4	5.2	2.7	1.37	1.37	1.77	5.0
22	5.6	8.3	11.2	9.1	10.1	3.5	4.9	3.1	1.37	1.37	1.77	4.1
23	6.0	7.5	10.4	8.5	9.6	3.8	6.8	2.7	1.37	1.37	1.77	3.6
24	6.3	6.7	9.3	8.0	8.3	4.2	8.1	2.3	1.37	1.37	1.87	3.2
25	6.1	6.3	9.1	7.8	7.6	4.8	7.9	2.2	1.37	1.37	1.87	3.8
26	5.8	6.5	8.8	7.1	7.3	5.2	6.1	2.2	1.37	1.47	1.87	4.1
27	5.6	6.3	8.6	6.6	7.1	4.9	5.5	2.0	1.37	1.47	1.97	4.0
28	7.7	5.8	9.5	6.4	10.2	4.6	5.0	2.0	1.37	1.47	1.97	3.9
29	6.8	5.2	10.9	6.9	8.7	4.2	4.8	1.87	1.47	1.47	1.87	4.1
30	5.9	.....	10.9	7.6	9.1	3.9	4.4	1.77	1.57	1.47	1.77	4.3
31	5.1	.....	10.8	.....	8.7	.....	3.9	1.77	.....	1.57	.....	4.7

[a] There may have been slight effect from ice conditions January 25 to March 12, 1907. All slight rises in stage during this period can, however, be readily explained from the precipitation and temperature records. December, 1907, open.

[b] Floating ice January 6–18 and 24–28, 1908, and February, 15, 1908. Ice conditions February 1 and 2 and river frozen February 3–14, 1908. Ice moved February 14, 1908. River clear February 16, 1908. December, 1908, probably not affected by ice. All rises in stage during this month can be explained from precipitation and temperature records.

Rating table for Allegheny River at Kittanning, Pa., for 1907 and 1908.

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	880	3.20	3,860	4.90	9,165	9.00	29,030
1.50	980	3.30	4,110	5.00	9,545	10.00	34,730
1.60	1,080	3.40	4,370	5.20	10,320	11.00	40.700
1.70	1,190	3.50	4,640	5.40	11,130	12.00	47,150
1.80	1,310	3.60	4.920	5.60	11,970	13.00	54,280
1.90	1,440	3.70	5,210	5.80	12,830	14.00	62,110
2.00	1,580	3.80	5,500	6.00	13,720	15.00	70.410
2.10	1.720	3.90	5,800	6.20	14,620	16.00	79,220
2.20	1,870	4.00	6.105	6.40	15,540	17.00	88.620
2.30	2,030	4.10	6,415	6.60	16,470	18.00	98,620
2.40	2,200	4.20	6,735	6.80	17,430	19.00	109,150
2.50	2,380	4.30	7,065	7.00	18,410	20.00	120,330
2.60	2,560	4.40	7,400	7.20	19,390	21.00	132,210
2.70	2.750	4.50	7,740	7.40	20,400	22.00	144,710
2.80	2,950	4.60	8,085	7.60	21,420	23.00	157,920
2.90	3,160	4.70	8,435	7.80	22,470	24.00	171,720
3.00	3,385	4.80	8,795	8.00	23,540	25.00	185,720
3.10	3,620						

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1904 to 1908 and is well defined.

Monthly discharge of Allegheny River at Kittanning, Pa., for 1907 and 1908.

[Drainage area, 8,690 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	59,700	10,700	34,300	3.95	4.55	B.
February	12,000	6,100	8,890	1.02	1.06	B.
March	78,300	6,740	34,400	3.96	4.56	B.
April	47,200	8,800	19,100	2.20	2.46	A.
May	34,700	11,100	19,700	2.27	2.62	A.
June	34,200	7,740	15,800	1.82	2.03	A.
July	18,400	3,380	7,400	.852	.98	A.
August	8,080	980	2,130	.245	.28	A.
September	6,100	1,190	3,100	.357	.40	A.
October	20,100	3,860	10,200	1.17	1.35	A.
November	33,600	6,420	17,100	1.97	2.20	A.
December	73,000	5,210	21,400	2.46	2.84	A.
The year	78,300	980	16,100	1.86	25.33	
1908.						
January	40,100	6,420	18,200	2.09	2.41	B.
February	176,000	.....	29,300	3.37	3.64	B.
March	106,000	11,100	53,600	6.17	7.11	B.
April	40,100	15,500	25,800	2.97	3.31	A.
May	55,000	18,900	33,600	3.87	4.46	B.
June	25,200	4,370	9,620	1.11	1.24	A.
July	24,100	4,110	9,140	1.05	1.21	A.
August	4,640	1,270	2,680	.308	.36	A.
September	1,270	853	987	.114	.13	A.
October	1,160	853	968	.111	.13	A.
November	1,540	853	1,150	.132	.15	A.
December	16,000	1,270	4,420	.509	.59	A.
The year	176,000	853	15,800	1.82	24.74	

NOTE.—Discharge February 1–14, 1908, estimated on the basis of climatological data and general run-off conditions in adjacent drainages.
Discharge February 1–14, 1908, 9,110 second-feet.

KISKIMINETAS RIVER AT AVONMORE, PA.

This station was established June 11, 1907, at the highway bridge near Avonmore station on the Pennsylvania Railroad. It is maintained by the Water Supply Commission of Pennsylvania, who furnish the records of gage height and discharge measurements. It was established to obtain general comparative and statistical data regarding the flow of Kiskiminetas River for the study of power and water pollution problems. This river is subject to sudden violent floods similar to those which occur in the Youghiogheny and Monongahela river drainages. These floods when combined make themselves felt with disastrous effects at Pittsburg and other cities on Ohio River. In the flood of March 19, 1908, the river rose to a crest height of 30.8 feet. The estimated discharge was 80,500 second-feet, or 46 second-feet per square mile, from a drainage area of 1,750 square miles.

The nearest important tributary is Loyalhanna Creek, which enters from the left about 5 miles above the station. Blacklegs Creek enters from the right about 4 miles above the station, and Long Run enters from the right about 1 mile below the station.

The discharge is affected by ice for short periods during the winter months. The datum of the gage has remained unchanged since the establishment of the station. Conditions of flow appear to be constant, and an excellent rating curve has been developed for stages below about 15 feet. (See fig. 1, p. 23.)

Discharge measurements of Kiskiminetas River at Avonmore, Pa., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 29	A. H. Horton	391	1,100	4.36	1,780
August 13	Horton and Padgett	312	434	2.89	635
September 11	A. H. Horton	416	3,550	10.26	11,000
September 12	do	408	3,140	9.15	8,600
1908.					
March 3	Kenneth Grant	429	5,280	13.64	19,200
Do	do	429	4,870	12.81	17,000
Do	do	424	4,760	12.35	15,700
March 4	do	422	3,880	10.74	11,500
Do	do	419	3,710	10.32	10,500
Do	do	418	3,580	10.08	9,880
Do	do	417	3,460	9.79	9,630
March 5	do	417	3,460	9.85	9,660
Do	do	417	3,460	9.79	9,400
May 11	do	403	2,250	7.17	5,250
May 13	do	398	1,810	6.06	3,770
July 23	do	382	508	2.86	628
August 23	R. H. Bolster	384	629	3.26	976
September 25	C. E. Ryder	185	199	1.61	68.5

Daily gage height, in feet, of Kiskiminetas River at Avonmore, Pa., for 1907 and 1908.

[Observers, Mrs. Thomas Green and Ralph Fickes.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	4.6	3.3	2.9	4.5	3.8	4.1
2	.....	.....	.....	.....	.....	.....	4.2	3.2	2.8	4.0	3.6	4.0
3	.....	.....	.....	.....	.....	.....	4.0	3.1	5.5	3.7	7.0	3.9
4	.....	.....	.....	.....	.....	.....	3.7	2.9	6.4	4.3	9.4	3.8
5	.....	.....	.....	.....	.....	.....	3.4	2.8	6.0	6.4	7.7	3.6
6	.....	.....	.....	.....	.....	.....	3.2	2.9	5.0	5.5	6.7	3.3
7	.....	.....	.....	.....	.....	.....	3.2	3.5	4.3	4.8	9.9	4.1
8	.....	.....	.....	.....	.....	.....	4.2	3.3	3.8	4.5	11.0	4.0
9	.....	.....	.....	.....	.....	.....	3.6	3.4	3.6	6.2	8.6	3.9
10	.....	.....	.....	.....	.....	.....	3.4	3.4	3.5	5.4	7.5	4.7
11	.....	.....	.....	.....	.....	4.6	4.2	3.6	8.8	4.8	6.4	12.0
12	.....	.....	.....	.....	.....	8.1	6.6	3.1	9.0	4.5	6.0	8.7
13	.....	.....	.....	.....	.....	7.3	6.5	2.9	6.8	4.2	5.4	6.8
14	.....	.....	.....	.....	.....	13.0	5.3	2.7	5.4	4.0	5.0	6.2
15	.....	.....	.....	.....	.....	10.8	4.4	2.6	4.6	3.7	4.9	6.1
16	.....	.....	.....	.....	.....	8.2	3.8	2.5	4.1	3.5	4.5	6.7
17	.....	.....	.....	.....	.....	6.8	3.6	2.6	3.9	3.3	4.2	6.0
18	.....	.....	.....	.....	.....	6.1	4.5	2.6	3.7	3.2	4.1	5.8
19	.....	.....	.....	.....	.....	5.3	5.0	2.5	4.1	3.1	4.2	5.4
20	.....	.....	.....	.....	.....	4.9	4.2	2.5	4.3	3.0	4.9	4.8
21	.....	.....	.....	.....	.....	4.6	3.7	2.5	4.0	3.0	4.3	4.6
22	.....	.....	.....	.....	.....	4.3	3.4	2.4	4.6	2.9	4.2	4.8
23	.....	.....	.....	.....	.....	4.0	3.2	2.6	4.8	3.0	4.5	6.5
24	.....	.....	.....	.....	.....	4.5	5.8	3.5	5.0	2.9	4.2	17.5
25	.....	.....	.....	.....	.....	4.1	4.2	9.2	4.6	2.8	4.4	11.5
26	.....	.....	.....	.....	.....	4.0	6.0	6.0	4.0	2.8	4.3	9.1
27	.....	.....	.....	.....	.....	4.1	5.8	4.5	3.8	3.0	4.4	8.0
28	.....	.....	.....	.....	.....	3.8	4.2	3.8	3.5	5.4	4.5	7.5
29	.....	.....	.....	.....	.....	3.5	3.6	3.5	4.7	6.0	4.6	8.3
30	.....	.....	.....	.....	.....	3.7	3.3	3.3	5.0	4.8	4.2	8.5
31	.....	.....	.....	.....	.....	.....	3.1	3.1	.....	4.2	.....	8.0
1908.												
1	7.1	11.2	4.7	8.0	6.3	5.6	2.5	2.2	1.9	1.8	1.8	1.8
2	6.4	10.9	12.1	7.4	7.1	5.3	2.5	2.3	1.9	1.8	1.8	1.8
3	5.5	10.6	14.1	7.7	6.5	4.6	2.5	2.1	1.8	1.8	1.8	2.3
4	5.2	10.8	10.7	6.7	6.0	4.2	2.6	2.1	1.8	1.8	1.8	1.8
5	4.8	11.2	9.8	6.3	5.6	3.9	2.6	2.2	1.7	1.8	1.8	1.8
6	4.3	11.2	11.8	8.1	7.4	3.7	2.4	2.6	1.7	1.8	1.7	1.8
7	4.2	11.2	17.8	6.2	9.1	3.5	2.4	2.8	1.7	1.8	1.7	1.9
8	4.3	10.9	14.8	5.8	13.3	3.2	2.4	2.7	1.7	1.8	1.7	2.9
9	4.7	10.8	13.8	12.1	10.2	3.2	2.4	2.6	1.7	1.8	1.7	2.9
10	5.8	10.4	10.6	9.5	8.6	3.3	2.3	2.6	1.7	1.8	1.7	3.0
11	6.3	10.5	9.9	8.9	7.5	4.0	2.2	2.3	1.7	1.8	1.7	2.7
12	7.0	10.8	10.2	8.3	6.7	3.4	2.2	2.3	1.7	1.8	1.8	2.5
13	16.0	12.8	10.0	7.6	6.0	3.2	2.2	2.1	.....	1.8	1.8	2.5
14	12.0	14.0	10.8	6.9	5.6	3.0	2.2	2.1	1.7	1.7	1.8	2.5
15	8.7	20.3	10.9	6.7	5.5	2.9	2.6	2.1	1.7	1.7	2.2	2.3
16	7.8	21.4	13.1	7.2	7.9	3.9	2.6	2.0	1.7	1.7	2.0	2.2
17	6.9	11.8	9.8	6.7	8.8	4.0	2.4	2.0	1.7	1.7	2.2	2.3
18	6.2	8.8	10.6	5.9	9.0	3.5	2.2	2.1	1.6	1.7	2.0	2.8
19	5.8	7.8	30.1	12.1	7.2	3.7	2.2	2.4	1.6	1.7	1.8	7.0
20	5.3	6.7	17.9	10.2	13.4	3.2	2.2	2.4	1.6	1.7	1.8	5.1
21	5.0	6.0	11.9	7.1	10.1	3.6	2.2	2.7	1.6	1.7	1.8	3.8
22	5.7	5.6	9.6	6.4	8.2	3.7	3.2	2.6	1.6	1.7	.....	3.4
23	6.7	4.9	8.9	5.9	7.8	3.7	3.1	3.3	1.6	1.7	1.9	3.4
24	6.2	5.2	8.2	5.5	6.9	3.2	2.8	2.9	1.6	1.7	1.9	3.4
25	5.5	5.4	7.7	5.8	6.0	2.9	5.7	2.6	1.6	1.7	1.9	2.9
26	8.2	5.2	6.9	5.5	5.9	3.0	4.6	2.3	1.6	1.7	1.8	2.9
27	10.2	5.6	7.3	5.3	5.3	2.8	3.9	2.1	1.6	1.7	1.8	3.0
28	13.8	4.8	8.1	5.1	5.0	2.7	3.2	2.0	1.7	1.7	1.8	2.8
29	13.5	4.0	8.5	4.5	5.5	2.5	2.8	2.0	1.8	1.8	1.8	2.6
30	13.0	.....	10.1	4.3	6.6	2.5	2.6	1.9	1.8	1.8	1.8	2.6
31	11.6	.....	8.3	.....	5.6	.....	2.4	1.9	.....	1.8	.....	2.7

NOTE.—Ice conditions prevailed January 30 to February 14, 1908.

Rating table for Kiskiminetas River at Avonmore, Pa., for 1907 and 1908.

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	65	3.50	1,040	5.80	3,430	16.00	26,050
1.70	95	3.60	1,120	6.00	3,690	17.00	29,200
1.80	128	3.70	1,200	6.20	3,950	18.00	32,480
1.90	163	3.80	1,280	6.40	4,210	19.00	35,830
2.00	200	3.90	1,360	6.60	4,470	20.00	39,290
2.10	240	4.00	1,450	6.80	4,730	21.00	42,790
2.20	282	4.10	1,540	7.00	5,000	22.00	46,350
2.30	326	4.20	1,630	7.20	5,280	23.00	50,000
2.40	372	4.30	1,720	7.40	5,570	24.00	53,800
2.50	420	4.40	1,820	7.60	5,870	25.00	57,700
2.60	470	4.50	1,920	7.80	6,180	26.00	61,600
2.70	525	4.60	2,020	8.00	6,500	27.00	65,500
2.80	580	4.70	2,130	9.00	8,180	28.00	69,400
2.90	640	4.80	2,240	10.00	10,050	29.00	73,300
3.00	700	4.90	2,350	11.00	12,230	30.00	77,300
3.10	765	5.00	2,460	12.00	14,740	31.00	81,300
3.20	830	5.20	2,700	13.00	17,430		
3.30	900	5.40	2,940	14.00	20,210		
3.40	970	5.60	3,180	15.00	23,050		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 18 discharge measurements made during 1907 to 1908, and is well defined between gage heights 1.6 feet and 15 feet.

Above 15.0 feet the extension of the discharge curve is based on the extension of the area and velocity curves. For illustration of the above rating, see figure 1, page 23.

Monthly discharge of Kiskiminetas River at Avonmore, Pa., for 1907 and 1908.

[Drainage area, 1,750 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
June 11-30	17,400	1,040	3,950	2.26	1.68	A.
July	4,470	765	1,800	1.03	1.19	A.
August	8,540	372	1,110	.634	.73	A.
September	8,180	580	2,380	1.36	1.52	A.
October	4,210	580	1,690	.966	1.11	A.
November	12,200	1,120	3,490	1.99	2.22	A.
December	30,800	900	5,160	2.95	3.40	A.
1908.						
January	26,000	1,630	6,250	3.57	4.12	A.
February	44,200	.....	5,900	3.37	3.64	B.
March	77,700	2,130	14,400	8.23	9.49	A.
April	15,000	1,720	5,520	3.15	3.51	A.
May	18,500	2,460	6,070	3.47	4.00	A.
June	3,180	420	1,130	.646	.72	A.
July	3,300	282	603	.345	.40	A.
August	900	163	353	.202	.23	A.
September	163	65	93.9	.054	.06	A.
October	128	95	112	.064	.07	A.
November	282	95	141	.081	.09	A.
December	5,000	128	716	.409	.47	A.
The year	77,700	65	3,440	1.97	26.80	

NOTE.—Discharge during the frozen period estimated on the basis of climatological data and general run-off conditions.

Discharge January 30 to 31, 1908, 7,000 second-feet; February 1 to 14, 1908, 2,110 second-feet.

BLACKLICK CREEK AT BLACKLICK, PA.

This station was established by the United States Geological Survey at the highway bridge about one-fourth mile from the railroad station August 16, 1904, was discontinued July 15, 1906, and was reestablished January 8, 1907, by the Water Supply Commission of Pennsylvania, by whom the records of gage heights and discharge measurements given below were furnished. Its purpose was to obtain data regarding the flow of Blacklick Creek for power development and for the study of flood and pollution prevention.

It is located about 6 miles above the junction of Blacklick Creek with Kiskiminetas River and is about 1 mile below the junction of Blacklick and Two Lick creeks.

The channel is obstructed by ice for short periods during the winter months. The datum of the gage has remained constant during the maintenance of the station.

During September, 1905, the original covered wooden bridge was torn down and replaced by a steel bridge. From September 1 to November 2, 1905, the gage readings were taken on a temporary gage 235 feet above the bridge, referred to the correct datum. On November 2 the chain gage was replaced on the new bridge. Construction work and changes in the abutments and pier changed the conditions of flow, requiring the use of a new rating curve beginning about September 1. The monthly discharge September 1, 1905, to April 9, 1906, has been revised and is republished below. The discharge for September and October, 1905, during the time that the temporary gage was used, is liable to some error, and the discharge April 10 to July 15, 1906, is suppressed owing to poor gage readings; otherwise all records of discharge for low and medium stages are excellent. The rating curve has not been developed above gage height 6 feet.

Discharge measurements of Blacklick Creek at Blacklick, Pa., in 1905–1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1905.					
November 2	E. C. Murphy	199	543	3.36	507
1906.					
May 23	Robert Follansbee	210	373	2.40	118
1907.					
May 27	R. J. Taylor	201	524	3.04	336
August 14[a]	H. D. Padgett	98	177	2.22	47
September 12[a]	A. H. Horton	207	776	4.35	1,290
1908.					
May 11	Kenneth Grant	205	759	4.23	1,150
July 24	do	199	609	3.41	529
August 22[b]	R. H. Bolster	100	80	2.09	36.3
September 24[c]	C. E. Ryder	28	33.4	1.89	6.8

[a] Section full of drift.
[b] Measured from coal tipple, one-third mile above bridge.
[c] Wading measurement.

Daily gage height, in feet, of Blacklick Creek at Blacklick, Pa., for 1907 and 1908.

[Observer, D. J. Walling.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	.....	3.5	3.25	3.75	3.5	2.85	3.45	2.35	2.1	3.45	3.1	2.9
2	.....	3.45	4.5	3.55	3.4	4.15	3.2	2.35	2.5	3.15	3.3	2.9
3	.....	4.25	4.4	3.4	3.25	3.6	3.0	2.3	3.6	3.0	5.25	2.8
4	.....	3.9	3.85	3.45	3.75	3.35	2.85	2.35	3.5	4.6	4.95	2.8
5	.....	3.65	3.7	3.5	3.85	3.55	2.7	2.3	3.15	4.8	4.45	2.8
6	.....	3.55	3.65	3.35	3.7	3.7	2.65	2.45	2.95	4.0	4.2	2.7
7	.....	3.95	3.4	3.2	3.8	3.55	2.95	2.55	2.75	3.6	5.75	2.7
8	4.65	4.85	3.55	3.3	3.7	3.35	3.1	2.4	2.6	4.3	4.95	2.7
9	4.95	4.7	3.4	3.35	4.25	3.15	2.75	2.3	2.55	4.3	4.65	2.75
10	4.8	4.7	3.45	3.4	4.35	3.0	2.7	2.5	2.65	3.8	4.25	4.35
11	4.4	4.65	3.45	3.3	4.1	3.25	2.65	2.45	4.8	3.55	3.95	5.4
12	6.1	4.6	3.65	3.35	3.75	4.6	3.1	2.35	4.6	3.6	3.7	4.4
13	6.1	4.6	12.0	3.45	3.65	4.15	3.1	2.3	3.65	3.45	3.45	3.85
14	8.4	4.6	13.2	3.55	3.45	5.9	2.75	2.25	3.25	3.15	3.35	3.85
15	7.1	4.6	8.0	3.5	3.35	4.75	2.6	2.2	3.05	3.0	3.15	3.9
16	5.85	4.6	5.95	3.85	3.4	4.2	2.5	2.2	2.85	2.95	3.05	3.75
17	5.2	4.35	5.4	3.9	3.3	3.8	2.55	2.2	2.85	2.85	3.0	3.55
18	4.8	4.05	5.65	3.7	3.15	3.55	2.65	2.2	2.95	2.8	3.0	3.5
19	9.4	3.95	6.2	3.65	3.1	3.35	2.6	2.15	3.25	2.7	3.2	3.35
20	8.1	4.25	9.0	3.6	3.05	3.25	2.5	2.1	3.25	2.7	3.1	3.15
21	5.85	4.05	6.1	3.6	2.95	3.15	2.45	2.15	3.25	2.75	3.1	3.05
22	4.8	3.75	5.05	3.5	2.9	3.0	2.4	2.15	3.7	2.7	3.1	3.05
23	4.15	3.6	4.6	3.4	2.8	3.3	2.35	2.15	3.55	2.6	3.0	6.6
24	3.7	3.5	4.2	4.4	2.8	3.0	2.35	2.45	3.55	2.6	3.0	7.25
25	4.05	3.4	3.95	4.1	2.8	2.9	2.5	2.65	3.3	2.6	3.0	5.45
26	3.8	3.45	3.85	3.9	2.95	2.9	2.85	2.45	3.05	2.5	3.0	4.75
27	3.35	3.35	5.15	3.75	3.05	3.0	2.95	2.3	2.9	2.8	3.0	4.35
28	3.65	3.55	5.0	3.55	3.05	2.85	2.75	2.25	2.85	4.6	2.95	4.55
29	3.95	.....	4.65	3.45	2.85	2.75	2.55	2.2	3.65	3.95	2.9	4.85
30	3.8	.....	4.3	3.4	2.75	3.55	2.4	2.2	3.8	3.5	2.9	4.4
31	3.6	.....	3.95	.....	2.7	.....	2.35	2.15	.....	3.25	.....	4.3
1908.[b]												
1	3.95	3.25	3.6	4.35	4.35	3.55	2.4	2.3	2.08	2.08	2.08	2.08
2	3.75	4.45	6.9	4.25	4.15	3.35	2.45	2.3	2.08	2.08	2.08	2.08
3	3.55	4.6	6.2	4.1	4.4	3.15	2.5	2.3	2.08	2.08	1.98	1.98
4	3.4	4.75	5.35	3.85	4.05	3.0	2.5	2.3	2.08	2.08	2.03	2.03
5	3.75	4.35	5.05	3.7	4.15	2.9	2.5	2.2	2.08	2.03	2.08	2.08
6	3.35	4.0	8.35	3.8	4.55	2.8	2.35	2.4	1.98	1.98	2.08	2.08
7	3.3	3.65	9.15	3.75	5.85	2.7	2.4	2.55	1.98	1.98	2.08	2.3
8	3.35	3.3	6.5	4.35	5.8	2.65	2.4	2.65	1.98	1.98	2.08	2.45
9	3.3	3.15	6.45	5.8	5.0	2.7	2.35	2.55	1.98	1.98	2.08	2.45
10	3.2	3.05	5.45	4.95	4.7	3.4	2.3	2.35	1.98	1.98	2.08	2.3
11	3.35	2.95	5.0	5.15	4.2	3.0	2.2	2.55	1.98	1.98	2.08	2.3
12	4.35	3.05	5.2	4.5	3.95	2.8	2.3	2.4	1.88	1.98	2.08	2.5
13	6.8	3.9	5.45	4.25	3.75	2.65	2.3	2.35	1.98	1.98	2.18	2.6
14	5.3	5.3	6.1	3.9	3.6	2.6	2.35	2.3	1.98	1.98	2.18	2.45
15	4.55	10.0	5.8	3.85	4.55	3.05	2.55	2.1	1.93	1.98	2.18	2.4
16	4.35	7.5	6.1	4.45	4.75	3.15	2.45	2.2	1.88	1.98	2.18	2.2
17	3.9	5.45	5.2	4.0	6.9	2.85	2.4	2.2	1.88	1.98	2.18	2.45
18	3.75	4.55	6.2	3.95	5.9	2.7	2.3	2.45	1.88	1.98	2.18	5.7
19	3.6	4.3	10.8	5.9	6.2	2.6	2.3	2.45	1.88	1.98	2.18	4.7
20	3.5	4.05	6.65	4.9	7.0	3.1	2.3	2.25	1.88	1.98	2.18	3.7
21	3.5	3.75	5.35	4.4	5.4	3.15	2.4	2.25	1.88	1.98	2.18	3.05
22	3.9	3.7	4.7	4.05	4.75	3.0	3.6	2.2	1.88	1.98	2.18	2.85
23	3.9	3.35	4.4	3.85	4.4	2.85	2.7	2.75	1.88	1.98	2.18	2.65
24	3.6	3.4	4.5	3.65	4.0	2.7	3.6	2.55	1.88	1.98	2.18	2.7
25	3.55	3.35	4.1	3.55	3.65	2.85	4.35	2.3	1.88	1.98	2.08	3.05
26	3.45	3.4	3.85	3.85	3.5	2.85	3.2	2.3	1.88	1.98	2.08	2.95
27	4.15	3.35	3.7	3.65	3.5	2.65	2.9	2.3	1.88	1.98	2.08	2.6
28	3.95	3.15	3.8	3.45	3.4	2.6	2.65	2.2	1.93	2.08	2.08	2.75
29	3.75	3.15	4.95	3.3	3.3	2.6	2.5	2.2	2.08	2.08	2.08	2.7
30	3.4	.....	4.95	3.4	3.2	2.5	2.4	2.05	2.08	2.08	2.08	2.65
31	3.2	.....	4.55	.....	3.75	.....	2.2	2.1	.....	2.08	.....	3.25

[a] Ice conditions probably prevailed about February 7 to 28 and perhaps for a few days also during the periods from January 25 to February 6 and March 1 to 12, 1907.

[b] Ice conditions prevailed February 2 to 14 and probably slight ice effect during December, 1908.

Rating table for Blacklick Creek at Blacklick, Pa., for September 1, 1905, to December 31, 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.88	6.0	3.10	365	4.50	1,420	6.80	4,130
1.89	6.8	3.20	415	4.60	1,520	7.00	4,410
1.90	7.5	3.30	470	4.70	1,620	7.20	4,690
2.00	21	3.40	525	4.80	1,720	7.40	4,970
2.10	38	3.50	590	4.90	1,820	7.60	5,250
2.20	59	3.60	660	5.00	1,930	7.80	5,550
2.30	83	3.70	730	5.20	2,150	8.00	5,850
2.40	110	3.80	805	5.40	2,370	9.00	7,570
2.50	140	3.90	885	5.60	2,600	10.00	9,250
2.60	172	4.00	965	5.80	2,840	11.00	11,050
2.70	205	4.10	1,050	6.00	3,090	12.00	12,950
2.80	240	4.20	1,140	6.20	3,350	13.00	14,950
2.90	280	4.30	1,230	6.40	3,610	14.00	17,050
3.00	320	4.40	1,320	6.60	3,870		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 9 discharge measurements made during 1905 to 1908 and is well defined below gage height 5 feet. Above this point the rating is only approximate.

The above rating supersedes all ratings previously published for the period September 1, 1905, to July, 1906.

Monthly discharge of Blacklick Creek at Blacklick, Pa., for 1905 to 1908.

[Drainage area, 403 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1905.						
September	3,740	38	349	0.866	0.97	B.
October	3,090	21	520	1.29	1.49	B.
November	5,400	240	710	1.76	1.96	A.
December	10,500	280	1,570	3.90	4.50	B.
1906.						
January	3,350	525	1,130	2.80	3.23	A.
February 21–28	730	240	468	1.16	.35	A.
March	5,550	205	1,140	2.83	3.26	A.
April 1–9	5,250	1,140	2,840	7.05	2.36	B.
1907.						
January	8,230	498	2,280	5.66	6.52	B.
February	.....	.....	515	1.28	1.33	D.
March	15,400	442	2,570	6.38	7.36	B.
April	1,320	415	651	1.62	1.81	A.
May	1,280	205	533	1.32	1.52	A.
June	2,960	222	680	1.69	1.89	A.
July	558	96	221	.548	.63	B.
August	186	38	86.0	.213	.25	C.
September	1,720	38	485	1.20	1.34	A.
October	1,720	140	579	1.44	1.66	A.
November	2,780	280	763	1.89	2.11	A.
December	2,370	205	1,060	2.63	3.03	A.
The year	15,400	38	869	2.16	29.45	
1908.						
January	4,130	415	894	2.22	2.56	A.
February	9,250	.....	1,060	2.63	2.84	B.
March	10,700	660	2,830	7.02	8.09	B.
April	2,960	470	1,160	2.88	3.21	A.
May	4,410	415	1,570	3.90	4.50	A.
June	625	140	283	.702	.78	A.
July	1,280	59	201	.499	.58	A.
August	222	30	95.5	.237	.27	B.
September	35	6.0	16.4	.041	.05	C.
October	35	18.3	22.9	.057	.07	C.
November	55	18.3	42.1	.104	.12	B.
December	2,720	18	302	.749	.86	C.
The year	10,700	6.0	706	1.75	23.93	

NOTE.—Ice conditions prevailed February 1 to 20, 1906. No discharge published after April 9, 1906, on account of inaccurate gage readings.

The above values of monthly discharge for 1905-6 supersede those previously published in Water-Supply Papers 169 and 205.

Discharge during the frozen periods and January 1 to 7, 1907, estimated on the basis of climatological reports and general run-off conditions in the Allegheny and Youghiogheny River drainages.

Discharge January 1 to 7, 1907, 2,000 second-feet; February 7 to 28, 1907, 450 second-feet; February 2 to 14, 1908, 392 second-feet.

MONONGAHELA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Monongahela and Allegheny rivers unite at Pittsburg to form Ohio River. The drainage basin of the Allegheny, which is much the larger, lies to the north; that of the Monongahela lies to the south. The drainage basin of Monongahela River lies in the States of Pennsylvania, Maryland, and West Virginia. The river is formed in the east central part of Marion County, W. Va., by the junction of Tygart and West Fork rivers; from this point it flows northeastward across the Pennsylvania state line to the mouth of Cheat River, thence northward, and joins Ohio River at Pittsburg, Pa. The important tributaries beginning at the head of the river and following down the east bank are Cheat and Youghiogheny rivers; on the west bank are Buffalo and Tenmile creeks, neither of which is of much importance. The total length of the river is 125 miles. The total drainage area is about 7,350 square miles.

The Tygart, also called Tygarts Valley River, drains the country to the southeast of the head of Monongahela River; the West Fork, the country to the southwest. Tygart River rises in the southern part of Randolph County, W. Va., flows in a general northerly direction, and joins the West Fork at Fairmont, W. Va. West Fork River rises in the western part of Upshur County, W. Va., flows northwestward into Lewis County, thence it flows in a slight northeasterly direction, and joins the Monongahela at Fairmont. The length of Tygart River is about 100 miles (map measurement); its drainage area above its mouth is about 1,420 square miles. The West Fork is about 70 miles (map measurement) in length; the drainage area above its mouth is about 845 square miles. The headwaters of these two streams drain the western slopes of the Allegheny Mountains.

In the upper portions the country is mountainous in character, the slopes of the valleys are steep and in many places precipitous, and the fall of the streams is rapid; farther down the country becomes less mountainous in character but remains very rolling. The steep slopes and rocky nature of the soil at the headwaters cause the heavy rains to run off rapidly, with but little absorption by the soil, thus producing sudden and intense floods, and a low flow in dry periods. The headwater regions are covered with fine growths of hardwood timber which are being rapidly lumbered. Below Fairmont the slope of the main stream is but little more than 1 foot per mile.

The drainage basin is exceptionally rich in natural resources, being underlain by very valuable and extensive coal beds and containing oil and gas in abundance. The country drained by Cheat and Youghiogheny rivers is of the same character as that drained by Tygart and West Fork rivers, being mountainous and rough at the

headwaters, losing the mountainous character as the rivers are descended, and continuing rolling and hilly to the junctions with the main stream.

Monongahela River is navigable its entire length by means of locks and dams.

The elevation of the sources of the West Fork is 1,500 feet; of the Tygart is 3,500 feet; at Fairmont the elevation is 860 feet; at the mouth of the river at Pittsburg the elevation is 707 feet.

This basin was at one time covered with forests, but the greater part has been cut off. There is still timber at the headwaters, but the area of timbered land is small when compared to the total area of drainage basin.

The mean annual rainfall on that portion of the basin in West Virginia is from 45 to 50 inches. On the portion in Pennsylvania, it is 40 to 45 inches. The winter conditions in the southern part of the basin are comparatively mild. The snowfall is light and does not last long, and ice does not form very thick. In the northern part of the basin ice forms about a foot in thickness during severe winters, but in ordinary winters it is not very thick, and it causes little trouble in floods. The tributaries of Monongahela River afford a number of reservoirs, some of which would store an immense quantity of water.

Fuel is so cheap and abundant in the drainage basin that little water power has been developed, although the main stream and its tributaries afford good opportunities. At the dams on the main stream a fall of about 140 feet is available for use. The low flow during dry spells is an unfavorable condition for water power development.

The following gaging stations have been maintained in this drainage basin:

Tygart River at Belington, W. Va., 1907–1908.
Tygart River at Fetterman, W. Va., 1907–1908.
Monongahela River at Lock No. 4, Pa., 1886–1906. Flood stage record only.
Buckhannon River at Hall, W. Va., 1907–1908.
West Fork River at Enterprise, W. Va., 1907–1908.
Buffalo Creek at Barrackville, W. Va., 1907–1908.
Cheat River at Morgantown, W. Va., 1899–1900; 1902–1905; 1908.
Youghiogheny River at Friendsville, Md., 1898–1904.
Youghiogheny River at Confluence, Pa., 1904–1908.
Casselman River at Confluence, Pa., 1904–1908.
Laurel Hill Creek at Confluence, Pa., 1904–1908.
Indian Creek at Westmoreland County, Pa., 1892–1893.

TYGART RIVER AT BELINGTON, W. VA.

This station is located at the highway bridge at Belington, W. Va. It was established June 5, 1907, to obtain data connected with the study of water power, water supply, pollution, flood control, and storage problems.

In general the winters are mild. The station has not been maintained long enough to determine definitely the ice conditions.

The records are reliable and accurate; the datum of the gage has remained unchanged.

Discharge measurements of Tygart River at Belington, W. Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 5	A. H. Horton	189	604	4.50	856
June 6	C. E. Langley	196	838	5.54	1,640
June 7	A. H. Horton	193	718	4.99	1,200
August 12	Horton and Padgett	186	468	3.73	459
September 16	A. H. Horton	174	349	3.14	233
1908.					
August 2	W. G. Hoyt	180	303	2.87	147

Daily gage height, in feet, of Tygart River at Belington, W. Va., for 1907 and 1908.

[Observers, Charles Brandenburg and S. A. Campbell.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							3.5	3.9	3.0	3.2	4.1	3.9
2							3.9	3.4	3.1	3.1	4.0	3.7
3							5.6	3.3	3.2	3.0	5.2	3.5
4							5.1	3.1	3.5	3.1	6.3	3.4
5						4.5	4.1	3.3	4.6	5.6	5.9	3.6
6						5.6	3.5	3.4	4.1	4.8	5.3	3.7
7						5.0	3.7	3.2	3.5	4.2	8.2	3.6
8						4.8	4.1	3.2	3.1	4.9	7.1	3.5
9						10.8	4.7	2.9	3.0	5.8	6.3	3.4
10						6.7	9.2	3.5	2.8	5.2	6.6	5.2
11						5.4	5.9	4.0	3.1	4.3	7.3	8.9
12						5.0	7.6	3.7	4.0	4.0	6.1	6.3
13						9.3	8.1	3.4	4.1	3.6	5.3	5.4
14						10.1	7.9	3.2	3.6	3.4	4.4	6.0
15						11.7	5.1	3.1	3.3	3.3	4.2	9.3
16						11.2	4.1	3.0	3.2	3.1	3.9	7.1
17						5.3	7.1	3.2	3.4	3.1	3.8	6.2
18						4.9	18.7	3.5	3.2	3.2	3.6	5.1
19						4.0	6.2	3.3	4.9	3.1	3.5	4.7
20						3.9	5.6	3.2	4.1	3.0	3.4	4.5
21						3.8	5.0	3.0	3.7	2.9	3.2	4.2
22						3.5	4.1	2.8	3.4	2.9	3.3	3.9
23						3.4	4.5	3.1	3.1	2.8	3.4	4.1
24						3.3	4.4	10.0	3.5	2.8	6.1	9.3
25						4.4	4.6	8.6	3.8	2.8	7.8	7.1
26						4.1	4.6	4.9	3.2	2.7	6.2	6.0
27						3.7	4.5	4.1	3.0	2.9	5.3	4.7
28						3.5	4.1	3.8	2.9	3.5	4.6	4.3
29						3.4	5.1	3.5	3.0	6.5	4.3	4.2
30						3.2	4.8	3.3	3.1	6.2	3.9	4.7
31							4.6	3.2		5.8		5.1

Daily gage height, in feet, of Tygart River at Belington, W. Va., for 1907 and 1908—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	4.9	4.3	4.4	10.1	3.8	4.7	2.5	3.0	2.2	1.9	1.8	2.1
2	4.7	6.1	12.3	7.8	3.9	4.1	2.4	2.8	2.2	1.9	1.8	2.1
3	4.5	5.9	9.1	7.0	4.1	3.9	2.3	2.2	2.2	1.9	1.9	2.1
4	4.2	5.5	6.9	5.8	4.3	4.0	3.1	2.6	2.1	1.8	1.8	2.1
5	4.4	5.3	5.6	4.9	8.9	6.3	4.6	2.9	2.1	1.8	2.0	2.1
6	4.6	7.1	6.2	4.6	10.8	4.9	3.8	3.2	2.1	1.8	2.1	2.2
7	4.3	7.3	8.5	4.3	7.9	4.2	3.4	2.7	2.1	1.8	2.2	2.2
8	6.2	6.2	7.3	4.4	10.7	3.9	3.2	2.7	2.1	1.8	2.1	2.2
9	6.9	5.7	7.0	7.5	7.8	3.5	3.1	2.8	2.0	1.8	2.0	2.2
10	6.7	4.8	6.8	7.7	10.9	3.3	3.0	2.9	2.0	1.8	2.0	2.2
11	6.4	4.6	6.4	8.9	10.4	3.1	2.9	2.8	2.0	1.8	2.0	2.3
12	10.0	6.2	5.3	8.7	6.7	3.2	2.6	2.9	2.0	1.8	2.0	2.5
13	11.5	9.1	4.9	6.6	5.6	3.1	2.7	2.6	2.0	1.8	2.0	2.8
14	8.2	10.5	4.6	5.3	4.5	3.0	2.6	2.5	2.0	1.7	2.0	3.0
15	5.9	10.4	4.5	4.7	4.3	3.2	3.0	2.4	2.0	1.7	2.0	2.9
16	5.1	12.9	4.6	5.1	5.8	3.3	2.8	2.3	2.0	1.7	2.0	2.7
17	4.8	7.1	4.5	6.7	.....	3.4	2.6	2.3	1.9	1.8	2.0	2.6
18	4.5	6.2	4.7	5.6	4.2	3.0	3.0	2.3	1.9	1.8	2.0	2.5
19	4.3	5.3	5.8	5.8	4.7	2.9	3.4	2.2	1.9	1.8	2.0	2.5
20	4.2	5.2	8.3	6.5	7.3	3.1	2.9	2.2	1.9	1.8	2.0	2.8
21	4.3	4.9	6.5	5.7	8.2	3.2	2.8	2.2	1.9	1.8	2.0	3.0
22	4.5	4.4	5.1	4.8	7.4	3.3	3.2	2.2	1.9	1.8	2.0	2.7
23	5.9	4.1	4.8	4.5	6.2	3.1	3.2	2.2	1.8	1.8	2.0	2.8
24	5.6	4.0	4.7	3.9	4.9	3.0	3.3	2.2	1.8	1.8	2.0	2.7
25	5.4	3.8	4.5	3.8	4.6	2.9	3.9	2.0	1.8	1.8	2.0	2.6
26	4.2	3.9	4.3	4.1	6.4	2.9	5.9	2.3	1.8	1.8	2.0	2.6
27	6.3	4.5	4.0	4.2	5.2	2.8	6.9	2.3	1.8	1.8	2.0	2.6
28	6.6	4.3	4.1	4.3	4.5	2.8	4.6	2.4	1.8	1.8	2.0	2.6
29	5.7	4.0	4.6	4.0	4.1	2.7	4.1	2.6	1.8	1.8	2.0	2.6
30	5.4	.....	6.5	3.9	8.3	2.6	3.6	2.5	1.9	1.9	2.1	2.6
31	4.5	.....	6.4	.....	6.2	.....	3.3	2.3	.....	1.8	.....	2.9

TYGART RIVER AT FETTERMAN, W. VA.

This station is located at the highway bridge at Fetterman, W. Va. It was established June 3, 1907, to obtain data for use in studying water power, water supply, pollution, flood control, and storage problems.

Lost Otter Creek enters from the west about one-half mile below the station.

The winters are mild; ice does not form very thick and does not last long. The records are reliable and accurate; the datum of the gage has not been changed.

Discharge measurements of Tygart River at Fetterman, W. Va., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 3	A. H. Horton	271	1,890	5.68	3,100
June 8	do	271	1,970	6.02	3,790
August 10	Horton and Padgett	271	1,800	5.39	2,480
September 15	A. H. Horton	265	1,500	4.30	794

Daily gage height, in feet, of Tygart River at Fetterman, W. Va., for 1907 and 1908.

[Observer, Joseph Gerken.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	5.15	4.5	4.3	4.12	5.4	4.85
2	.....	.....	.....	.....	.....	.....	6.3	4.4	4.25	4.1	5.5	4.75
3	.....	.....	.....	.....	.....	5.7	6.6	4.3	4.25	4.08	7.4	4.7
4	.....	.....	.....	.....	.....	5.6	5.5	4.28	4.25	4.1	7.75	4.55
5	.....	.....	.....	.....	.....	5.4	4.9	4.15	4.65	6.05	6.95	4.5
6	.....	.....	.....	.....	.....	6.6	4.55	4.65	5.0	7.4	6.65	4.35
7	.....	.....	.....	.....	.....	6.35	4.55	4.6	4.6	5.55	8.85	4.3
8	.....	.....	.....	.....	.....	6.05	4.45	4.4	4.4	5.7	8.95	4.2
9	.....	.....	.....	.....	.....	10.9	4.8	4.5	4.25	8.65	7.6	4.45
10	.....	.....	.....	.....	.....	8.8	9.1	5.25	4.5	6.8	7.05	6.75
11	.....	.....	.....	.....	.....	6.3	8.25	6.1	4.7	5.6	6.9	11.8
12	.....	.....	.....	.....	.....	6.0	8.15	5.05	4.95	5.15	6.6	8.4
13	.....	.....	.....	.....	.....	6.4	8.15	4.6	4.65	4.9	6.0	6.55
14	.....	.....	.....	.....	.....	13.3	7.2	4.35	4.45	4.75	5.5	8.0
15	.....	.....	.....	.....	.....	12.6	5.9	4.15	4.35	4.65	5.15	9.95
16	.....	.....	.....	.....	.....	8.95	5.3	4.0	4.15	4.55	4.95	9.05
17	.....	.....	.....	.....	.....	6.5	12.7	4.0	4.05	4.48	4.75	7.0
18	.....	.....	.....	.....	.....	5.7	19.8	4.0	4.15	4.35	4.6	6.15
19	.....	.....	.....	.....	.....	5.25	15.6	4.15	5.05	4.15	5.0	5.75
20	.....	.....	.....	.....	.....	4.75	9.15	4.05	5.0	4.12	5.0	5.45
21	.....	.....	.....	.....	.....	4.7	6.75	3.95	4.55	4.12	5.0	5.05
22	.....	.....	.....	.....	.....	4.55	5.6	3.88	4.5	4.1	4.9	4.95
23	.....	.....	.....	.....	.....	4.55	5.45	4.15	4.4	4.02	4.8	5.75
24	.....	.....	.....	.....	.....	4.5	5.85	8.6	4.45	3.98	6.6	8.75
25	.....	.....	.....	.....	.....	5.45	6.45	11.2	4.35	3.9	8.0	8.3
26	.....	.....	.....	.....	.....	4.55	5.75	9.1	4.3	3.8	7.2	6.5
27	.....	.....	.....	.....	.....	4.5	5.75	6.2	4.15	3.9	6.4	5.6
28	.....	.....	.....	.....	.....	4.45	5.0	5.45	4.05	5.4	5.65	5.45
29	.....	.....	.....	.....	.....	4.25	4.55	4.9	4.1	7.7	5.45	5.4
30	.....	.....	.....	.....	.....	4.3	4.8	4.75	4.2	6.55	5.1	5.25
31	.....	.....	.....	.....	.....	.....	4.85	4.45	.....	5.75	.....	5.35
1908.												
1	5.4	5.55	5.95	11.0	4.65	5.6	3.6	4.35	3.25	2.6	2.4	2.7
2	5.35	5.5	13.35	10.25	4.75	5.0	3.6	3.85	3.2	2.6	2.4	2.7
3	5.15	5.55	11.05	8.55	4.95	4.75	3.6	3.65	3.25	2.55	2.35	2.7
4	5.05	5.9	8.2	7.2	5.7	4.8	3.5	3.6	3.25	2.5	2.3	2.75
5	5.1	6.15	6.7	5.95	12.75	5.4	3.6	3.6	3.2	2.5	2.3	2.8
6	5.02	10.1	7.2	5.65	13.0	5.5	4.3	3.55	3.15	2.5	2.3	2.9
7	4.95	8.4	9.2	5.35	11.55	4.85	4.35	3.5	3.1	2.5	2.3	2.95
8	4.95	6.6	8.4	5.4	13.45	4.55	4.25	3.8	3.08	2.45	2.3	3.1
9	4.75	5.7	12.1	8.35	10.6	4.4	4.1	4.0	3.02	2.4	2.3	3.1
10	4.65	5.5	10.15	8.55	12.55	4.2	3.95	3.7	3.0	2.4	2.3	3.0
11	4.7	5.25	8.25	9.65	11.85	4.18	3.8	3.65	2.98	2.4	2.4	3.0
12	8.8	5.75	6.7	11.25	8.55	4.12	3.6	3.65	2.92	2.45	2.4	3.25
13	14.1	9.1	6.15	8.85	6.3	4.1	3.65	3.6	2.9	2.55	2.4	3.65
14	10.2	10.65	5.75	6.6	5.8	3.95	3.95	3.6	2.9	2.55	2.4	3.75
15	7.0	13.25	5.6	5.85	5.75	4.0	3.95	3.6	2.85	2.5	2.45	3.85
16	6.25	14.3	5.5	5.85	5.5	4.45	3.85	3.55	2.8	2.5	2.5	4.0
17	5.95	9.65	5.5	6.45	5.95	4.55	3.85	3.5	2.8	2.5	2.5	3.85
18	5.65	6.85	5.45	6.7	5.85	4.2	4.1	3.5	2.7	2.5	2.5	3.7
19	5.55	6.55	8.85	6.3	6.65	4.05	4.45	3.5	2.7	2.45	2.5	3.65
20	5.15	7.1	9.5	6.8	7.6	3.95	4.5	3.45	2.7	2.4	2.5	3.8
21	5.0	6.45	7.7	6.9	11.55	3.85	4.15	3.4	2.7	2.4	2.55	3.7
22	5.2	5.9	6.6	5.95	9.05	3.8	4.05	3.4	2.7	2.4	2.6	3.75
23	5.82	5.65	5.9	5.4	7.25	3.85	4.45	3.35	2.7	2.4	2.6	3.75
24	5.85	5.35	5.8	5.15	6.25	4.0	4.7	3.3	2.7	2.4	2.6	3.7
25	5.3	5.2	5.6	5.0	5.7	3.95	5.15	3.3	2.7	2.4	2.6	3.7
26	5.2	5.7	5.4	4.85	5.85	3.9	6.7	3.3	2.7	2.35	2.7	3.65
27	7.45	6.25	5.3	4.75	5.55	3.85	7.45	3.3	2.7	2.3	2.7	3.6
28	7.95	5.9	5.15	4.7	5.15	3.8	6.3	3.2	2.7	2.3	2.7	3.6
29	6.9	5.6	5.6	4.55	4.8	3.75	5.55	3.2	2.65	2.35	2.7	3.55
30	6.0	.....	7.75	4.5	4.55	3.7	5.1	3.15	2.6	2.4	2.7	3.55
31	5.5	.....	9.2	.....	6.6	.....	4.85	3.1	.....	2.4	.....	3.65

BUCKHANNON RIVER AT HALL, W. VA.

This station is located at the highway bridge at Hall, W. Va. It was established June 7, 1907, to obtain data for use in studying water power, water supply, pollution, flood control, and storage problems.

Pecks Run is tributary on the left bank about a mile below the station.

When this station was established, it was thought that the dam and mill at Boulder, a few miles below, had been abandoned, and that backwater effect, being constant, would not vitiate the gage readings. Some time during the summer of 1908 the dam was repaired, thus raising the water about 1 foot in the pond above the dam. It is believed that the gage readings from the date of establishment until the latter part of November, 1908, are but little modified by backwater effect, but this is not certain, and the records should be used with caution, especially for low stages. A small power plant, used principally for grinding grain, is located a short distance above the station, and this plant may modify the low water flow to a slight extent.

Winter conditions are mild, and ice causes little trouble.

Except as above indicated, the records are reliable and accurate. The datum of the gage has remained unchanged.

Discharge measurements of Buckhannon River at Hall, W. Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 7	A. H. Horton	108	484	5.32	867
August 12	Horton and Padgett	108	329	4.10	273
September 16	A. H. Horton	102	285	3.54	138
1908.					
August 1	W. G. Hoyt	100	286	3.53	147

Daily gage height, in feet, of Buckhannon River at Hall, W. Va., for 1907 and 1908.

[Observer, James Newcomb.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							5.6	4.1	3.9	3.2	4.9	4.3
2							6.6	4.0	3.7	3.3	4.7	4.3
3							5.6	4.0	3.6	3.3	6.4	4.1
4							4.7	3.8	3.9	3.3	6.7	4.1
5							4.4	3.7	4.7	5.3	6.0	4.0
6							3.9	3.6	4.3	6.1	5.5	3.9
7						5.3	3.9	4.1	4.0	4.9	6.5	3.8
8						7.6	5.0	3.9	3.8	4.5	6.8	4.0
9						10.5	4.3	3.9	3.7	7.9	6.1	4.0
10						7.3	10.3	5.0	3.6	5.9	6.0	4.8
11						5.7	7.2	4.9	3.6	5.0	6.9	9.8
12						5.2	6.0	4.1	3.6	4.5	6.0	7.5
13						7.3	8.5	3.9	4.0	4.3	5.4	5.9
14						10.6	6.4	3.8	3.9	4.1	5.1	6.6
15						9.9	5.3	3.7	3.7	4.1	4.6	8.8

Daily gage height, in feet, of Buckhannon River at Hall, W. Va., for 1907 and 1908— Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
16	.....	.....	.....	.....	.....	7.1	5.3	3.5	3.6	4.0	4.4	7.2
17	.....	.....	.....	.....	.....	5.9	5.1	3.6	3.5	3.9	4.2	6.2
18	.....	.....	.....	.....	.....	5.0	13.3	4.0	3.5	3.9	4.2	5.5
19	.....	.....	.....	.....	.....	4.6	11.5	3.9	3.4	3.8	4.3	5.2
20	.....	.....	.....	.....	.....	4.2	7.1	3.7	3.4	3.8	4.4	4.9
21	.....	.....	.....	.....	.....	4.2	5.7	3.5	3.4	3.7	4.3	4.6
22	.....	.....	.....	.....	.....	3.9	4.8	3.4	3.5	3.6	4.2	4.5
23	.....	.....	.....	.....	.....	3.8	5.5	3.4	3.4	3.6	4.1	4.5
24	.....	.....	.....	.....	.....	4.2	5.6	8.3	3.4	3.5	5.9	6.1
25	.....	.....	.....	.....	.....	4.0	4.8	10.1	3.5	3.5	6.9	6.5
26	.....	.....	.....	.....	.....	3.8	4.4	8.9	3.4	3.5	6.0	5.8
27	.....	.....	.....	.....	.....	3.8	4.3	5.8	3.3	3.5	5.4	5.3
28	.....	.....	.....	.....	.....	4.0	4.2	4.9	3.2	4.3	5.0	4.9
29	.....	.....	.....	.....	.....	3.7	3.9	4.4	3.1	7.3	4.6	4.8
30	.....	.....	.....	.....	.....	3.8	4.3	4.2	3.3	6.0	4.4	4.7
31	.....	.....	.....	.....	.....	.....	4.2	4.0	.....	5.3	.....	4.6
1908.												
1	4.5	6.0	4.8	9.1	4.0	4.7	2.3	3.6	2.0	1.5	1.4	1.6
2	4.5	8.9	9.7	8.5	4.0	4.2	2.2	3.4	2.0	1.5	1.4	1.6
3	4.4	8.7	8.4	7.0	4.3	4.0	2.2	3.2	2.0	1.4	1.4	1.7
4	4.3	8.5	6.7	5.7	4.4	3.9	2.4	2.9	2.0	1.5	1.4	1.7
5	4.3	8.2	5.8	5.2	8.4	4.3	3.3	2.6	1.9	1.5	1.4	1.7
6	4.5	13.8	6.1	4.9	9.5	4.1	3.8	2.5	1.9	1.5	1.4	1.8
7	4.3	8.3	7.7	4.8	7.5	3.9	3.5	3.7	1.9	1.5	1.4	1.9
8	4.3	6.0	6.5	4.6	9.2	3.7	3.4	3.8	1.9	1.5	1.4	1.9
9	4.6	5.1	7.8	6.6	7.4	3.5	3.2	3.6	1.8	1.5	1.4	1.8
10	4.3	5.0	8.2	7.2	10.55	3.4	3.1	3.3	1.8	1.5	1.4	1.9
11	4.2	4.7	6.6	8.5	10.2	3.4	2.8	3.5	1.8	1.5	1.4	2.0
12	6.3	4.6	5.9	10.1	6.7	3.7	2.5	3.3	1.7	1.5	1.4	2.2
13	9.5	5.6	5.4	7.0	5.6	3.5	2.3	3.1	1.7	1.5	1.4	2.6
14	6.7	7.4	5.2	5.8	5.0	3.3	2.5	2.8	1.7	1.4	1.4	3.9
15	6.0	8.3	4.9	5.2	4.6	3.5	2.8	2.5	1.7	1.4	1.5	3.5
16	5.5	11.1	5.0	5.5	5.2	3.9	3.5	2.3	1.7	1.4	1.5	3.2
17	5.2	7.6	4.8	6.0	5.0	3.9	3.2	2.3	1.7	1.4	1.6	2.7
18	5.0	6.0	4.8	5.5	4.6	3.5	4.0	2.3	1.7	1.4	1.6	2.5
19	4.8	5.7	5.0	5.6	4.7	3.4	4.4	2.2	1.6	1.4	1.5	2.3
20	4.5	6.2	7.2	6.2	5.9	3.4	3.8	2.2	1.6	1.4	1.5	2.5
21	4.3	5.7	6.2	5.8	8.2	3.2	3.6	2.1	1.6	1.4	1.5	3.0
22	4.5	5.4	5.5	5.2	6.8	3.4	4.1	2.1	1.6	1.4	1.5	3.1
23	4.7	4.9	5.2	4.8	5.8	3.5	4.3	2.1	1.6	1.4	1.5	3.2
24	4.9	4.7	5.0	4.6	5.2	3.4	3.8	2.1	1.6	1.4	1.5	2.8
25	4.7	4.6	4.9	4.4	4.8	3.3	4.2	2.1	1.5	1.4	1.5	2.7
26	4.7	4.5	4.8	4.3	4.9	3.2	5.7	2.1	1.5	1.4	1.6	2.5
27	6.5	5.5	4.6	4.2	4.7	3.1	5.4	2.1	1.5	1.4	1.6	2.8
28	7.8	5.4	4.4	4.0	4.3	3.0	5.3	2.1	1.5	1.4	1.6	3.4
29	6.2	4.9	4.7	3.9	4.1	2.7	4.5	2.1	1.6	1.5	1.6	3.4
30	6.0	.....	8.2	3.8	4.0	2.5	4.1	2.0	1.5	1.5	1.6	3.4
31	6.0	.....	7.2	.....	5.6	.....	3.8	2.0	.....	1.4	.....	3.5

WEST FORK RIVER AT ENTERPRISE, W. VA.

This station, which is located at the highway bridge at Enterprise, W. Va., was established June 2, 1907, to obtain data for use in studying water power, water supply, pollution, flood control, and storage problems.

Bingamon Creek is tributary from the west about 1 mile below the station.

Winter conditions are mild and ice does not form very thick, if at all.

A small dam is located at Worthington about 3 miles below the station, but backwater does not reach to the section, for, from December 5 to 12, 1908, when the gates at the dam were opened to let water out of the pond, no effect was produced at the gage. The gage reader states that during the summer of 1908 the only water running in the river was the pumpage from the numerous coal mines along the stream.

The datum of the gage has remained unchanged; the records are reliable and accurate.

Discharge measurements of West Fork River at Enterprise, W. Va., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 2	A. H. Horton	171	825	4.94	2,260
June 8	do	156	558	3.44	1,010
August 10	Horton and Padgett	161	718	4.20	1,600
September 13	A. H. Horton	157	500	3.04	617

Daily gage height, in feet, of West Fork River at Enterprise, W. Va., for 1907 and 1908.

[Observer, Charles M. Tetrick.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							1.6	2.1	2.0	2.0	3.6	2.6
2						4.9	3.0	2.0	1.9	2.0	8.4	2.4
3						4.8	3.9	2.0	1.8	2.1	6.3	2.3
4						3.8	3.6	1.9	2.7	2.2	5.5	2.2
5						3.2	3.1	1.9	2.5	4.7	5.0	2.1
6						3.6	2.0	1.9	2.3	4.0	4.6	2.0
7						3.5	3.5	2.3	2.0	3.5	4.2	2.0
8						3.2	3.5	2.2	1.9	4.3	4.0	1.9
9						4.8	8.4	2.0	1.8	3.6	3.7	2.1
10						4.5	5.0	4.2	1.7	3.2	3.5	2.6
11						3.3	9.6	3.6	4.5	3.0	3.1	9.7
12						2.9	7.5	2.9	6.5	2.8	2.8	7.5
13						5.1	4.8	2.5	4.5	2.6	2.4	6.0
14						9.4	3.2	2.1	3.0	2.3	2.3	8.5
15						6.4	3.0	2.0	2.8	2.1	2.2	9.0
16						4.5	2.9	2.0	2.5	2.1	2.2	7.0
17						3.5	2.5	1.9	2.1	2.0	2.1	6.3
18						2.9	9.5	1.8	2.0	1.9	2.4	5.1
19						2.6	8.5	2.0	3.0	1.9	3.6	4.0
20						2.4	4.9	2.3	3.1	1.8	3.5	3.8
21						2.3	4.2	2.1	2.6	1.8	3.3	3.5
22						2.2	3.1	2.0	2.4	1.7	3.0	3.0
23						2.0	4.6	3.0	2.2	1.6	2.8	2.8
24						1.8	3.8	8.2	2.1	1.5	10.5	4.8
25						1.6	3.5	6.8	2.0	1.4	8.5	4.0
26						1.7	3.8	5.6	2.0	1.4	5.4	3.8
27						1.7	3.1	4.2	2.0	1.5	4.5	3.5
28						1.7	2.7	3.5	1.8	3.6	3.2	3.1
29						1.8	2.3	2.6	1.9	5.4	3.0	2.9
30						1.6	2.2	2.4	2.0	4.5	2.7	3.0
31							2.0	2.1		3.3		2.6
1908.												
1	2.4	3.8	9.0	8.7	2.0	2.4	1.6	1.9	1.0	.8	.8	.8
2	2.3	3.6	14.0	10.4	3.0	2.2	1.4	1.8	.9	.7	.8	.8
3	2.2	3.4	8.0	8.0	2.6	2.0	1.3	2.5	.8	.8	.8	.8
4	2.0	3.3	6.5	6.4	5.0	1.9	1.2	2.0	.7	.8	.8	.8
5	3.0	15.0	5.0	4.4	16.4	1.8	1.1	1.6	.8	.8	.8	.8

Daily gage height, in feet, of West Fork River at Enterprise, W. Va., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
6	2.8	7.7	6.0	3.5	11.4	1.7	1.1	2.6	0.8	0.9	0.8	0.8
7	2.7	5.5	5.4	3.4	10.5	1.6	1.1	2.1	.8	.8	.8	.8
8	2.6	4.6	5.0	3.2	8.2	1.5	1.8	2.0	.8	.8	.8	.8
9	4.2	4.2	13.5	6.8	10.0	1.5	1.6	1.9	.7	.8	.8	1.3
10	4.0	4.0	9.6	6.3	9.5	1.4	1.4	1.8	.6	.7	.8	1.1
11	4.2	3.7	6.3	6.5	7.1	1.3	1.3	1.6	.9	.8	.8	1.0
12	4.6	3.3	4.7	5.5	5.2	1.2	1.2	1.4	.8	.8	.8	1.0
13	9.9	3.1	4.1	4.5	4.0	1.0	1.1	1.3	.7	.8	.8	1.1
14	7.6	3.0	3.7	4.0	3.2	1.0	1.6	1.3	.6	.8	.8	1.0
15	5.2	8.3	3.5	3.7	3.1	3.1	1.4	1.2	.7	.8	.8	1.2
16	4.8	8.0	3.3	3.3	2.8	2.6	1.5	1.1	.7	.8	.8	1.1
17	4.5	6.4	3.1	3.2	3.2	2.2	1.3	1.3	.9	.8	.8	1.0
18	4.1	4.3	3.0	3.2	3.9	2.0	2.8	1.1	.9	.8	.8	.9
19	3.8	4.0	11.8	3.0	5.3	1.9	2.0	1.0	.9	.8	.8	1.2
20	3.4	6.1	7.6	2.9	5.1	1.7	2.9	1.0	.8	.8	.8	1.1
21	3.1	5.0	5.1	3.1	10.6	1.5	2.2	.9	.8	.8	.8	1.1
22	3.0	4.5	4.5	2.7	5.6	1.4	2.0	1.0	.9	.8	.8	1.2
23	2.9	4.0	3.9	2.5	4.7	1.3	1.8	1.1	.8	.9	.8	1.1
24	2.8	3.8	3.4	2.4	4.0	1.2	1.5	1.0	.7	.9	.8	1.1
25	2.8	3.6	3.1	2.3	3.7	1.3	1.4	.9	.6	.9	.8	1.0
26	3.5	5.7	3.4	2.2	3.6	1.2	1.6	.9	.8	.9	.8	1.0
27	6.7	5.2	3.2	2.2	3.5	1.1	2.5	.8	.9	.9	.8	1.6
28	5.0	4.8	3.0	2.1	3.0	1.1	2.3	.8	.8	.9	.8	1.3
29	4.6	4.5	6.5	2.0	2.8	1.9	2.1	.8	.7	.8	.8	1.2
30	4.2	.....	7.0	1.9	2.5	1.7	2.0	.8	.8	.8	.8	1.1
31	4.0	.....	7.0	.....	2.3	.....	2.0	.7	.....	.8	.....	1.0

BUFFALO CREEK AT BARRACKVILLE, W. VA.

This station, which was established June 3, 1907, to obtain data for studying water power, flood control, and storage problems, is located at the iron highway bridge, about one-third mile above the covered wooden bridge at Barrackville, W. Va. The bridge is about $2\frac{3}{4}$ miles from Fairmont, and is about 4 miles above the mouth of the creek. Finches Run is tributary from the north about one-third mile below the station.

The winters are mild at this station and ice causes little or no trouble. The datum of the gage has remained unchanged. The records are reliable and accurate.

The station was discontinued December 31, 1908, as the stream is dry in summer.

Discharge measurements of Buffalo Creek at Barrackville, W. Va., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 3	A. H. Horton	92	181	2.73	275
June 4	do	87	141	2.36	194
August 10	Horton and Padgett	90	193	2.79	303
September 13	A. H. Horton	69	90	1.79	58

Daily gage height, in feet, of Buffalo Creek at Barrackville, W. Va., for 1907 and 1908.

[Observer, Miss Ethel Bert Motter.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							1.4	1.8	1.3	1.4	1.7	1.9
2							2.8	1.6	1.3	1.4	1.8	1.9
3						2.7	1.9	1.7	1.4	1.4	5.4	1.7
4						2.4	1.6	1.4	2.9	1.3	3.3	1.7
5						2.8	1.4	1.4	2.0	2.5	2.6	1.8
6						3.0	1.5	3.1	1.7	2.0	2.3	2.2
7						2.4	1.5	2.2	1.5	1.7	2.5	1.7
8						2.3	1.3	2.1	1.5	1.7	2.3	1.6
9						2.0	1.4	1.7	1.4	1.5	2.1	1.6
10						1.8	1.5	3.0	1.4	2.1	1.9	1.9
11						1.7	1.2	2.0	2.9	1.8	1.9	3.8
12						1.7	3.1	1.7	3.0	1.7	1.7	2.8
13						1.9	2.5	1.6	2.1	1.7	1.7	2.2
14						6.8	1.8	1.5	1.8	1.6	1.6	5.6
15						3.2	1.7	1.4	1.7	1.6	1.5	4.4
16						2.4	1.6	1.4	1.6	1.5	1.6	3.5
17						2.1	2.2	1.5	1.5	1.6	1.6	2.8
18						1.8	2.3	1.5	1.5	1.4	1.5	2.5
19						1.7	3.1	1.4	2.4	1.4	2.5	2.4
20						1.7	1.7	1.4	1.7	1.4	2.1	2.0
21						1.8	2.0	1.3	1.6	1.4	2.1	2.1
22						1.7	1.8	1.4	1.7	1.4	2.0	2.0
23						1.5	3.5	1.3	1.6	1.4	1.9	4.5
24						1.4	2.3	1.9	2.2	1.4	5.3	3.9
25						1.4	4.4	1.8	1.8	1.3	4.2	2.9
26						1.6	5.3	1.6	1.6	1.3	3.1	2.5
27						2.0	3.5	1.5	1.5	1.3	2.7	2.2
28						1.6	2.5	1.4	1.5	1.9	2.3	2.1
29						1.5	2.0	1.4	1.5	2.7	2.1	2.1
30						1.4	2.0	1.3	1.5	2.1	1.9	1.9
31							1.8	1.3		1.8		2.5
1908.												
1	2.2	2.3	2.5	3.5	3.1	1.9	.9	1.0	.7			
2	2.1	2.8	6.4	3.9	2.4	1.6	.9	1.0	.7			
3	2.0	2.8	3.9	3.0	3.0	1.5	1.7	.9	.7			
4	1.9	2.6	2.9	2.5	2.8	1.5	1.2	.9				
5	2.7	2.7	2.5	2.2	8.2	1.5	1.1	.8				
6	2.3	7.5	4.1	2.3	4.3	1.4	.9	.9				
7	2.3	3.2	3.8	2.1	4.4	1.3	.9	.8				.7
8	3.5	2.5	3.0	2.0	3.7	1.1	.9	.7				.7
9	3.0	2.7	5.7	4.1	3.0	1.1	1.3	.7				1.4
10	2.3	2.3	3.8	3.0	4.6	1.2	1.2	.7				1.2
11	2.3	2.3	3.1	4.7	3.0	1.1	1.1	.7				1.1
12	2.9	2.6	2.7	3.4	2.5	1.2	1.0	.7				1.6
13	4.9	3.0	2.4	2.7	2.2	1.1	1.2					1.9
14	3.2	3.4	2.5	2.3	2.0	1.1	1.8					1.5
15	2.5	6.0	2.3	2.2	1.9	1.2	2.7					1.3
16	2.3	4.1	2.4	2.3	2.1	1.2	1.6					1.2
17	2.2	2.9	2.2	2.0	1.8	1.2	1.3					1.2
18	2.1	2.3	2.1	1.9	2.2	1.1	1.5	.7				1.2
19	2.0	2.5	8.0	2.2	2.0	1.0	1.6	1.6				2.1
20	2.0	3.6	3.6	2.0	2.2	1.1	1.5	1.3				1.5
21	2.0	2.6	2.8	1.9	2.7	1.0	1.4	1.2				1.3
22	2.0	2.5	2.4	1.8	2.2	1.0	1.3	1.1				1.2
23	1.8	2.3	2.3	1.8	1.9	1.0	1.1	1.1				1.1
24	2.1	2.0	2.5	1.8	1.6	1.0	1.1	1.0				1.1
25	2.2	2.0	2.3	1.7	1.9	1.4	1.7	1.0				1.1
26	1.8	4.0	2.1	1.8	1.7	1.1	1.7	1.1				1.1
27	5.2	4.0	2.0	1.7	1.7	1.0	1.7	1.0				1.1
28	2.9	2.8	2.0	1.6	1.6	.9	1.4	1.0				1.1
29	2.7	2.5	2.4	1.6	1.6	.9	1.3	.9	.7			1.1
30	2.2		3.6	1.6	4.1	1.0	1.2	.8				1.1
31	2.3		3.7		2.6		1.1	.8				1.1

NOTE.—Water was standing in pools at gage height 0.7 foot and on those days for which no gage height is given.

YOUGHIOGHENY RIVER AT CONFLUENCE, PA.

The Youghiogheny rises in Garrett County, Md., and flows in a northwesterly direction into Pennsylvania, emptying into Monongahela River about 15 miles above Pittsburg. Its source is on the western slope of the Allegheny Mountains, at an elevation of about 2,900 feet. For 19 miles above its mouth the average fall of the stream is about 2 feet per mile, but above that point it soon increases to an average fall of nearly 5 feet per mile. The average width of the river from its mouth to West Newton, Pa., is about 546 feet.

The gaging station which was established by the United States Geological Survey September 15, 1904, to obtain comparative and statistical data regarding the discharge of the Youghiogheny for use in the determination of methods of flood prevention and for storage, navigation, and power problems, is located at a highway bridge about one-half mile from the railroad station at Confluence, Pa. It is now maintained by the Water Supply Commission of Pennsylvania, by which the records of gage heights and discharge measurements are furnished.

No important tributaries enter above the station. Casselman River, having approximately the same drainage area as Youghiogheny River, enters from the right about one-half mile below the station, and a short distance below Casselman River, Laurel Hill Creek enters also from the right. This creek has about one-fourth the drainage area of the Youghiogheny above Confluence. The joining of these three tributaries to the main Youghiogheny River, together with the inadequate flood channel capacity of the main stream, causes gorging and backwater at high stages to a greater or less extent in all of them. No measurements have yet been obtained which show backwater at the Youghiogheny station, but from general conditions it is believed to occur occasionally, particularly at very high stages, although much less than at the Casselman and Laurel Hill stations. A tangent has been adopted for the rating curve at high stages and applied directly without correction throughout 1907 and 1908. It may give excessive discharge occasionally, but in general and from daily comparisons with other stations the results are believed to be essentially correct.[a]

Conditions of flow are probably permanent, although somewhat disturbed by a low rock dam under the bridge. The low-water rating curve is fairly well defined. The discharge is occasionally affected by ice conditions. The datum of the gage has remained constant since the establishment of the station.

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[a] See also Casselman River and Laurel Hill Creek at Confluence, Pa.

Discharge measurements of Youghiogheny River at Confluence, Pa., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 10	A. H. Horton	222	475	3.38	1,390
August 15	H. D. Padgett	201	196	2.20	307
1908.					
February 16	F. F. Henshaw	257	1,900	9.10	8,850
August 21	R. H. Bolster	178	98	1.59	76
September 25[a]	F. E. Langenheim	75	69	1.20	22.9

[a] Wading measurement.

Daily gage height, in feet, of Youghiogheny River at Confluence, Pa., for 1907 and 1908.

[Observer, L. L. Mountain.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	6.3	2.65	3.2	2.45	3.1	3.2	2.2	2.9	2.05	2.05	2.3	3.2
2	4.9	3.2	4.15	2.4	3.0	5.55	2.7	2.7	2.0	1.95	2.35	3.0
3	4.4	6.35	3.6	2.3	2.95	4.5	2.55	2.6	2.65	1.9	6.0	3.1
4	3.9	5.0	3.4	2.25	3.2	3.5	2.35	2.5	2.6	2.1	4.7	3.9
5	3.7	3.75	3.25	2.25	2.9	4.5	2.1	2.5	2.5	2.1	4.3	3.0
6	3.4	3.65	3.1	2.2	2.85	4.8	2.05	3.4	2.2	2.55	4.1	2.5
7	3.4	3.6	3.0	2.25	3.15	4.2	2.0	3.1	2.05	2.45	6.75	2.75
8	3.9	3.3	2.95	2.4	3.15	4.05	1.95	3.0	2.05	2.4	5.25	3.0
9	6.75	3.15	2.9	2.4	8.25	3.6	1.9	2.9	2.05	3.0	5.1	3.2
10	5.0	2.8	3.0	2.75	5.25	3.2	1.9	2.8	2.0	2.7	4.25	5.95
11	4.2	2.7	3.5	2.8	4.4	5.15	2.8	2.75	2.45	2.5	3.8	5.85
12	11.15	2.65	3.5	3.0	4.0	3.85	5.35	2.6	2.5	2.4	3.6	5.6
13	7.25	2.65	16.2	3.0	3.4	4.05	3.85	2.5	2.3	2.45	2.15	5.4
14	11.6	2.6	19.0	3.1	3.05	5.3	3.05	2.4	2.1	2.3	2.95	5.0
15	8.9	2.9	9.5	3.0	2.85	4.05	2.7	2.3	2.0	2.25	2.75	4.6
16	6.7	2.85	6.5	3.7	2.85	3.6	2.5	2.2	1.9	2.4	2.55	4.3
17	6.3	2.8	5.0	3.7	2.75	3.4	5.2	2.1	1.9	2.4	2.5	4.0
18	8.1	2.75	4.4	3.45	2.65	3.1	6.1	2.1	2.05	2.25	2.6	3.85
19	12.65	3.0	14.0	3.3	2.85	2.85	4.6	2.1	2.3	2.15	3.1	2.5
20	9.3	3.85	10.7	3.3	4.4	2.75	3.8	2.0	2.3	2.1	2.8	2.4
21	6.2	3.4	6.7	3.25	3.65	2.7	3.2	1.9	2.2	2.1	2.65	2.35
22	4.8	3.1	5.7	3.2	3.55	2.6	3.2	1.9	2.1	2.0	2.85	2.5
23	4.1	3.05	4.3	3.2	3.45	2.4	4.6	2.2	2.1	1.95	2.8	6.05
24	3.7	3.0	3.75	5.3	3.35	2.6	4.0	4.0	2.4	1.9	2.8	7.25
25	4.0	2.95	3.35	4.4	3.05	2.3	3.8	3.55	2.15	1.85	2.9	5.75
26	3.7	2.9	3.1	3.85	3.15	2.3	6.6	3.1	2.1	1.9	3.0	4.7
27	3.3	2.9	3.0	3.7	3.25	2.3	5.35	2.75	2.0	2.0	3.15	3.85
28	3.05	3.0	2.85	3.55	3.2	2.2	4.2	2.55	1.9	3.3	3.25	5.0
29	2.9	.....	2.8	3.4	3.1	2.2	3.7	2.35	1.85	2.75	3.75	5.2
30	2.8	.....	2.65	3.2	2.9	2.2	3.35	2.2	2.1	2.35	3.15	4.2
31	2.7	.....	2.55	.....	2.9	.....	2.95	2.1	.....	2.4	.....	4.1
1908.[b]												
1	3.8	3.3	2.7	4.75	2.6	2.95	1.6	1.65	1.5	1.3	1.3	1.3
2	3.6	2.95	7.5	4.75	2.5	2.75	1.6	1.6	1.5	1.3	1.3	1.3
3	3.5	2.75	7.2	4.05	2.5	2.6	1.6	1.6	1.5	1.3	1.3	1.3
4	3.0	2.6	5.5	3.65	3.55	2.5	1.6	1.55	1.45	1.3	1.3	1.3
5	2.95	2.55	5.1	3.4	7.85	2.45	1.6	1.55	1.45	1.3	1.3	1.25
6	2.9	2.55	7.4	3.4	6.7	2.4	1.55	1.55	1.45	1.3	1.3	1.25
7	2.65	2.7	10.9	3.2	10.25	2.5	1.55	2.05	1.45	1.3	1.3	1.4
8	2.5	2.6	7.75	3.9	8.1	2.35	1.55	1.9	1.45	1.25	1.3	1.5
9	2.65	2.55	10.05	5.4	6.15	2.2	1.5	1.7	1.45	1.25	1.3	1.4
10	2.55	2.55	6.6	4.55	5.25	2.1	1.5	1.5	1.4	1.25	1.3	1.5
11	2.45	2.6	5.3	7.25	4.45	2.0	1.5	1.5	1.4	1.25	1.3	1.5
12	6.45	2.7	5.0	4.95	3.85	2.0	1.5	1.5	1.4	1.25	1.3	1.6
13	5.8	3.75	5.0	4.2	3.5	1.95	1.5	1.45	1.4	1.25	1.3	1.7
14	5.35	5.65	5.3	3.75	3.35	1.9	1.7	1.45	1.35	1.25	1.3	1.7
15	4.65	15.0	5.0	3.6	3.9	2.05	1.85	1.4	1.35	1.25	1.3	1.7
16	3.65	8.75	4.8	3.5	3.6	2.0	1.85	1.4	1.3	1.25	1.3	1.7
17	3.3	5.8	4.4	3.4	3.4	1.95	1.85	1.4	1.3	1.25	1.3	1.7
18	2.95	4.95	4.5	3.3	3.25	1.9	1.8	2.35	1.25	1.25	1.35	2.2
19	2.8	4.0	11.0	4.3	4.3	1.9	1.95	2.0	1.25	1.25	1.35	2.8
20	2.65	3.5	6.75	4.0	5.3	1.85	1.85	1.75	1.25	1.25	1.4	2.3

[a] No information available regarding ice conditions 1907. It is quite probable that there was some effect from ice during February, 1907.

[b] See note at end of table, next page.

Daily gage height, in feet, of Youghiogheny River at Confluence, Pa., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.[a]												
21	2.7	3.2	4.9	3.35	5.6	1.85	1.7	1.55	1.2	1.25	1.4	2.0
22	3.1	3.15	4.15	3.2	6.6	1.9	1.6	1.5	1.2	1.25	1.4	1.85
23	3.2	2.9	3.8	3.1	4.4	1.9	1.5	1.5	1.2	1.25	1.4	1.85
24	3.05	2.8	3.75	3.0	4.4	1.85	2.45	1.7	1.2	1.25	1.4	1.85
25	3.0	2.7	3.25	2.9	3.9	1.85	2.2	1.7	1.2	1.3	1.4	1.8
26	3.25	2.7	3.0	2.8	3.6	1.8	2.1	1.65	1.2	1.3	1.35	1.7
27	3.95	2.7	2.85	2.6	3.5	1.7	2.0	1.65	1.2	1.3	1.35	1.6
28	3.75	2.7	2.8	2.45	3.3	1.65	1.9	1.65	1.3	1.3	1.35	1.7
29	3.1	2.65	3.65	2.45	3.6	1.65	1.85	1.6	1.3	1.3	1.35	1.7
30	2.85	.....	3.8	2.4	4.2	1.6	1.75	1.55	1.3	1.3	1.3	1.7
31	3.7	.....	4.55	.....	3.3	.....	1.7	1.5	.....	1.3	.....	1.75

[a] No information available regarding ice conditions, 1908; discharge probably not affected at any time during this year.

Rating table for Youghiogheny River at Confluence, Pa., for 1907 and 1908.

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	23	2.30	465	3.40	1,316	4.50	2,467
1.30	33	2.40	533	3.50	1,407	4.60	2,585
1.40	47	2.50	603	3.60	1,501	4.70	2,705
1.50	67	2.60	674	3.70	1,598	4.80	2,827
1.60	93	2.70	746	3.80	1,698	4.90	2,951
1.70	127	2.80	820	3.90	1,801	5.00	3,077
1.80	168	2.90	896	4.00	1,907	5.20	3,337
1.90	217	3.00	974	4.10	2,015	5.40	3,604
2.00	271	3.10	1,055	4.20	2,125	5.60	3,880
2.10	334	3.20	1,139	4.30	2,237	5.80	4,166
2.20	399	3.30	1,226	4.40	2,351	6.00	4,460

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1904 to 1909 and is fairly well defined below gage height 10 feet. Above gage height 6 feet the rating curve is a tangent, the difference being 150 per tenth.

Monthly discharge of Youghiogheny River at Confluence, Pa., for 1907 and 1908.

[Drainage area, 435 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	14,400	746	4,200	9.66	11.14	B.
February	4,980	674	1,240	2.85	2.97	C.
March	24,000	638	4,090	9.40	10.84	B.
April	3,470	399	1,120	2.57	2.87	A.
May	7,840	710	1,460	3.36	3.87	A.
June	3,810	399	1,470	3.38	3.77	A.
July	5,360	217	1,540	3.54	4.08	A.
August	1,910	217	685	1.57	1.81	A.
September	710	192	379	.871	.97	A.
October	1,230	192	467	1.07	1.23	A.
November	5,580	366	1,530	3.52	3.93	A.
December	6,340	499	2,240	5.15	5.94	A.
The year	24,000	192	1,700	3.91	53.42	
1908.						
January	5,140	568	1,440	3.31	3.82	A.
February	18,000	638	2,050	4.71	5.08	B.
March	12,000	746	3,910	8.99	10.36	B.
April	6,340	533	1,730	3.98	4.44	A.
May	10,800	603	2,760	6.34	7.31	B.
June	935	93	333	.766	.85	A.
July	568	67	158	.363	.42	B.
August	499	47	116	.267	.31	B.
September	67	23	40.7	.094	.10	B.
October	33	28	30.3	.070	.08	B.
November	47	33	37.2	.086	.10	B.
December	820	28	150	.345	.40	B.
The year	18,000	23	1,060	2.44	33.27	

NOTE.—Open channel rating applied throughout 1907–8.

CASSELMAN RIVER AT CONFLUENCE, PA.

This station was established by the United States Geological Survey September 15, 1904, at a highway bridge about 500 yards from the railroad station. It is now maintained by the Water Supply Commission of Pennsylvania, by which the records of gage heights and discharge measurements are furnished to obtain data for the determination of methods of flood prevention, and for storage, navigation, and power problems.

No important tributary enters near the station. It is located, however, only a few hundred yards above the junction of Casselman and Youghiogheny rivers, and as a result backwater usually occurs at high stages. The measurements indicate that as a rule backwater does not occur below gage height 4 feet, and below this stage a good rating curve has been developed under permanent channel conditions. Above 4 feet a double reversed rating curve has been used which shows about 1 to 2 feet backwater. From daily comparisons of discharge of the 3 streams at Confluence, this seems to be a fair average of backwater conditions which, of course, vary with each flood.[a]

The discharge is more or less affected by ice during the winter periods. The datum of the gage has remained the same since the installation of the station. The bridge was moved a little by the flood of March 14, 1907, but gage heights were not materially affected thereby nor by the repairs to the bridge later.

Discharge measurements of Casselman River at Confluence, Pa., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 10	A. H. Horton	217	409	3.00	1,140
August 15	H. D. Padgett	194	172	1.88	153
1908.					
February 16	F. F. Henshaw	248	2,170	10.20	8,900
Do	do	248	1,560	7.73	5,560
February 17	do	228	1,010	5.52	3,320
August 21	R. H. Rolster	219	148	1.67	85
September 25[b]	F. E. Langenheim	69	68	1.35	13.2

[a] See also Youghiogheny River and Laurel Hill Creek at Confluence, Pa.
[b] Wading measurement.

Daily gage height, in feet, of Casselman River at Confluence, Pa., for 1907 and 1908.

[Observer, L. L. Mountain.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.8	2.5	2.5	2.65	3.1	3.1	2.4	2.2	1.8	1.9	1.95	2.9
2	4.3	2.7	3.5	2.6	2.9	5.55	2.85	2.1	1.75	1.85	1.9	2.85
3	3.8	5.3	3.2	2.55	3.0	4.55	2.5	2.0	1.9	1.8	4.95	2.8
4	3.5	3.7	3.0	2.5	3.3	3.65	2.25	2.0	2.2	1.85	4.1	2.75
5	3.3	3.25	2.9	2.45	3.1	4.85	2.3	2.0	2.2	1.9	3.6	2.7
6	3.05	3.1	2.9	2.45	2.95	4.55	2.3	2.45	2.0	2.0	3.3	2.6
7	3.05	2.95	2.9	2.55	3.2	3.65	2.3	2.4	1.85	1.95	6.0	2.35
8	3.5	2.85	2.8	2.5	3.25	3.7	2.25	2.2	1.8	1.9	4.15	2.45
9	6.0	2.75	2.7	2.45	8.55	3.3	2.15	2.2	1.8	2.25	3.65	2.6
10	4.2	2.7	2.6	2.85	5.1	3.05	2.2	2.15	1.8	2.1	3.1	6.2
11	3.5	2.6	2.8	2.9	4.15	6.25	2.55	2.15	3.0	2.05	2.9	6.1
12	11.2	2.55	3.0	3.1	3.8	4.45	4.95	2.1	2.8	2.0	2.75	5.7
13	7.5	2.5	16.3	3.0	3.35	4.75	3.25	2.05	2.4	2.35	2.6	5.55
14	11.25	2.5	18.1	2.95	3.15	6.55	2.7	2.0	2.2	2.0	2.55	5.25
15	8.15	2.75	8.3	2.9	3.0	5.15	2.5	1.9	2.05	2.1	2.45	4.1
16	5.85	2.7	6.1	3.4	2.9	3.75	2.4	1.8	2.0	2.0	2.35	3.95
17	5.4	2.65	4.5	3.3	2.8	3.45	3.35	1.9	2.0	1.95	2.3	3.75
18	6.4	2.6	3.9	3.2	2.7	3.20	3.8	1.9	2.0	1.95	2.4	3.55
19	12.2	2.8	14.2	3.1	2.85	3.05	2.9	1.9	2.15	1.95	2.95	2.35
20	9.0	3.3	10.4	3.1	4.4	2.95	2.5	1.8	2.15	1.9	2.7	2.4
21	5.5	2.95	6.1	3.05	3.65	2.85	2.3	1.75	2.1	1.85	2.55	2.5
22	4.2	2.7	5.1	3.2	3.5	2.75	2.2	1.75	1.9	1.85	2.75	2.7
23	3.5	2.7	4.0	3.2	3.3	3.2	2.15	1.85	1.9	1.8	2.75	5.95
24	3.1	2.7	3.55	4.6	3.2	2.85	2.15	2.8	2.1	1.75	2.7	5.25
25	3.3	2.6	3.3	3.6	3.05	2.75	2.2	2.35	2.0	1.7	2.65	4.3
26	3.1	2.5	3.1	3.25	3.3	2.55	4.1	2.2	1.95	1.75	2.7	3.7
27	2.9	2.5	3.2	3.25	3.3	2.45	3.5	2.1	1.85	1.9	2.95	3.4
28	2.9	2.55	3.2	3.2	3.25	2.3	2.55	2.0	1.8	2.5	3.1	4.6
29	2.8	.....	3.1	3.15	3.15	2.4	2.4	1.9	1.75	2.25	3.35	4.7
30	2.7	.....	2.9	3.1	3.05	2.45	2.3	1.85	1.9	2.1	2.95	3.8
31	2.6	.....	2.75	.....	2.9	.....	2.15	1.8	.....	2.0	.....	3.6
1908.												
1	3.4	2.6	2.65	3.8	2.7	2.85	1.75	1.7	1.5	1.5	1.4	1.4
2	3.0	2.55	6.8	4.3	2.6	2.65	1.75	1.6	1.5	1.5	1.4	1.4
3	2.8	2.5	6.3	3.5	2.55	2.5	1.75	1.6	1.45	1.5	1.4	1.45
4	2.75	2.4	4.65	3.2	2.85	2.4	1.75	1.55	1.45	1.5	1.4	1.45
5	2.7	2.4	4.6	3.05	6.95	2.3	1.75	1.55	1.4	1.5	1.35	1.45
6	2.65	2.35	7.25	3.1	5.7	2.2	1.75	1.55	1.4	1.45	1.35	1.45
7	2.45	2.45	10.6	3.0	10.3	2.15	1.75	1.75	1.4	1.45	1.35	1.5
8	2.25	2.35	7.05	3.9	7.2	2.1	1.75	1.7	1.4	1.45	1.35	1.6
9	2.5	2.35	9.35	4.8	5.2	2.05	1.7	1.7	1.4	1.45	1.35	1.5
10	2.45	2.45	5.7	3.9	4.2	2.0	1.7	1.6	1.35	1.4	1.35	1.55
11	2.4	2.45	4.6	7.55	3.6	1.95	1.65	1.55	1.35	1.4	1.4	1.6
12	7.1	2.55	4.75	4.7	3.25	1.95	1.65	1.55	1.35	1.4	1.4	1.7
13	5.8	3.1	5.00	3.9	3.05	1.95	1.65	1.50	1.35	1.4	1.4	1.65
14	4.8	4.9	5.4	3.5	3.0	1.9	1.75	1.50	1.35	1.4	1.4	1.6
15	4.5	16.1	5.0	3.3	3.7	2.1	1.85	1.45	1.35	1.4	1.4	1.7
16	3.3	7.95	5.0	3.2	3.1	2.05	1.85	1.45	1.35	1.4	1.45	1.75
17	2.95	5.05	4.25	3.0	3.0	2.0	1.8	1.45	1.35	1.4	1.45	1.9
18	2.9	4.8	4.6	3.1	3.0	2.0	1.8	1.65	1.3	1.4	1.5	2.85
19	2.6	3.8	11.3	4.15	3.3	1.95	1.7	2.0	1.3	1.4	1.55	2.55
20	2.45	3.15	6.35	3.3	4.7	1.9	1.7	1.75	1.3	1.4	1.6	2.15
21	2.65	2.95	4.5	3.1	5.3	2.3	1.7	1.6	1.3	1.4	1.6	1.95
22	3.2	2.9	3 75	3.0	5.8	2.25	1.95	1.55	1.3	1.4	1.6	1.9
23	3.25	2.8	3.5	2.95	3.5	2.15	1.85	1.55	1.3	1.4	1.55	1.9
24	2.85	2.7	3.5	2.9	3.55	2.1	2.95	1.6	1.35	1.4	1.55	1.9
25	2.65	2.65	3.15	2.85	3.25	2.3	2.9	1.6	1.35	1.45	1.55	1.9
26	3.0	2.6	2.95	2.8	3.05	2.0	2.65	1.55	1.3	1.45	1.5	1.8
27	3.15	2.6	2.85	2.65	2.9	1.9	2.45	1.55	1.3	1.45	1.45	1.7
28	3.2	2.6	2.8	2.55	2.8	1.8	2.3	1.55	1.3	1.45	1.45	1.75
29	2.7	2.55	3.5	2.55	3.0	1.8	2.1	1.6	1.3	1.45	1.45	1.75
30	2.45	.....	3.25	2.5	4.0	1.75	1.95	1.55	1.5	1.45	1.4	1.7
31	2.5	.....	3.9	.....	3.1	.....	1.8	1.5	.....	1.45	.....	1.95

NOTE.—No information is available regarding ice conditions 1907 and 1908; it is probable, however, that there was little or no effect due to ice

Rating table for Casselman River at Confluence, Pa., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.30	9	2.70	866	4.10	2,315	6.00	3,720
1.40	19	2.80	967	4.20	2,390	6.20	3,910
1.50	36	2.90	1,070	4.30	2,465	6.40	4,110
1.60	61	3.00	1,175	4.40	2,535	6.60	4,310
1.70	95	3.10	1,281	4.50	2,600	6.80	4,510
1.80	141	3.20	1,388	4.60	2,660	7.00	4,720
1.90	196	3.30	1,497	4.70	2,720	7.20	4,950
2.00	260	3.40	1,608	4.80	2,785	7.40	5,180
2.10	331	3.50	1,720	4.90	2,850	7.60	5,410
2.20	408	3.60	1,835	5.00	2,920	7.80	5,640
2.30	491	3.70	1,945	5.20	3,065	8.00	5,880
2.40	579	3.80	2,050	5.40	3,220	9.00	7,200
2.50	671	3.90	2,145	5.60	3,380	10.00	8,600
2.60	767	4.00	2,235	5.80	3,545		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1904 to 1909, and is well defined below gage height 4 feet. There is a double reversal in the rating curve between gage heights 4 and 10 feet on account of backwater effect. See description. Above gage height 10 feet the rating curve is a tangent, the difference being 150 per tenth.

Monthly discharge of Casselman River at Confluence, Pa., for 1907 and 1908.

[Drainage area, 450 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	11,900	767	3,280	7.29	8.40	B.
February	3,140	671	1,020	2.27	2.36	C.
March	20,800	671	3,560	7.91	9.12	B.
April	2,660	625	1,180	2.62	2.92	A.
May	6,580	866	1,630	3.62	4.17	B.
June	4,260	491	1,780	3.96	4.42	B.
July	2,880	370	844	1.88	2.17	A.
August	967	118	311	.691	.80	A.
September	1,180	118	308	.684	.76	A.
October	671	95	254	.564	.65	A.
November	3,720	196	1,200	2.67	2.98	A.
December	3,910	535	1,880	4.18	4.82	B.
The year	20,800	95	1,440	3.19	43.57	
1908.						
January	4,840	450	1,280	2.84	3.27	B.
February	17,800	535	1,800	4.00	4.31	B.
March	10,600	816	3,230	7.18	8.28	B.
April	5,350	671	1,640	3.64	4.06	B.
May	9,050	719	2,130	4.73	5.45	B.
June	1,020	118	356	.791	.88	A.
July	1,120	78	245	.544	.63	A.
August	260	28	64.7	.144	.17	B.
September	36	9	16.3	.036	.04	C.
October	36	19	24.9	.055	.06	C.
November	61	14	28.7	.064	.07	C.
December	1,020	19	160	.356	.41	A.
The year	17,800	9	915	2.03	27.63	

LAUREL HILL CREEK AT CONFLUENCE, PA.

This station was established by the United States Geological Survey September 15, 1904, at a highway bridge about one-quarter mile from the railroad station. It is now maintained by the Water Supply Commission of Pennsylvania, by whom the records of gage heights and discharge measurements are furnished. It was established to obtain data for use in the determination of methods of flood and water pollution prevention and for storage and power problems.

No important tributary enters near the station. It is located, however, only a few hundred yards above its junction with Youghiogheny River, and as a result backwater almost invariably occurs at high stages. The measurements indicate that as a rule backwater does not occur below gage height 3.0 feet. At low stages, however, conditions of flow are changeable owing to the fact that refuse dumped into the creek from a tannery a few feet above the station settles under one end of the bridge. As a result, the records of flow at this station are not so good as those at the other two Confluence stations. For high stages a reversed curve followed by a tangent has been used, the backwater effect increasing with the stage. This curve seems to give fair average results for flood stages and the daily discharges compare favorably with Casselman and Youghiogheny rivers. Backwater conditions vary with each flood.[a]

The discharge is affected by ice during the winter periods. The datum of the gage has remained constant during the period of maintenance of the station.

Discharge measurements of Laurel Hill Creek at Confluence, Pa., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 10	A. H. Horton	92	175	2.52	260
August 15	H. D. Padgett	85	120	2.07	72
1908.					
February 16	F. F. Henshaw	114	595	6.73	1,940
February 17	do	102	275	3.74	960
August 21	R. H. Bolster	73	81	1.61	16.8

[a] See Casselman River and Youghiogheny River at Confluence, Pa.

Daily gage height, in feet, of Laurel Hill Creek at Confluence, Pa., for 1907 and 1908.

[Observer, L. L. Mountain.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	4.8	2.35	2.7	2.4	2.7	3.25	2.2	2.3	2.0	2.05	2.1	2.5
2	3.55	2.55	3.2	2.4	2.6	4.0	2.5	2.2	2.0	1.95	2.05	2.45
3	3.2	3.35	3.0	2.3	2.65	3.25	2.25	2.1	2.3	1.9	4.25	2.3
4	3.2	2.5	2.75	2.25	2.8	2.6	2.15	2.05	2.4	2.05	4.3	2.2
5	3.0	2.3	2.5	2.2	2.5	3.0	2.1	2.0	2.25	2.0	3.5	2.25
6	2.8	2.25	2.35	2.2	2.5	2.5	2.1	2.55	2.2	2.15	3.05	2.15
7	2.8	2.2	2.25	2.25	2.85	2.5	2.05	2.25	2.15	2.05	4.0	2.05
8	3.3	2.25	2.2	2.35	2.9	2.7	2.05	2.4	2.1	2.0	5.1	2.35
9	3.9	2.3	2.3	2.4	5.0	2.55	2.0	2.35	2.1	2.6	3.1	2.5
10	3.2	2.4	2.35	2.6	3.4	2.35	1.95	2.3	2.05	2.35	3.0	4.75
11	3.0	2.35	2.65	2.7	3.1	4.4	2.6	2.25	2.6	2.2	2.8	4.7
12	9.0	2.3	2.7	2.9	2.85	3.8	3.85	2.35	2.55	2.1	2.65	4.5
13	4.0	2.25	14.4	2.7	2.75	3.8	3.0	2.2	2.25	2.2	2.55	4.15
14	8.8	2.35	17.0	2.7	2.65	4.8	2.6	2.1	2.2	2.25	2.5	3.95
15	5.75	2.5	6.7	2.6	2.45	3.85	2.4	2.05	2.15	2.15	2.45	3.7
16	3.95	2.5	5.2	3.0	2.5	3.1	2.35	2.05	2.1	2.1	2.35	2.95
17	3.8	2.45	4.25	3.05	2.5	2.8	4.05	2.0	2.05	2.05	2.3	2.7
18	4.9	2.4	3.85	2.9	2.5	2.65	4.2	1.95	2.1	2.1	2.4	2.5
19	9.6	2.6	12.35	2.9	2.65	2.55	3.4	1.9	2.2	2.05	2.5	2.3
20	6.3	2.95	7.7	2.85	3.15	2.45	2.9	1.9	2.15	2.05	2.45	2.2
21	3.8	2.8	4.25	2.8	2.7	2.35	2.7	1.9	2.05	2.0	2.4	2.25
22	3.3	2.7	3.45	2.75	2.65	2.3	2.5	1.85	2.2	2.0	2.5	2.4
23	2.9	2.6	3.2	2.8	2.6	2.3	2.4	2.15	2.1	2.0	2.45	4.85
24	2.8	2.5	2.95	3.9	2.55	2.3	2.4	3.6	2.1	1.95	2.45	4.75
25	3.0	2.5	2.7	3.4	2.5	2.3	2.3	2.9	2.0	1.9	2.5	3.8
26	2.8	2.5	2.65	3.05	2.7	2.25	3.2	2.7	2.0	1.9	2.5	3.1
27	2.6	2.5	2.65	2.95	3.45	2.2	2.8	2.5	1.9	1.95	2.55	2.95
28	2.5	2.5	2.7	2.9	3.3	2.1	2.45	2.3	1.8	2.85	2.75	3.35
29	2.45	.....	2.6	2.8	3.2	2.15	2.3	2.2	1.75	2.45	2.65	3.45
30	2.4	.....	2.5	2.75	3.0	2.2	2.25	2.1	2.1	2.2	2.55	3.25
31	2.4	.....	2.45	.....	3.0	.....	2.2	2.0	.....	2.25	.....	3.0
1908.												
1	2.85	2.65	2.55	3.25	2.8	2.5	1.85	1.75	1.5	1.6	1.45	1.5
2	2.75	2.55	5.1	3.45	2.7	2.4	1.85	1.7	1.5	1.6	1.45	1.5
3	2.6	2.5	4.35	3.2	2.65	2.3	1.85	1.65	1.45	1.6	1.45	1.5
4	2.55	2.45	3.6	3.0	2.95	2.25	1.8	1.6	1.45	1.6	1.45	1.5
5	2.5	2.4	3.5	2.85	4.1	2.2	1.8	1.6	1.4	1.6	1.45	1.5
6	2.45	2.45	5.1	2.85	3.7	2.2	1.8	1.6	1.4	1.55	1.45	1.5
7	2.45	2.5	8.15	2.75	7.65	2.15	1.8	1.75	1.4	1.55	1.45	1.6
8	2.45	2.35	3.85	4.15	4.75	2.1	1.8	1.7	1.4	1.5	1.45	1.65
9	2.4	2.35	5.5	3.95	4.6	2.1	1.8	1.7	1.4	1.45	1.45	1.55
10	2.4	2.4	3.85	3.35	3.2	2.05	1.75	1.65	1.35	1.4	1.45	1.6
11	2.35	2.35	3.4	5.5	2.6	2.0	1.75	1.6	1.35	1.4	1.5	1.65
12	4.5	2.7	3.6	3.65	2.6	2.0	1.75	1.6	1.35	1.4	1.5	1.75
13	3.45	3.3	3.85	3.2	2.65	1.95	1.75	1.6	1.35	1.4	1.5	1.75
14	3.15	3.8	4.4	2.9	2.55	1.9	1.75	1.55	1.35	1.4	1.5	1.85
15	2.8	12.2	4.35	2.95	2.8	2.15	1.9	1.55	1.35	1.4	1.5	1.85
16	2.65	5.5	4.05	2.9	2.6	2.1	1.85	1.55	1.35	1.4	1.5	1.9
17	2.5	3.7	3.55	2.85	2.65	2.05	1.8	1.55	1.35	1.4	1.5	2.1
18	2.45	3.45	6.15	2.8	2.8	2.0	1.75	2.0	1.3	1.4	1.55	3.1
19	2.4	3.1	9.05	3.5	3.3	1.95	1.75	2.0	1.3	1.4	1.55	2.7
20	2.35	2.9	4.5	3.1	3.6	1.9	1.75	1.9	1.3	1.4	1.6	2.2
21	2.5	2.8	3.5	3.0	3.35	2.1	1.7	1.85	1.3	1.4	1.6	2.05
22	2.95	2.6	3.2	2.9	3.7	2.05	2.4	1.8	1.3	1.4	1.6	2.0
23	2.9	2.6	3.0	2.8	3.0	2.0	2.1	1.8	1.3	1.4	1.55	1.95
24	2.6	2.55	3.0	2.7	2.75	2.4	3.1	1.8	1.3	1.4	1.55	1.95
25	2.55	2.5	2.85	2.6	2.6	2.3	3.05	1.75	1.3	1.45	1.55	1.9
26	2.55	2.45	2.85	2.5	2.55	2.1	2.8	1.7	1.3	1.45	1.55	1.9
27	3.15	2.4	2.75	2.45	2.5	2.0	2.6	1.7	1.3	1.45	1.55	1.9
28	3.0	2.4	2.75	2.4	2.4	1.9	2.4	1.65	1.5	1.45	1.55	2.0
29	2.6	2.35	3.9	2.4	2.4	1.9	2.2	1.6	1.5	1.45	1.55	1.95
30	2.35	.....	3.3	2.45	2.8	1.85	2.0	1.55	1.6	1.45	1.5	1.85
31	2.55	.....	3.6	.....	2.6	.....	1.85	1.5	.....	1.45	.....	1.95

NOTE.—No information available regarding ice conditions 1907 and 1908. It is probable that there was no great effect from ice.

Rating tables for Laurel Hill Creek at Confluence, Pa.

FOR 1907.

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	10	2.60	295	3.50	840	4.40	1,206
1.80	19	2.70	350	3.60	885	4.50	1,240
1.90	33	2.80	410	3.70	930	4.60	1,274
2.00	53	2.90	475	3.80	975	4.70	1,308
2.10	80	3.00	540	3.90	1,020	4.80	1,342
2.20	115	3.10	610	4.00	1,060	4.90	1,376
2.30	155	3.20	680	4.10	1,100	5.00	1,410
2.40	200	3.30	740	4.20	1,136	5.20	1,476
2.50	245	3.40	790	4.30	1,171	5.40	1,540

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on two discharge measurements made during 1907 and the 1904 to 1906 rating. It is fairly well defined between gage heights 2.0 feet and 3.0 feet. The rating curve is a tangent above gage height 5.4 feet, the difference being 30 per tenth. There is a reversal in the rating curve between gage heights 3.0 and 5.4 feet due to backwater. See description.

FOR 1908.

1.30	4	1.90	52	2.50	284	3.10	636
1.40	7	2.00	76	2.60	338	3.20	690
1.50	11	2.10	106	2.70	395	3.30	742
1.60	16	2.20	142	2.80	456	3.40	790
1.70	23	2.30	185	2.90	522		
1.80	35	2.40	233	3.00	581		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on one discharge measurement made during 1908 and the form of the 1906 and 1907 curves. It is fairly well defined between gage heights 1.6 feet and 3.0 feet. Above gage height 3.4 feet it is the same as the 1907 table.

Monthly discharge of Laurel Hill Creek at Confluence, Pa., for 1907 and 1908.

[Drainage area, 118 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	2,800	200	919	7.79	8.98	C.
February	765	115	251	2.13	2.22	C.
March	5,020	115	953	8.08	9.32	C.
April	1,020	115	380	3.22	3.59	B.
May	1,410	222	445	3.77	4.35	B.
June	1,340	80	443	3.75	4.18	B.
July	1,140	43	317	2.69	3.10	B.
August	885	26	152	1.29	1.49	B.
September	295	14	99.3	.842	.94	B.
October	442	33	99.3	.842	.97	B.
November	1,440	66	421	3.57	3.98	B.
December	1,360	66	572	4.85	5.59	B.
The year	5,020	14	421	3.57	48.71	
1908.						
January	1,240	209	395	3.35	3.86	B.
February	3,580	209	541	4.58	4.94	B.
March	2,640	311	1,030	8.73	10.06	C.
April	1,570	233	596	5.05	5.63	B.
May	2,220	233	606	5.14	5.93	B.
June	284	44	113	.958	1.07	B.
July	636	23	116	.983	1.13	B.
August	76	14	26.2	.222	.26	B.
September	16	4	6.57	.056	.06	D.
October	16	7	9.55	.081	.09	D.
November	16	9	11.7	.099	.11	D.
December	636	11	75.1	.636	.73	B.
The year	3,580	4	294	2.49	33.87	

MUSKINGUM RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The drainage basin of Muskingum River lies in the eastern part of the State of Ohio. The Muskingum is formed by the junction of Mohican and Tuscarawas rivers at Coshocton, near the central part of Coshocton County. It flows in a slightly southwesterly direction to Zanesville, thence it flows in a southeasterly direction and joins Ohio River at Marietta, Ohio. In the southeastern part of Morgan County the river forms a large bend and flows due north for several miles. Mohican River rises in the northwestern part of Richland County and flows in a general southeastward direction until it joins the main river. Tuscarawas River rises in the western part of Summit County, flows in a general southerly direction to the northeastern part of Tuscarawas County, thence it flows southwestward to its junction with the Mohican. The important tributaries of the Mohican are Walhonding and Killbuck creeks; of the Tuscarawas, Chippewa and Sugar creeks on the west bank, and Sandy and Big Stillwater creeks on the east bank. There are only two tributaries of any importance tributary to the Muskingum, Licking River from the west near Zanesville, and Wills Creek from the east near the southern line of Coshocton County. The length of the river below the junction of the Mohican and Tuscarawas is about 100 miles (map measurement). The total drainage area is about 8,000 square miles.

The drainage basin is regular in shape, being about 100 miles wide and 125 miles long. Only the headwaters of Licking, Mohican, and Tuscarawas rivers lie within the glaciated area, the remainder of the basin being unglaciated. In the central and southern part of the basin the soil has resulted from the disintegration of native rocks, and the country is poorly watered; its surface is extremely rough and irregular, cut in every direction by valleys, between which rise high hills. To the north the surface becomes less broken, though still undulating; the soil has been derived from drift materials and is sandy and gravelly. At the headwaters of Mohican and Tuscarawas rivers it is naturally marshy. This characteristic has been much modified by cultivation and drainage, but swamp areas still exist, and springs are common in the glaciated region. The elevation of the sources of the Mohican and Tuscarawas rivers is about 1,100 feet; the elevation at Coshocton is about 730 feet; at Zanesville about 688 feet; at the mouth of the river at Marietta the elevation is 570 feet.

There are no large forested areas in this drainage basin. This region has been long settled and the timber left standing is in groves or wood lots, generally of small size.

The mean annual rainfall is about 40 inches, being less at the headwaters and greater at the mouth of the river. The winter conditions in the northern part are comparatively severe. Ice forms

on the streams about 1 foot in thickness. In the lower part of the basin the conditions are milder, but ice generally forms on the river.

The basin affords opportunities for storage reservoirs at the headwaters of the tributaries, and reservoirs constructed in 1830 to store water for feeding the Ohio Canal are in existence at the present time. The cost of overflowed land would undoubtedly now prohibit the construction of reservoirs.

The basin offers favorable opportunities for the development of water power, both on the main stream and tributaries.

The Muskingum is navigable from Zanesville down. In this stretch of the river there are 10 locks and dams with a total fall of 118 feet; and the surplus water is available for water power, but only at one or two places is all the power at these dams utilized.

The Ohio Canal, which runs from Cleveland to Portsmouth, Ohio, crosses this drainage basin. At the headwaters of Tuscarawas and Licking rivers are the reservoirs for feeding the canal both ways from the summits, thus some water is diverted from the Muskingum basin. The surplus water from the canal between the two summits is discharged into Muskingum River near Dresden. About the only use made of the canal at the present time is to furnish water for the power plants situated along its banks.

The following gaging stations have been maintained in this drainage basin:

Muskingum River at Zanesville, Ohio, 1905–1908.[a]
Licking River at Pleasant Valley, Ohio, 1902–1906.
Jonathan Creek at Powells, Ohio, 1902–3.

MUSKINGUM RIVER AT ZANESVILLE, OHIO.

This station is located at the Sixth Street Bridge at Zanesville, about 1,000 feet above Lock No. 10. The gage, which belongs to the United States Engineer Corps, is located at the lock. The United States Weather Bureau furnishes the daily gage heights. The gage was established June 4, 1887. On March 11, 1905, discharge measurements were begun at this station to obtain data for the study of water-power, water-supply, pollution, and navigation problems.

Licking River enters from the west about one-half mile above the station. The drainage area above the section is about 5,830 square miles.

The winter conditions are comparatively severe, and ice generally causes some trouble. Several power plants located above the station may modify the flow in low water to some extent.

The datum of the gage has remained unchanged.

The station has not been visited since June, 1906, and nothing is known about the present conditions.

[a] In House Document No. 278, 1st sess., 54th Cong., 1896, pp. 41–43, Lieut. Col. H. M. Chittenden, U. S. Engineer Corps, gives the discharge of the Muskingum at Zanesville from December 1, 1887, to November 30, 1895.

Daily gage height, in feet, of Muskingum River at Zanesville, Ohio, for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	15.4	10.5	9.3	12.0	12.55	11.5	9.1	10.1	7.8	8.7	8.6	8.0
2	14.85	11.3	10.2	11.2	11.5	12.15	9.0	9.4	7.8	8.5	8.55	8.6
3	14.0	12.2	12.25	10.6	11.0	13.6	9.1	9.1	7.8	8.2	9.4	8.0
4	16.55	12.45	12.45	10.2	10.6	13.65	9.2	8.8	7.8	8.5	10.45	8.0
5	20.55	12.25	11.30	10.3	10.4	13.1	8.7	8.6	8.0	8.5	10.95	8.0
6	21.1	11.75	10.7	10.3	10.5	13.75	8.5	8.5	8.0	8.8	10.35	8.0
7	19.55	11.05	10.2	10.2	10.4	13.55	8.3	8.7	8.0	8.7	9.5	8.0
8	18.0	10.25	9.95	10.2	11.0	12.85	8.3	8.7	7.8	8.4	9.15	8.0
9	17.7	9.85	9.75	10.7	11.5	12.0	8.3	8.5	7.8	8.2	8.9	8.0
10	17.4	9.75	9.7	11.1	11.2	10.9	8.4	8.4	7.7	8.3	8.75	8.0
11	16.1	9.6	9.75	10.6	10.6	10.3	8.6	8.2	7.9	8.4	8.6	8.1
12	16.0	9.45	10.3	10.2	10.2	10.1	9.5	8.2	7.7	8.2	8.55	8.0
13	15.9	9.35	20.7	10.1	9.7	10.4	9.6	8.1	8.0	8.1	8.4	8.0
14	16.15	9.45	30.95	9.9	9.4	11.1	9.8	8.0	8.1	7.9	8.3	8.45
15	16.8	9.7	29.45	9.9	9.2	12.05	9.4	8.0	7.9	7.9	8.25	9.1
16	18.1	10.15	28.2	9.8	9.3	11.6	8.9	8.0	7.8	7.9	8.2	9.35
17	18.7	10.25	27.55	9.8	9.1	10.6	9.6	7.9	7.7	7.8	8.1	9.7
18	20.65	10.3	24.45	9.7	9.2	9.8	11.5	8.0	9.3	7.8	8.1	9.6
19	21.55	10.85	22.0	9.5	9.3	9.4	11.5	7.9	9.7	7.8	8.0	9.2
20	24.2	11.75	23.7	9.3	9.2	9.1	13.5	7.9	9.2	7.8	8.0	8.7
21	24.95	12.35	22.45	9.2	9.1	8.9	13.2	7.9	9.1	7.8	8.15	8.65
22	23.8	11.6	21.0	9.1	9.1	8.9	11.95	7.9	8.7	7.7	8.25	8.5
23	21.5	10.45	19.25	9.3	9.0	8.9	10.7	7.9	8.2	7.7	8.2	10.25
24	17.3	9.85	16.4	10.6	10.1	8.8	10.0	7.9	8.0	7.7	8.2	14.3
25	13.6	9.75	13.55	12.15	11.0	8.6	9.9	8.1	8.2	7.7	8.2	15.15
26	12.2	9.6	12.05	15.8	15.1	8.6	13.4	8.1	7.8	7.7	8.2	14.4
27	11.25	9.45	11.65	19.25	17.55	8.5	17.7	8.6	7.7	7.7	8.2	13.4
28	10.85	9.5	12.95	18.0	17.25	8.6	14.7	8.4	7.6	8.0	8.1	12.1
29	10.65	.....	13.8	16.8	16.15	8.7	13.45	8.0	9.0	8.1	8.15	11.25
30	10.55	.....	13.75	14.45	15.05	8.7	12.55	7.9	8.4	8.3	8.1	10.85
31	10.15	.....	12.9	.....	12.9	.....	11.5	7.8	.....	8.8	.....	11.6
1908.[b]												
1	11.7	9.15	13.1	13.05	9.95	10.75	8.1	8.0	7.7	7.7	7.7	7.7
2	11.15	9.05	22.1	12.95	10.95	10.15	8.2	8.0	7.7	7.6	7.7	7.7
3	10.65	8.8	25.75	12.2	12.15	9.95	8.1	7.9	7.8	7.6	7.7	7.7
4	10.25	8.75	26.0	11.5	12.2	9.6	8.15	7.9	7.8	7.5	7.7	7.7
5	10.4	8.75	24.85	10.8	13.3	9.35	8.0	8.05	7.8	7.6	7.7	7.7
6	10.3	13.75	26.65	10.55	13.3	8.95	8.0	8.7	7.8	7.7	7.7	7.7
7	10.1	11.95	22.4	10.5	18.2	8.7	8.2	8.9	7.8	7.7	7.7	7.75
8	9.75	11.8	20.15	12.4	20.25	8.55	8.2	8.9	7.8	7.7	7.7	7.8
9	9.25	11.6	19.65	17.55	18.4	8.4	8.1	8.6	7.8	7.7	7.7	7.8
10	8.8	11.3	18.5	17.1	17.1	8.4	8.15	8.45	7.8	7.7	7.7	7.8
11	8.8	11.0	17.45	16.75	15.65	8.4	8.2	8.3	7.8	7.7	7.7	7.8
12	9.1	11.3	16.1	15.2	13.85	8.3	8.1	8.2	7.8	7.7	7.7	7.8
13	10.6	14.15	14.75	13.75	11.95	8.3	8.2	8.1	7.7	7.7	7.7	7.8
14	11.35	16.75	13.65	12.3	10.85	8.25	8.25	8.0	7.7	7.7	7.7	7.8
15	10.9	21.55	13.3	11.55	10.4	8.3	8.8	8.0	7.7	7.7	7.7	7.8
16	10.55	24.2	13.25	11.65	10.05	8.4	8.5	8.0	7.6	7.7	7.7	7.8
17	9.85	23.95	12.9	11.85	10.1	8.3	8.5	7.9	7.6	7.7	7.7	7.8
18	9.75	22.2	13.7	11.9	10.75	8.2	8.8	8.05	7.6	7.6	7.7	7.8
19	9.3	20.05	21.2	11.65	11.35	8.1	8.45	8.0	7.6	7.6	7.7	7.8
20	9.2	16.45	22.4	11.95	11.65	8.15	8.6	8.0	7.6	7.7	7.7	7.8
21	9.0	13.35	21.3	11.9	11.35	8.1	8.4	8.0	7.7	7.6	7.7	8.0
22	9.0	11.9	20.8	11.1	11.2	8.8	8.6	7.9	7.7	7.7	7.7	8.0
23	9.0	11.25	19.4	10.5	10.6	9.85	8.8	7.8	7.6	7.7	7.7	8.0
24	9.15	10.7	17.05	10.0	10.3	8.9	8.75	7.8	7.6	7.7	7.7	8.0
25	8.8	10.35	14.4	9.9	9.75	8.35	8.55	7.8	7.6	7.7	7.7	8.0
26	8.75	10.85	12.25	9.9	9.45	8.2	8.25	7.8	7.6	7.7	7.7	8.0
27	9.7	12.3	11.3	9.8	9.25	8.15	8.45	7.8	7.6	7.7	7.7	8.0
28	10.0	12.5	11.0	9.65	9.05	8.1	8.4	7.75	7.7	7.7	7.7	8.0
29	10.5	11.5	12.25	9.45	9.05	8.1	8.4	7.8	7.7	7.7	7.7	8.0
30	9.95	.....	12.8	9.45	9.3	8.15	8.3	7.8	7.6	7.7	7.7	8.0
31	9.65	.....	13.15	.....	11.9	.....	8.15	7.8	.....	7.7	.....	8.0

[a] No information is available regarding ice conditions at this station during 1907. It is believed, however, that there was considerable backwater from this source from the latter part of January to the first part of March.

[b] No information is available regarding ice conditions at this station during 1908. It is believed, however, that there was considerable backwater from this source from the latter part of January to the middle of February.

KANAWHA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The lower part of this river, below the mouth of the Gauley, is called the Kanawha; above this point it is called the New. The drainage basin of the Kanawha comprises about one-third of the State of West Virginia, part of western Virginia, and the counties of Alleghany, Ashe, and part of Watauga County in the extreme northwestern part of North Carolina. New River is formed by the union of the North Fork and South Fork a few miles south of the northern boundary of North Carolina. Considering the South Fork as the main stream, as it is the larger, the river rises in the central part of Watauga County near Boone, N. C., whence it flows northeastward across the state line into Virginia. At Radford, Va., the river turns abruptly and flows northwestward across West Virginia, and empties into Ohio River at Point Pleasant, W. Va. The total length of the river is 427 miles. The lower 90 miles have been made navigable by means of locks and dams. The total drainage area comprises 12,197 square miles. Beginning at the headwaters and following down the right or eastern bank the important tributaries are Big Reed Island Creek and Little River in Virginia; Greenbrier River, Gauley River, Elk River, and Pocotaligo River in West Virginia; those on the left or western bank are Cripple Creek, Reed Creek, Walker Creek, and Wolf Creek in Virginia; East River, Bluestone River, and Coal River, in West Virginia. The drainage area is irregular in outline. Its length, following the general course of the river, is about 240 miles; its width at the widest point is about 140 miles. The sources of the river lie in the Appalachian Mountains among the high ridges that separate this basin from the basins of Great Pedee and Santee rivers, which drain into the Atlantic Ocean; and from the basin of Tennessee River which drains into the Ohio. The basins of the tributaries in North Carolina and in the southern part of Virginia are more or less regular in outline and circular in shape. The main river crosses the Allegheny Front just below Pearisburg, Va., near the Virginia and West Virginia line. Along this section the basins of the tributaries are long and narrow. Below the state line to the mouth of the river the valley of the Kanawha proper is very narrow.

As all the tributaries except those in the lower part of the basin drain the steep slopes and precipitous sides of mountainous country, the beds of the streams are rough and rocky and there are many falls and rapids. Along the section traversed by the Chesapeake and Ohio Railroad, from the West Virginia line to Charleston, W. Va., and especially from Hinton to the mouth of Gauley River the scenery is exceptionally fine, for through this section the river is confined to a narrow canyon with mountains on both sides. (See Pl. IV.)

The sources of the river are about 3,660 feet above sea level; at its mouth the elevation is 510 feet. The total fall is therefore about 3,100 feet, or an average fall of over 7 feet to the mile. The following table gives some idea of the slope of the river:

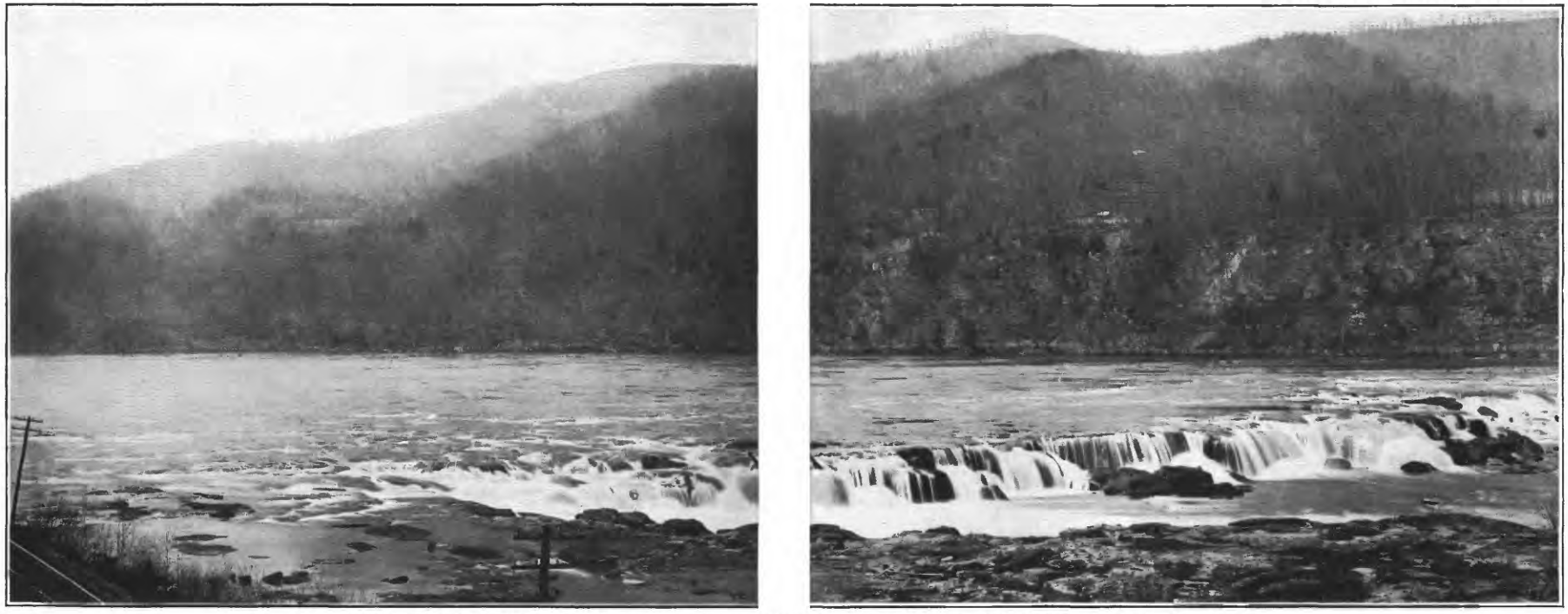
Locality.	Elevation.	Distance.	Fall between points.	Distance between points.	Average fall per mile.
	Feet.	*Miles.*	*Feet.*	*Miles.*	*Feet.*
Sources	3,600	0			
Junction of North and South Forks	2,500	86	1,100	86	12.8
Radford, Va	1,760	192	740	106	7.0
Virginia-West Virginia State line	1,500	246	260	54	4.8
Hinton, W. Va	1,340	270	160	24	6.7
Gauley River	650	331	690	61	11.3
Upper Pool, Lock No. 2	600	343	50	12	4.2
Mouth	510	427	90	84	1.1

Probably from 10 to 20 per cent of the drainage area is forested. Lumbering is being carried on extensively along many of the tributaries, especially at the headwaters of the Gauley and Greenbrier, where there are large areas of virgin timber. The mean annual rainfall at the sources of the river in North Carolina is about 55 inches; on that part of the drainage basin in Virginia the rainfall is from 45 to 50 inches; in West Virginia the rainfall is 45 inches.

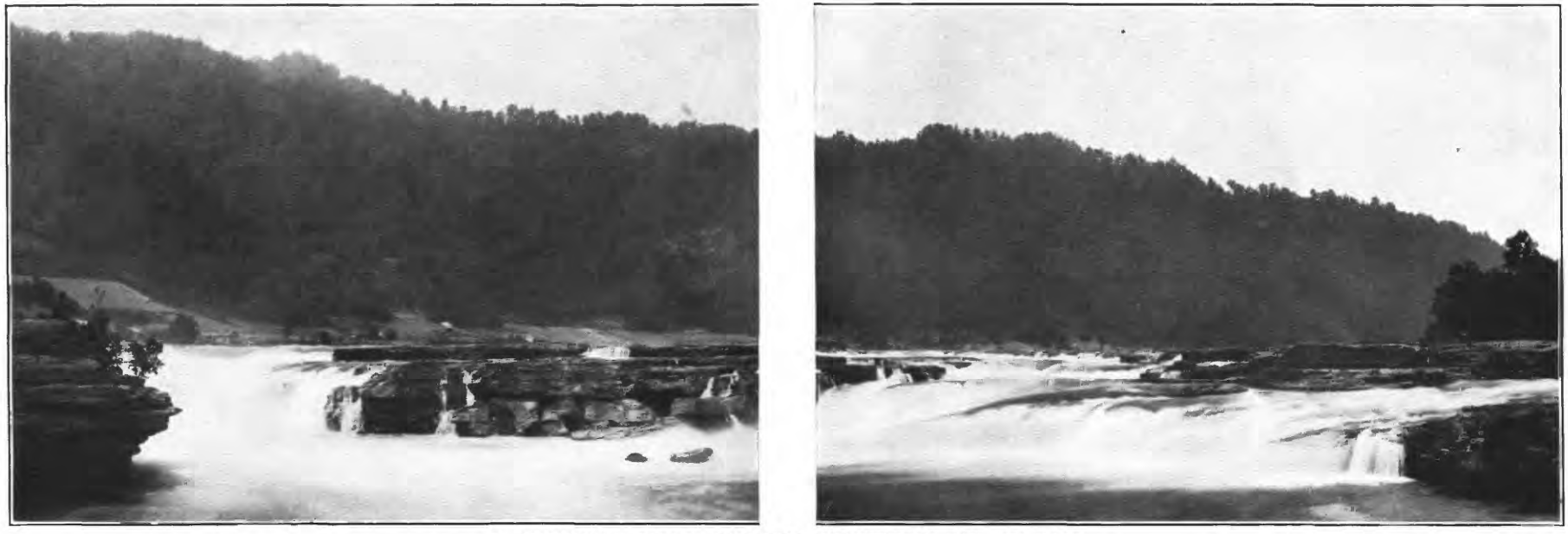
In general, the winters throughout the basin are mild. Ice does not form very thick, and the snowfall is light and does not last long. During the winter of 1908 and 1909 ice formed about 2 inches thick at a few of the stations in the basin and lasted only a few days,

The basin affords many opportunities for storage reservoirs, there being suitable foundation sites for large dams, and material for their construction is readily accessible. Reservoirs would be of use for flood control, as an aid to navigation, and for water-power development. At the present time, the basin affords abundant supplies of coal, oil, and gas, but as these supplies diminish and the cost of fuel increases, the numerous opportunities for power development afforded by the river and its tributaries will be very extensively utilized. The lower part of the river has been made navigable by means of ten locks and dams, the lift ranging from about 6 feet to 14 feet. The lock farthest upstream is located at Montgomery, W. Va., about 84 miles above the mouth; the lowest lock is near Point Pleasant, about one mile above the mouth of the river. The river is used principally for transporting the coal mined from the extensive coal fields along the river above Charleston.

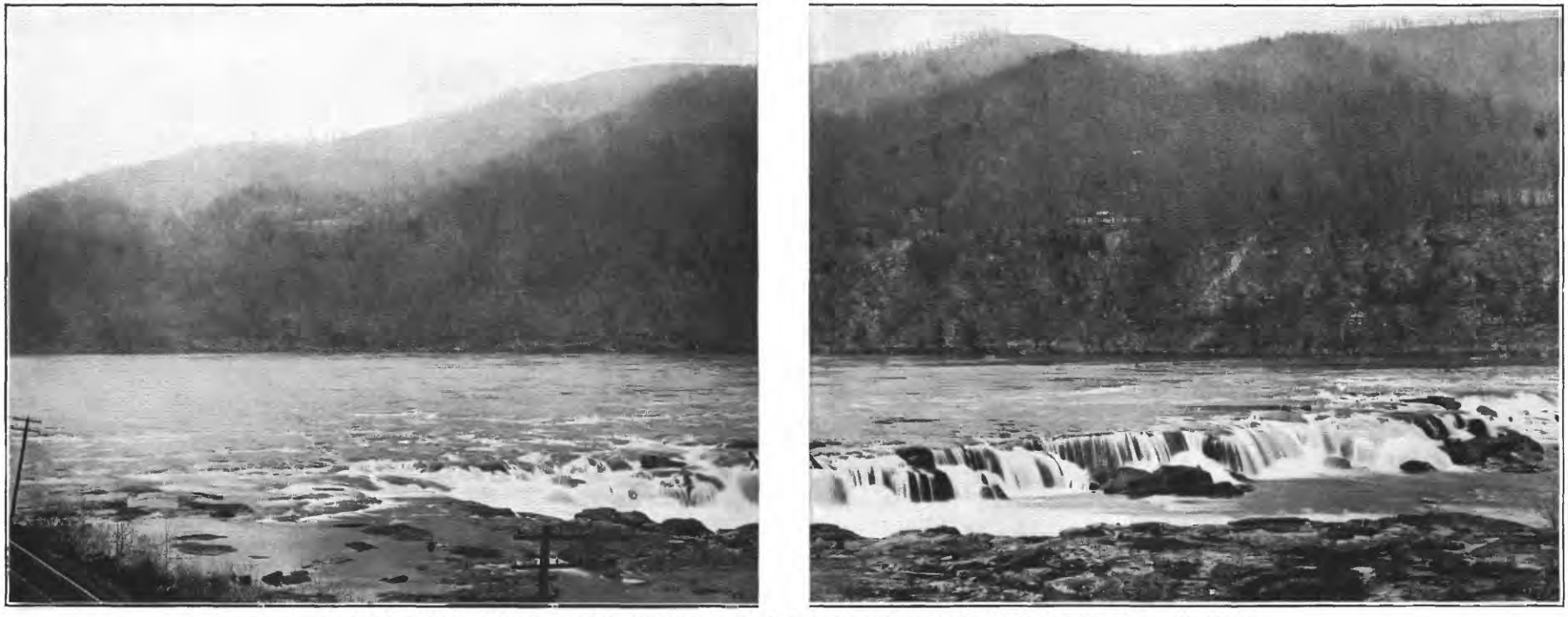
At ordinary stages the tributaries are clear and there is excellent trout and bass fishing in some of the larger streams. The water of the main stream is rarely, if ever, clear, being of a reddish-brown color, said to be due to the red soil of Virginia, and also from the hydraulic mining of iron ore at present carried on in the State.



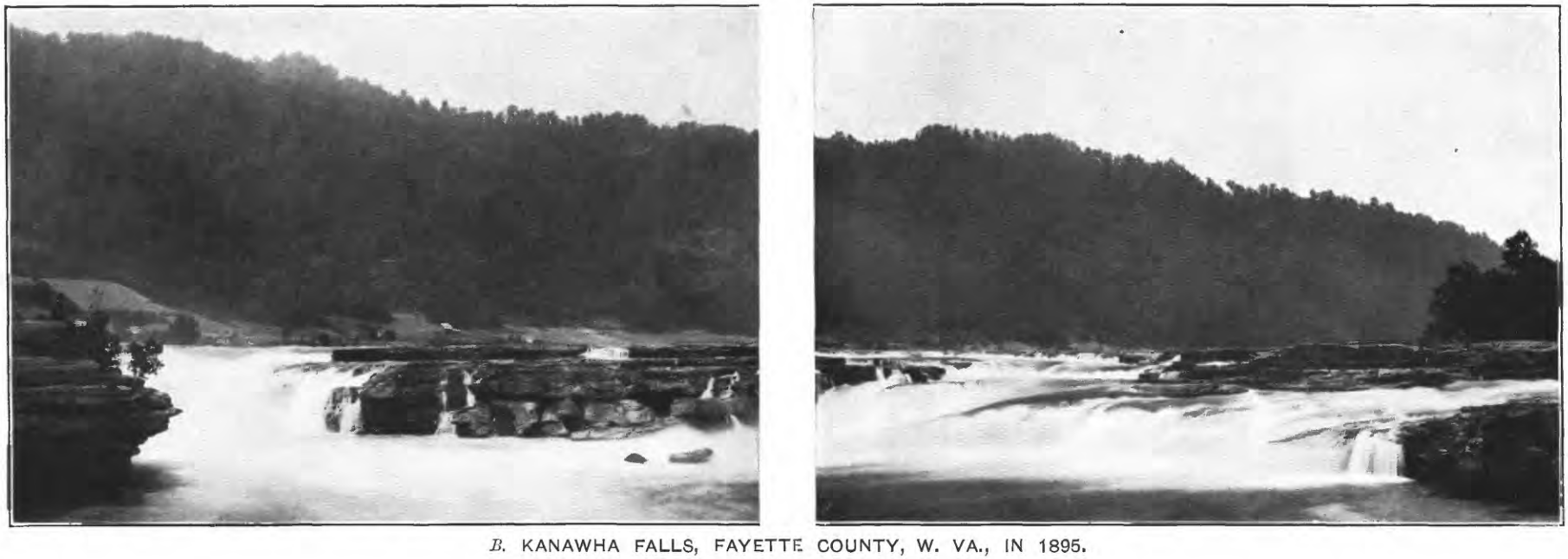
A. NEW RIVER FALLS, 2 MILES ABOVE SANDSTONE, SUMMERS COUNTY, W. VA., IN 1896.



B. KANAWHA FALLS, FAYETTE COUNTY, W. VA., IN 1895.



A. NEW RIVER FALLS, 2 MILES ABOVE SANDSTONE, SUMMERS COUNTY, W. VA., IN 1896.



B. KANAWHA FALLS, FAYETTE COUNTY, W. VA., IN 1895.

The following gaging stations have been maintained in this drainage basin:

On the main stream:
- North Fork New River at Weaversford, N. C., 1900–1901.
- North Fork New River near Crumpler, N. C., 1908.
- South Fork New River at New River, N. C., 1900–1901.
- South Fork New River near Crumpler, N. C., 1908.
- New River at Oldtown, Va., 1900–1903.
- New River near Grayson, Va., 1908.
- New River at Radford, Va., 1898–1908.
- New River at Hinton, W. Va., 1887–1908 (gage height record by U. S. Weather Bureau).
- New River at Fayette, W. Va., 1895–1904, 1908.

On the tributaries on the right or east bank:
- Big Reed Island Creek near Allisonia, Va., 1908.
- Little River near Copper Valley, Va., 1908.
- Greenbrier River near Marlinton, W. Va., 1908.
- Greenbrier River at Alderson, W. Va., 1895–1908.
- Gauley River at Allingdale, W. Va., 1908.
- Gauley River near Summersville, W. Va., 1908.
- Gauley River at Belva, W. Va., 1908.
- Cherry River at Richwood, W. Va., 1908.
- Meadow River near Russellville, W. Va., 1908.
- Elk River at Webster Springs, W. Va., 1908.
- Elk River at Gassaway, W. Va., 1908.
- Elk River at Clendennin, W. Va., 1908.
- Pocotaligo River at Sissonville, W. Va., 1908.

On the tributaries on the left or west bank:
- Reed Creek at Grahams Forge, Va., 1908.
- Walker Creek at Staffordsville, Va., 1908.
- Wolf Creek near Narrows, Va., 1908.
- Bluestone River at Lilly, W. Va., 1908.
- Coal River at Brushton, W. Va., 1908.
- Coal River at Tornado, W. Va., 1908.

SOUTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.

This station, which was established August 12, 1908, to obtain data for use in studying water power, pollution, flood control, and storage problems, is located about 1½ miles above the confluence of the North and South forks of New River, about 4 miles from Crumpler, N. C.

The drainage area above the section is about 325 square miles.

The datum of the gage has remained unchanged; the records are reliable and accurate.

Sufficient data have not been obtained to enable estimates of the flow to be made.

The following discharge measurement was made August 12, 1908:

Width, 177 feet; area, 415 square feet; gage height, 1.48 feet; discharge, 458 second-feet.

Daily gage height, in feet, of South Fork of New River near Crumpler, N. C., for 1908.

[Observer, J. J. Garvey.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.73	1.46	2.27	1.69	16	1.62	1.50	1.53	1.72	1.66
2	.....	1.72	1.40	2.16	1.77	17	1.61	1.48	1.49	1.70	1.64
3	.....	1.68	1.40	2.08	1.64	18	1.62	1.48	1.38	1.76	1.65
4	.....	1.66	1.39	2.02	1.57	19	1.52	1.46	1.38	1.78	1.65
5	.....	1.68	1.38	1.96	1.57	20	1.55	1.44	1.38	1.73	1.63
6	.....	1.82	1.38	1.86	1.57	21	1.56	1.44	1.38	1.68	1.58
7	.....	1.85	1.38	1.78	2.42	22	1.80	1.43	1.48	1.68	1.65
8	.....	1.96	1.36	1.78	2.37	23	1.78	1.43	3.93	1.68	1.85
9	.....	1.76	1.51	1.78	1.97	24	2.00	1.42	6.23	1.66	1.73
10	.....	1.64	2.73	1.75	1.78	25	2.60	1.42	3.08	1.68	1.76
11	.....	1.58	2.18	1.83	1.71	26	3.88	1.40	2.46	1.68	1.95
12	1.48	1.58	1.73	1.78	1.86	27	2.62	1.40	2.23	1.68	1.84
13	1.47	1.53	1.64	1.73	1.81	28	2.23	1.73	2.32	1.64	1.76
14	1.49	1.50	1.56	1.74	1.73	29	2.10	1.68	3.03	1.57	1.83
15	1.51	1.48	1.55	1.75	1.69	30	1.96	1.53	2.93	1.57	1.85
						31	1.82	.....	2.44	.....	2.15

NEW RIVER NEAR GRAYSON, VA.

This station is located at the Norfolk and Western Railroad bridge at Fries Junction, about 1 mile from Grayson, Va. It was established August 7, 1908, to obtain data for use in studying water power, pollution, flood control, and storage problems.

Chestnut Creek is tributary immediately below the section. The drainage area above the station is about 1,160 square miles.

The datum of the gage has remained unchanged; the records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of New River near Grayson, Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 6	O'Neill and Chapman	646	1,420	4.70	3,170
August 19	W. M. O'Neill	645	1,380	4.11	1,920

Daily gage height, in feet, of New River near Grayson, Va., for 1908.

[Observer, William J. Matkins.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.19	4.02	5.22	4.28	16	4.05	3.94	3.99	4.38	4.52
2	.....	4.15	3.98	4.98	4.27	17	4.25	3.90	3.98	4.35	4.37
3	.....	4.11	3.95	4.76	4.18	18	4.10	3.90	3.89	4.38	4.32
4	.....	4.09	3.88	4.76	4.18	19	4.10	3.90	3.88	4.46	4.46
5	.....	4.08	3.80	4.56	4.22	20	4.05	3.90	3.88	4.46	4.37
6	5.04	4.35	3.80	4.50	4.30	21	3.92	3.89	3.88	4.36	4.29
7	4.16	4.32	3.80	4.40	5.23	22	4.01	3.88	3.96	4.33	4.30
8	4.18	4.60	3.80	4.36	6.18	23	4.32	3.88	5.06	4.32	4.46
9	4.14	4.22	3.94	4.35	5.26	24	4.25	3.87	9.20	4.28	4.41
10	4.16	4.11	5.52	4.34	4.83	25	5.30	3.87	6.38	4.27	4.37
11	4.23	4.02	5.30	4.33	4.66	26	6.85	3.87	5.36	4.24	4.62
12	4.24	4.00	4.48	4.35	4.78	27	5.55	3.87	4.88	4.22	4.72
13	3.99	3.99	4.20	4.34	4.83	28	4.82	4.00	4.80	4.20	4.65
14	4.44	3.98	4.07	4.33	4.66	29	4.62	4.20	5.58	4.21	4.60
15	4.00	3.95	4.00	4.33	4.63	30	4.52	4.12	6.53	4.18	4.79
						31	4.35	.....	5.68	.....	5.24

NEW RIVER AT RADFORD, VA.

This station is located at the toll highway bridge about 1½ miles below the Norfolk and Western Railway bridge. It is near the Norfolk and Western Railway station at Radford, Va. It was established August 1, 1898, discontinued July 15, 1906, and reestablished May 6, 1907. It is maintained to obtain data for use in studying water supply, pollution, water power, flood control, and storage problems.

No important tributaries enter in the immediate vicinity of this station. Little River enters from the right about 6 miles above the station.

The United States Weather Bureau gage was originally used at this point, but owing to its inaccessibility it was replaced by a wire gage referred to the same datum February 23, 1900. On December 1, 1903, the wire gage was replaced by a chain gage and the datum lowered 3.41 feet to avoid negative readings. Numerous errors entered into the gage readings prior to the installation of the chain gage, and estimates of discharge based on them are not very reliable. All estimates at this station were revised in 1905, but it was impossible to eliminate all the gage errors.

Conditions of flow are constant and the discharge is only occasionally affected by backwater from ice conditions. A good low-water rating curve has been developed from recent measurements and two recomputed measurements made in 1900 and 1901. At high stages the rating curve is only approximate. The tubular piers of the bridge interfere somewhat with discharge measurements, and errors have occurred in some measurements due to not considering the area and velocity immediately above them.

Revised data for this station prior to 1906 have been published in Bulletin 3 of the Geological Survey of Virginia.

Discharge measurements of New River at Radford, Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 20	R. G. Knight	568	2,290	4.78	5,610
July 22	do	565	1,770	3.88	3,000
1908.					
July 27	O'Neill and Chapman	556	1,980	3.99	3,230
August 20	W. M. O'Neill	549	1,860	3.84	2,610

Daily gage height, in feet, of New River at Radford, Va., for 1907 and 1908.

[Observer, C. L. Gillespie.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						3.9	4.6	3.8	3.5	4.2	3.7	3.8
2						5.4	4.2	3.9	3.4	4.0	3.8	3.6
3						5.6	4.2	3.8	3.4	3.9	3.8	3.6
4						5.1	4.2	3.7	3.4	3.8	4.0	3.7
5						4.5	4.2	3.7	5.2	3.8	4.0	3.7
6					6.7	4.0	4.1	3.6	4.8	3.7	4.0	3.7
7					6.7	3.6	4.1	3.6	4.0	3.6	3.9	3.7
8					3.8	3.4	4.1	3.6	3.8	3.6	3.8	3.8
9					3.7	4.2	3.8	3.6	3.5	3.6	3.8	3.8
10					3.7	4.0	3.8	3.6	3.4	3.6	3.8	3.9
11					4.1	5.6	3.7	3.6	3.5	3.6	3.8	4.25
12					4.0	7.2	4.0	3.7	4.1	3.6	3.8	4.3
13					3.9	14.6	4.2	3.7	3.9	3.5	4.6	4.2
14					3.9	11.8	4.7	3.6	3.7	3.5	4.0	4.2
15					3.8	6.8	4.7	3.6	3.6	3.5	4.0	4.5
16					3.8	5.5	4.5	3.6	3.5	3.5	3.9	6.7
17					3.8	4.7	4.5	3.5	3.5	3.5	3.7	6.5
18					3.8	4.1	4.6	3.5	3.5	3.5	3.7	5.4
19					3.8	3.9	4.4	4.4	3.5	3.5	3.9	4.9
20					3.9	3.7	4.3	4.0	3.5	3.5	4.0	4.3
21					3.8	3.7	4.1	3.9	3.5	3.5	4.0	4.2
22					3.7	3.6	4.1	3.7	3.5	3.4	4.0	4.1
23					3.8	4.4	3.8	4.1	9.5	3.4	4.9	7.4
24					3.8	5.0	3.7	3.9	11.3	3.4	5.3	7.4
25					3.8	4.8	3.7	3.9	6.4	3.6	5.4	7.0
26					3.8	5.4	3.6	3.8	5.1	3.6	5.4	5.6
27					3.8	4.8	3.6	3.8	4.5	3.6	5.4	4.8
28					3.8	4.6	3.6	3.7	4.2	3.6	5.4	4.7
29					3.8	4.6	3.6	3.5	4.2	3.6	4.6	4.5
30					3.8	4.9	3.6	3.5	4.4	3.6	4.2	4.5
31					3.8	.....	3.6	3.5	.....	3.7	.....	4.5
1908.												
1	5.6	4.2	4.7	4.3	4.7	4.3	4.2	4.3	4.1	3.8	5.7	4.1
2	5.0	4.2	5.6	8.1	4.7	4.15	5.2	4.1	3.9	3.8	5.5	4.5
3	4.8	3.9	5.8	7.4	4.5	4.0	4.6	3.9	3.9	3.7	5.2	4.6
4	4.6	3.8	5.2	6.4	4.5	4.1	4.5	3.8	3.8	3.7	4.9	4.3
5	5.0	3.9	5.8	5.6	4.4	8.0	5.3	3.7	3.8	3.6	4.7	4.3
6	5.0	4.85	6.8	5.0	4.3	6.1	5.2	3.7	4.2	3.5	4.5	4.2
7	5.0	5.4	6.5	5.1	4.3	5.2	5.1	4.7	4.2	3.5	4.2	4.3
8	5.0	5.0	5.9	4.8	6.05	4.9	4.9	4.0	4.9	3.5	5.0	6.8
9	5.7	4.5	5.5	4.8	5.5	4.6	5.2	4.6	4.6	3.4	4.9	5.7
10	5.6	4.4	5.2	4.6	5.0	4.4	4.8	4.2	4.2	4.1	4.3	5.0
11	5.6	4.4	5.0	4.7	4.85	4.25	4.5	4.1	4.0	6.8	4.3	4.7
12	11.8	4.9	5.0	4.5	4.6	4.3	4.3	3.9	3.8	5.0	4.5	4.5
13	9.7	8.8	5.1	4.3	4.5	4.4	4.1	3.8	3.7	4.3	4.3	5.4
14	5.9	9.0	4.9	4.4	4.4	4.25	4.1	3.7	3.4	4.0	4.2	4.9
15	5.9	9.65	4.9	4.4	4.2	5.0	4.1	3.7	3.5	3.7	4.2	4.5
16	5.6	10.7	4.8	4.5	4.2	5.1	4.0	3.6	3.5	3.6	4.5	4.5
17	5.0	9.3	4.9	4.5	4.2	5.0	3.9	3.7	3.5	3.6	4.1	4.3
18	4.9	6.7	4.9	4.5	4.3	4.5	3.9	3.7	3.5	3.6	4.1	4.3
19	4.8	5.7	4.6	4.6	4.4	4.1	3.9	3.7	3.4	3.7	4.6	4.2
20	4.6	5.3	4.7	4.5	4.7	4.2	3.9	3.7	3.4	3.7	4.7	4.3
21	4.6	5.1	4.7	4.4	5.6	4.2	3.8	3.7	3.4	3.7	4.6	4.2
22	4.4	5.0	4.8	4.2	5.3	4.2	3.8	3.7	3.4	3.6	4.4	4.2
23	4.5	4.8	4.7	4.1	5.05	4.05	3.8	5.2	3.5	3.6	4.3	4.5
24	4.5	4.9	5.3	4.2	4.8	4.4	4.5	4.2	3.5	7.7	4.2	4.9
25	4.4	4.1	5.3	4.25	4.7	4.3	4.1	4.0	3.6	8.6	4.2	4.3
26	4.2	4.1	5.1	5.4	4.5	4.2	4.1	8.0	3.6	5.8	4.1	5.2
27	4.4	5.2	4.9	5.6	4.4	4.1	3.9	6.8	3.6	5.0	4.0	5.3
28	4.8	4.9	4.7	5.1	4.2	4.1	4.1	5.2	3.6	4.8	4.0	4.9
29	4.4	4.7	4.7	4.85	4.3	4.0	4.2	4.6	4.1	5.9	4.0	4.7
30	4.3	.....	4.6	4.6	4.5	4.0	4.3	4.5	3.8	8.1	4.0	5.1
31	4.2	.....	4.2	.....	4.5	.....	4.4	4.3	.....	7.7	.....	6.1

NOTE.—The observer evidently made mistakes in recording the foot marks for several days' gage heights during May and June, 1907. These have been corrected by estimation and by comparison with the Greenbrier station.

Rating table for New River at Radford, Va., for 1898 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.40	1,640	4.90	6,380	6.30	12,040	8.40	22,100
3.50	1,900	5.00	6,770	6.40	12,470	8.60	23,250
3.60	2,160	5.10	7,160	6.50	12,900	8.80	24,440
3.70	2,430	5.20	7,550	6.60	13,340	9.00	25,650
3.80	2,710	5.30	7,940	6.70	13,780	9.20	26,870
3.90	3,000	5.40	8,340	6.80	14,230	9.40	28,100
4.00	3,290	5.50	8,740	6.90	14,680	9.60	29,340
4.10	3,590	5.60	9,140	7.00	15,130	9.80	30,580
4.20	3,900	5.70	9,540	7.20	16,030	10.00	31,820
4.30	4,220	5.80	9,950	7.40	16,950	11.00	38,230
4.40	4,550	5.90	10,360	7.60	17,900	12.00	44,840
4.50	4,900	6.00	10,770	7.80	18,890	13.00	51,620
4.60	5,260	6.10	11,190	8.00	19,920	14.00	58,670
4.70	5,630	6.20	11,610	8.20	20,990	15.00	66,010
4.80	6,000						

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 12 discharge measurements made during 1904 to 1908, and is well defined between gage heights 3.0 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 1907 and 1908.

[Drainage area, 2,720 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
May 6-31	13,800	2,430	3,620	1.33	1.29	B.
June	63,000	1,640	8,970	3.30	3.68	B.
July	5,630	2,160	3,530	1.30	1.50	A.
August	4,550	1,900	2,510	.923	1.06	A.
September	40,200	1,640	5,400	1.99	2.22	A.
October	3,900	1,640	2,210	.812	.94	A.
November	8,340	2,430	4,120	1.51	1.68	A.
December	17,000	2,160	5,930	2.18	2.51	A.
1908.						
January	43,500	3,900	8,420	3.10	3.57	A.
February	36,300	2,710	9,860	3.62	3.90	A.
March	14,200	3,900	7,300	2.68	3.09	A.
April	20,400	3,590	6,640	2.44	2.72	A.
May	11,000	3,900	5,500	2.02	2.33	A.
June	19,900	3,290	5,270	1.94	2.16	A.
July	7,940	2,710	4,480	1.65	1.90	A.
August	19,900	2,160	4,460	1.64	1.89	A.
September	6,380	1,640	2,710	.996	1.11	A.
October	23,200	1,640	6,000	2.21	2.55	A.
November	9,540	3,290	4,880	1.79	2.00	A.
December	14,200	3,590	5,860	2.15	2.48	A.
The year	43,500	1,640	5,950	2.19	29.70	

NEW RIVER AT FAYETTE, W. VA.

This station, which is located at the highway bridge connecting Fayette with South Fayette, W. Va., was established July 29, 1895; discontinued May 22, 1901; reestablished August 11, 1902; discontinued December 31, 1904; and reestablished July 16, 1908. Its records furnish data for water power, flood control, and storage problems.

Wolf Creek enters on the right bank about one-eighth mile above the station; the drainage area above the section is about 6,800 square miles.

The bed of the river here is rock, with large bowlders on the bottom, which cause eddies and boils at high stages. The bottom has been carefully determined and by using standard soundings and care in making measurements the discharge can be determined with accuracy.

The datum of the gage has remained constant during the maintenance of the station, but numerous errors have entered into many of the gage readings prior to 1908, particularly before the chain gage was installed November 20, 1903, the original wire gage being frequently many tenths in error. Owing to this cause and to the difficulty of securing accurate measurements at Fayette, all estimates of discharge heretofore published are only fair.

Estimates of the discharge are withheld until sufficient measurements are obtained to develop a complete curve based upon recent measurements.

Discharge measurements of New River at Fayette, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 13	W. G. Hoyt	188	2,730	[a] 3.24	4,530
August 14	do	184	2,660	[b] 2.59	4,030
September 19	W. M. O'Neill	175	2,360	1.32	2,430
September 21	do	177	2,440	[c] 1.50	2,630
Do	do	175	2,400	1.24	2,460

[a] Stage fell 0.5 foot during measurement. [b] Gage height doubtful. [c] Gage height is approximate.

Daily gage height, in feet, of New River at Fayette, W. Va., for 1908.

[Observer, John R. Durrett.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.82	3.24	2.22	10.27	2.78	16	.....	2.10	1.56	1.44	2.72	5.86
2	.....	3.72	2.91	1.87	7.60	2.76	17	.....	2.10	1.48	1.38	2.42	5.08
3	.....	3.52	2.58	1.50	6.40	2.78	18	.....	2.08	1.42	1.34	2.55	4.70
4	.....	2.81	2.28	1.22	6.16	2.98	19	.....	2.06	1.35	1.31	3.04	4.36
5	.....	2.28	2.08	1.07	5.48	3.45	20	2.32	2.14	1.26	1.36	2.82	4.61
6	.....	2.16	2.44	.95	4.24	3.32	21	2.42	2.04	1.20	1.38	2.62	4.54
7	.....	2.11	3.12	.93	3.86	3.19	22	2.22	1.90	1.17	1.34	2.50	4.36
8	.....	2.65	3.65	.95	4.22	3.38	23	2.26	1.69	1.06	1.32	3.45	4.44
9	.....	4.44	3.65	.94	4.52	4.48	24	2.64	1.68	1.08	1.37	3.65	4.30
10	.....	4.94	3.72	.96	4.49	.....	25	3.98	3.62	1.06	12.38	3.42	5.09
11	.....	4.58	2.87	1.30	3.48	.....	26	3.88	2.88	1.01	9.09	3.20	8.04
12	.....	3.92	2.35	7.20	2.34	.....	27	3.72	9.76	.96	6.92	3.02	8.10
13	.....	3.43	1.98	4.71	2.10	7.90	28	5.54	7.78	.94	5.35	2.92	7.80
14	.....	2.84	1.80	3.12	2.60	7.48	29	5.78	6.42	1.02	4.66	2.85	7.54
15	.....	2.30	1.63	1.70	3.11	6.82	30	4.88	4.96	1.19	7.22	2.81	8.00
							31	4.08	3.70	.....	11.36	.....	11.02

NORTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.

This station is located at a ford about 1 mile above the confluence of the North and South forks of New River, about 2½ miles north of Crumpler, N. C. It was established August 13, 1908, to obtain data

for use in studying water power, pollution, flood control, and storage problems.

The drainage area above the section is about 279 square miles.

The datum of the gage has remained unchanged. The records are accurate and reliable. Sufficient data have not been obtained to enable estimates of the discharge to be made.

The following discharge measurement was made August 10, 1908:

Width, 202 feet; area, 294 square feet; gage height, 2.24 feet; discharge, 415 second-feet.

Daily gage height, in feet, of North Fork of New River near Crumpler, N. C., for 1908.

[Observer, J. J. Garvey.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.19	1.70	3.22	2.90	16	2.02	1.82	1.78	2.22	2.64
2		2.05	1.71	2.98	2.92	17	2.10	1.82	1.76	2.25	2.58
3		2.00	1.62	2.75	2.62	18	2.05	1.78	1.71	2.35	2.56
4		1.98	1.61	2.65	2.51	19	1.95	1.78	1.68	2.55	2.71
5		2.02	1.60	2.47	2.55	20	1.95	1.74	1.65	2.50	2.62
6		2.25	1.62	2.38	2.45	21	1.92	1.72	1.65	2.46	2.54
7		2.70	1.60	2.36	5.30	22	2.10	1.72	1.72	2.40	2.65
8		2.20	1.60	2.31	4.35	23	2.10	1.71	3.88	2.30	2.51
9		1.92	1.86	2.22	3.30	24	2.09	1.68	6.25	2.30	2.50
10		1.90	3.12	2.14	3.05	25	3.50	1.66	3.59	2.24	2.52
11		1.90	2.10	2.25	2.90	26	3.68	1.68	2.88	2.19	3.28
12	1.93	1.87	1.95	2.43	3.45	27	2.80	1.65	2.60	2.14	2.85
13	1.89	1.86	1.80	2.22	3.10	28	2.58	1.98	2.80	2.08	2.84
14	1.87	1.82	1.80	2.29	2.90	29	2.35	2.05	4.35	2.10	3.13
15	1.83	1.80	1.78	2.30	2.70	30	2.23	1.82	4.25	2.12	3.47
						31	2.15	.....	3.75	.....	4.18

REED CREEK AT GRAHAMS FORGE, VA.

This station, which is located at the highway bridge at Grahams Forge, Va., was established July 29, 1908, to obtain data for solving water power, flood control, and storage problems.

The drainage area above the station is about 247 square miles.

There is a dam and grist mill just above the station. The storage is small and the miller states that water flows over the dam at all times, so that the flow is modified little, if any, by the dam. The datum of the gage has remained unchanged, and the records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the discharge to be made.

Discharge measurements of Reed Creek at Grahams Forge, Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 30	O'Neill and Chapman	125	255	2.46	243
Aug. 15	W. M. O'Neill	124	221	2.29	158

Daily gage height, in feet, of Reed Creek at Grahams Forge, Va., for 1908.

[Observer, Robert Runion.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.38	2.33	2.24	2.97	2.58	16	.....	2.25	2.24	2.28	2.49	2.77
2	.....	2.31	2.32	2.20	2.90	2.88	17	.....	2.37	2.24	2.27	2.51	2.69
3	.....	2.27	2.26	2.18	2.76	2.78	18	.....	2.32	2.22	2.22	2.67	2.67
4	.....	2.26	2.22	2.19	2.70	2.70	19	.....	2.27	2.22	2.26	3.19	2.67
5	.....	2.24	2.32	2.14	2.62	2.64	20	.....	2.25	2.24	2.20	3.08	2.65
6	.....	2.24	2.38	2.18	2.56	2.60	21	.....	2.24	2.20	2.28	2.82	2.60
7	.....	2.23	2.40	2.17	2.53	3.18	22	.....	2.26	2.19	2.28	2.74	2.65
8	.....	2.24	3.18	2.18	2.50	3.58	23	.....	2.22	2.20	2.21	2.64	2.65
9	.....	2.48	2.48	2.22	2.48	3.14	24	.....	2.26	2.20	3.17	2.61	2.65
10	.....	2.50	2.42	2.46	2.48	2.88	25	.....	2.42	2.15	2.72	2.58	2.72
11	.....	2.47	2.36	2.82	2.52	2.78	26	.....	2.68	2.20	2.52	2.54	3.91
12	.....	2.38	2.30	2.50	2.51	2.96	27	.....	2.54	2.20	2.48	2.48	3.27
13	.....	2.30	2.29	2.41	2.48	3.24	28	.....	2.48	2.20	2.58	2.48	3.17
14	.....	2.24	2.28	2.33	2.50	3.02	29	.....	2.41	2.31	3.92	2.48	3.39
15	.....	2.25	2.23	2.32	2.51	2.86	30	2.48	2.39	2.25	4.58	2.48	3.72
							31	2.42	2.32	.....	3.48	.....	4.09

BIG REED ISLAND CREEK NEAR ALLISONIA, VA.

This station, which is located at J. P. Thomas's farm about 1½ miles from Allisonia, Va., was established July 31, 1908, to obtain data for use in studying water power, flood control, and storage problems.

The drainage area above the section is about 291 square miles. Little Reed Island Creek is tributary on the left bank a short distance below the station.

The datum of the gage has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Big Reed Island Creek near Allisonia, Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 1	O'Neill and Chapman	205	344	0.72	384
August 18	W. M. O'Neill	200	313	.63	323

Daily gage height, in feet, of Big Reed Island Creek near Allisonia, Va., for 1908.

[Observer, J. P. Thomas.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.6	0.6	0.75	0.7	16	0.6	0.6	0.6	0.8	0.7
2	0.64	.6	.6	.8	.7	17	.65	.6	.6	.8	.7
3	.62	.6	.6	.8	.7	18	.5	.5	.6	.8	.75
4	.6	.6	.55	.8	.7	19	.6	.5	.6	1.15	.8
5	.64	.65	.5	.8	.7	20	.6	.5	.6	.85	.8
6	1.75	1.05	.5	.8	.7	21	.6	.5	.6	.8	.8
7	1.2	.8	.5	.8	1.3	22	.65	.5	.6	.8	.8
8	.9	1.3	.5	.75	1.2	23	.75	.5	.6	.8	.85
9	.9	.75	.5	.7	.95	24	.7	.5	.6	.8	.9
10	.82	.7	1.9	.7	.8	25	1.0	.5	1.15	.8	1.05
11	.74	.6	1.35	.75	.8	26	1.7	.5	.8	.8	1.15
12	.7	.6	.85	.8	.9	27	1.3	.5	.8	.75	.9
13	.68	.6	.75	.8	.8	28	.8	.85	.95	.7	.8
14	.65	.6	.7	.8	.8	29	.8	.9	1.95	.7	.8
15	.65	.6	.65	.8	.8	30	.7	.65	1.5	.7	.8
						31	.7	.....	1.0	.....	.85

LITTLE RIVER NEAR COPPER VALLEY, VA.

This station, which is located at the highway bridge about 5 miles south of Childress, and 1 mile north of Copper Valley, Va., was established July 28, 1908, to obtain data for use in studying water-supply, water-power, flood-control, and storage problems.

Indian Creek is tributary about 600 feet below the station. The drainage area above the section is about 195 square miles.

The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Little River near Copper Valley, Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 28	O'Neill and Chapman	155	331	3.74	337
August 21	W. M. O'Neill	150	271	3.39	182

Daily gage height, in feet, of Little River near Copper Valley, Va., for 1908.

[Observers, William J. Trail and Thomas A. DeHart.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.45	3.44	3.43	4.06	3.71	16	.....	.....	3.39	3.57	3.86	3.71
2	.....	.....	3.41	3.40	3.96	3.72	17	.....	3.42	3.36	3.52	3.86	3.68
3	.....	3.35	3.39	3.37	3.88	3.61	18	.....	3.34	3.38	3.53	3.95	3.68
4	.....	3.34	3.39	3.36	3.85	3.59	19	.....	3.36	3.36	3.52	4.38	3.72
5	.....	3.34	3.44	3.36	3.79	3.71	20	.....	3.32	3.38	3.53	4.07	3.70
6	.....	4.04	4.36	3.34	3.72	3.67	21	.....	3.32	3.38	3.50	3.93	3.66
7	.....	3.98	4.29	3.33	3.71	4.62	22	.....	3.32	3.39	3.50	3.83	3.71
8	.....	3.44	4.42	3.33	3.71	4.23	23	.....	3.40	3.39	3.86	3.81	3.81
9	.....	.....	3.66	3.37	3.71	3.95	24	.....	3.42	3.36	6.50	3.77	3.80
10	.....	4.05	3.51	5.77	3.71	3.81	25	.....	3.69	3.34	4.51	3.75	3.87
11	.....	3.32	3.48	4.73	3.73	3.78	26	.....	5.14	3.34	4.12	3.72	4.26
12	.....	3.40	3.48	3.96	3.81	3.90	27	.....	3.85	3.33	3.96	3.71	3.98
13	.....	3.38	3.42	3.76	3.71	3.84	28	.....	3.62	3.84	4.13	3.66	3.94
14	.....	3.35	3.42	3.67	3.73	3.75	29	4.56	3.66	3.86	5.29	3.67	3.97
15	.....	3.34	3.40	3.62	3.82	3.71	30	4.66	3.46	3.48	4.90	3.71	4.22
							31	4.02	3.49	.....	4.26	.....	4.88

WALKER CREEK AT STAFFORDSVILLE, VA.

This station, which is located at the highway bridge at Staffordsville, Va., was established July 24, 1908, to obtain data for use in studying water-power, flood-control, and storage problems.

Whitley Creek is tributary a short distance above the station. The drainage area above the section is about 277 square miles. A dam and power plant about 250 feet above the station may modify the flow in extreme low water.

The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Walker Creek at Staffordsville, Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 24	O'Neill and Chapman	77	105	3.24	113
August 22	W. M. O'Neill	89	97	3.02	59

Daily gage height, in feet, of Walker Creek at Staffordsville, Va., for 1908.

[Observer, James D. Worley.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.15	3.2	3.0	4.55	3.55	16	.....	3.15	3.2	3.25	3.4	4.25
2	.....	3.05	3.1	3.0	4.25	3.78	17	.....	3.15	3.15	3.2	3.45	4.2
3	.....	3.05	3.1	3.0	3.95	3.88	18	.....	3.2	3.1	3.15	3.6	4.05
4	.....	3.0	3.1	3.0	3.85	3.75	19	.....	3.2	3.1	2.15	4.55	3.92
5	.....	3.1	3.15	3.0	3.7	3.75	20	.....	3.05	3.05	3.15	4.5	4.35
6	.....	3.1	3.75	3.0	3.6	3.75	21	.....	3.0	3.0	3.15	4.2	3.75
7	.....	3.05	3.7	3.0	3.45	4.2	22	.....	3.01	3.0	3.1	3.9	3.8
8	.....	3.05	3.5	3.0	3.45	5.55	23	.....	3.15	3.0	3.1	3.85	3.85
9	.....	3.4	3.4	3.05	3.4	4.75	24	3.22	3.05	3.0	3.9	3.75	3.75
10	.....	3.45	3.3	3.95	3.35	4.48	25	3.31	3.15	3.0	4.1	3.7	3.85
11	.....	3.3	3.3	4.2	3.35	4.25	26	3.4	3.6	3.05	3.7	3.7	6.3
12	.....	3.15	3.3	3.7	3.35	5.3	27	3.25	3.65	3.05	3.55	3.55	5.25
13	.....	3.1	3.2	3.5	3.4	5.4	28	3.35	3.45	3.25	3.6	3.48	4.95
14	.....	3.0	3.25	3.3	3.45	4.85	29	3.3	3.3	3.15	5.25	3.45	5.25
15	.....	3.15	3.2	3.3	3.45	4.48	30	3.25	3.25	3.0	6.5	3.48	5.55
							31	3.2	3.15	.....	5.2	.....	7.0

WOLF CREEK NEAR NARROWS, VA.

This station is located at a highway bridge about 3 miles above Narrows, Va. It was established July 22, 1908, to obtain data for use in studying water-supply, water-power, flood-control, and storage problems.

The drainage area above the station is about 223 square miles.

The datum of the gage has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Wolf Creek near Narrows, Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 22	O'Neill and Chapman	77	123	2.72	92
August 24	W. M. O'Neill	76	110	2.66	64

Daily gage height, in feet, of Wolf Creek near Narrows, Va., for 1908.

[Observer, John A. Hale.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.64	2.64	2.58	3.84	3.09	16		2.56	2.66	2.63	2.99	3.76
2		2.62	2.64	2.57	3.54	3.60	17		2.54	2.64	2.60	3.02	3.62
3		2.58	2.59	2.56	3.38	3.47	18		2.55	2.62	2.59	3.15	3.52
4		2.56	2.54	2.51	3.28	3.38	19		2.62	2.59	2.58	3.70	3.59
5		2.56	2.63	2.50	3.18	3.32	20		2.60	2.59	2.56	3.62	3.50
6		2.62	4.35	2.47	3.09	3.32	21		2.58	2.58	2.57	3.50	3.41
7		2.62	3.45	2.48	3.04	3.87	22	2.72	2.60	2.56	2.56	3.38	3.42
8		2.60	3.19	2.49	2.99	4.72	23	2.72	2.63	2.57	2.58	3.32	3.46
9		2.89	3.04	2.52	2.94	4.18	24	2.72	2.62	2.56	3.02	3.23	3.37
10		2.98	2.92	2.72	2.91	3.88	25	2.72	2.64	2.54	3.24	3.14	3.50
11		2.82	2.85	3.28	2.94	3.65	26	2.68	2.99	2.52	96'2	3.06	5.37
12		2.72	2.82	2.95	3.01	5.12	27	2.64	3.12	2.51	2.84	3.00	4.53
13		2.66	2.81	2.82	3.02	4.84	28	2.74	2.90	2.55	2.82	2.94	4.35
14		2.59	2.72	2.72	3.00	4.30	29	2.82	2.77	2.54	3.84	2.98	4.79
15		2.57	2.74	2.66	3.04	4.01	30	2.74	2.71	2.58	5.09	3.00	5.01
							31	2.71	2.73	.....	4.32	.....	6.52

BLUESTONE RIVER AT LILLY, W. VA.

This station, which is located about 2,000 feet below the mouth of Little Bluestone River at Lilly, W. Va., was established August 22, 1908, to obtain data for use in studying water-power, flood-control, and storage problems.

The drainage area above the station is about 454 square miles.

The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

The following discharge measurement was made by wading, August 22, 1908:

Width, 97 feet; area, 115 square feet; gage height, 1.10 feet; discharge, 53 second-feet.

Daily gage height, in feet, of Bluestone River at Lilly, W. Va., for 1908.

[Observer, E. M. Lilly.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1		1.12	0.76	2.83	1.54	16		0.90	1.25	1.26	2.22
2		1.05	.79	1.99	1.72	17		.84	.98	1.32	2.12
3		1.00	.76	1.59	1.70	18		.84	.95	1.76	2.10
4		.96	.76	1.35	1.70	19		.82	.95	1.90	2.16
5		.93	.80	1.28	1.60	20		.82	.92	1.90	2.22
6		1.09	.78	2.22	1.47	21		.81	.94	1.89	2.12
7		1.58	.74	1.18	2.15	22		.80	.91	1.74	2.16
8		1.38	.74	1.18	4.00	23	1.10	.80	.88	1.66	2.09
9		1.34	.76	1.20	3.35	24	1.13	.78	.97	1.50	2.25
10		1.11	1.01	1.16	2.18	25	1.23	.76	.98	1.42	2.45
11		1.55	1.45	1.16	3.70	26	1.38	.76	1.16	1.38	5.0
12		1.00	1.47	1.17	4.35	27	1.35	.76	1.18	1.34	3.95
13		.78	1.30	1.26	4.02	28	1.42	.72	1.06	1.30	2.52
14		.92	1.20	1.38	2.50	29	1.28	.79	1.64	1.24	3.81
15		.90	1.26	1.32	2.48	30	1.22	.80	2.83	1.59	4.09
						31	1.13	.....	2.62	.....	5.95

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GREENBRIER RIVER NEAR MARLINTON, W. VA.

This station, which is located at the Chesapeake and Ohio Railway bridge on the switch that runs to Campbell's lumber mill near Marlinton, W. Va., was established July 9, 1908, to obtain data for use in studying water supply, pollution, water power, flood control, and storage problems.

Stoney Creek enters immediately above the station. The drainage area above the section is about 408 square miles.

The datum of the gage has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Greenbrier River near Marlinton, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 9	O'Neill and Chapman	217	404	4.01	435
August 3	W. G. Hoyt	181	276	3.59	143

Daily gage height, in feet, of Greenbrier River near Marlinton, W. Va., for 1908.

[Observer, Paris G. Johnston.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.79	3.49	3.24	3.38	3.23	16	3.56	3.45	3.20	3.20	3.24	3.57
2	.....	3.66	3.44	3.24	3.36	3.23	17	3.50	3.46	3.26	3.20	3.24	3.73
3	.....	3.58	3.38	3.21	3.36	3.22	18	3.46	3.42	3.24	3.19	3.23	3.85
4	.....	3.53	3.32	3.21	3.35	3.21	19	3.56	3.36	3.22	3.19	3.22	3.88
5	.....	3.72	3.29	3.20	3.34	3.21	20	3.56	3.36	3.20	3.17	3.22	3.87
6	.....	3.84	3.28	3.19	3.33	3.20	21	3.51	3.38	3.20	3.17	3.21	3.86
7	.....	3.76	3.26	3.18	3.32	3.27	22	3.51	3.42	3.19	3.16	3.20	3.85
8	.....	3.65	3.24	3.17	3.31	3.36	23	3.50	3.36	3.18	3.15	3.26	3.85
9	3.99	3.58	3.38	3.23	3.30	3.35	24	4.06	3.54	3.18	3.23	3.30	3.83
10	3.88	3.53	3.34	3.25	3.30	3.33	25	4.48	3.56	3.16	3.25	3.30	3.82
11	3.78	3.46	3.30	3.24	3.28	3.39	26	4.58	3.50	3.15	3.23	3.28	3.80
12	3.68	3.40	3.26	3.23	3.28	3.47	27	4.71	3.46	3.34	3.23	3.28	3.78
13	3.62	3.33	3.24	3.22	3.26	3.47	28	4.72	3.40	3.32	3.21	3.25	3.78
14	3.58	3.42	3.23	3.21	3.26	3.45	29	4.34	3.36	3.29	3.29	3.25	3.76
15	3.60	3.46	3.22	3.21	3.25	3.50	30	4.12	3.55	3.26	3.39	3.24	3.80
							31	3.92	3.54	.....	3.38	.....	3.86

GREENBRIER RIVER AT ALDERSON, W. VA.

This station is located at the highway bridge at Alderson, W. Va. It was established August 1, 1895, was discontinued July 15, 1906, and was reestablished May 10, 1907. It is maintained to obtain data for for use in studying water power, water supply, pollution, flood control, and storage problems.

Muddy Creek, the only important tributary in the immediate vicinity of this station, enters from the right about one-half mile below the bridge.

The records are little affected by ice. The datum of the gage has remained the same since the installation of the station. Conditions of flow are nearly permanent and a good rating curve has been developed.

Discharge measurements of Greenbrier River at Alderson, W. Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 10	R. J. Taylor	411	1,490	4.74	6,440
June 25	R. G. Knight	410	947	3.46	2,760
July 17	do	381	573	2.65	1,260
1908.					
April 21	Follansbee and Barrows	414	1,180	3.94	3,880
August 4	W. G. Hoyt	310	401	2.15	425
August 8	do	310	412	2.20	456
August 10	do	368	662	2.88	1,460
August 18	W. M. O'Neill	297	308	1.70	175

Daily gage height, in feet, of Greenbrier River at Alderson, W. Va., for 1907 and 1908.

[Observer, W. J. Hancock.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						5.2	2.6	2.5	2.2	2.4	2.1	2.9
2						5.5	2.5	2.3	2.1	2.3	2.28	2.8
3						5.0	2.45	2.2	2.1	2.2	5.0	2.75
4						4.1	2.4	2.1	2.2	2.15	4.28	2.65
5						3.7	2.5	2.05	2.2	2.1	3.5	2.5
6						3.5	2.4	2.05	2.15	2.2	3.2	2.4
7						3.45	2.3	2.0	2.15	2.5	3.0	2.4
8						3.25	2.25	2.45	2.1	2.5	3.1	2.3
9						7.4	2.3	2.3	2.1	5.4	3.1	2.5
10					4.74	5.0	2.25	2.2	2.0	4.0	4.05	3.5
11					4.15	4.75	3.4	2.1	2.3	3.3	5.9	7.75
12					3.8	5.3	3.0	2.3	3.1	3.0	4.7	5.6
13					3.5	6.5	2.85	2.3	3.4	2.7	3.9	4.3
14					3.25	14.35	3.1	2.2	2.85	2.6	3.45	3.85
15					3.1	7.42	2.85	2.05	2.6	2.45	3.1	4.0
16					3.0	5.25	2.7	2.0	2.4	2.4	2.9	3.9
17					2.9	4.6	2.65	1.9	2.3	2.3	2.8	3.6
18					2.8	3.7	4.85	1.95	2.6	2.2	2.7	3.3
19					2.7	3.35	4.8	1.9	2.5	2.2	3.25	3.2
20					2.6	3.1	3.6	1.9	2.5	2.1	4.0	3.0
21					2.6	3.0	3.2	1.85	2.4	2.1	3.75	2.9
22					2.5	2.8	2.8	1.75	2.3	2.1	3.5	2.8
23					2.45	2.8	2.65	1.9	2.35	2.0	3.6	3.25
24					2.4	4.0	2.5	2.0	3.4	2.0	5.25	8.9
25					2.4	3.5	2.5	4.3	3.7	2.0	5.7	6.3
26					2.4	3.5	2.35	3.8	3.0	2.0	4.6	4.75
27					2.5	3.3	2.25	3.2	2.7	2.0	4.0	4.1
28					2.5	3.0	2.2	2.8	2.5	1.95	3.5	3.7
29					2.5	2.8	2.2	2.6	2.4	2.0	3.3	3.7
30					2.45	2.7	2.3	2.4	2.35	2.0	3.1	5.15
31					2.55	.....	2.7	2.3	.....	2.05	.....	6.25
1908.												
1	5.3	2.8	2.9	10.65	3.3	3.6	2.1	2.5	2.15	1.7	2.3	1.9
2	4.5	2.8	4.55	7.75	3.6	3.2	2.0	2.35	2.1	1.7	2.15	1.85
3	4.4	3.0	6.55	6.15	3.45	2.9	2.2	2.25	2.0	1.7	2.0	1.8
4	3.6	3.5	6.0	5.0	3.5	2.9	2.95	2.15	1.95	1.7	1.95	1.8
5	3.5	2.8	5.62	4.3	3.4	4.4	4.08	2.1	1.9	1.65	1.85	1.8
6	3.4	2.6	7.6	3.85	3.4	4.0	3.5	2.1	1.9	1.7	1.8	1.75
7	3 25	2.65	10.4	3.6	8.85	3.4	3.6	1.9	1.9	1.7	1.8	1.9
8	3 0	2.7	9.6	3.4	9.4	3.1	3.3	2.1	1.85	1.7	1.8	2.3
9	3.1	2.7	6.75	3.3	5.75	2.9	2.85	2.6	1.85	1.7	1.8	2.35
10	2.9	2.7	6.2	3.6	4.9	2.8	2.6	2.9	1.8	1.7	1.7	2.2
11	2.85	2.6	5.0	4.4	6.2	2.7	2.45	2.9	1.8	1.75	1.8	2.2
12	9.5	2.9	4.4	5.4	4.8	2.6	2.3	2.6	1.75	1.7	1.75	3.1
13	9.4	4.9	4.2	4.6	4.1	2.5	2.2	2.4	1.75	1.7	1.75	3.4
14	6.4	7.2	4.2	4.1	3.7	2.4	2.15	2.25	1.75	1.7	1.75	3.0
15	4.8	13.0	4.2	3.7	3.4	2.5	2.1	2.2	1.75	1.7	1.8	2.7
16	4.2	14.0	4.2	4.0	3.2	2.5	2.1	2.1	1.7	1.7	1.7	2.5
17	3.9	6.3	4.4	4.8	3.0	2.5	2.1	2.1	1.7	1.7	1.7	2.4
18	3.5	5.0	5.6	4.4	3.0	2.4	2.0	2.05	1.7	1.7	1.7	2.4
19	3.4	4.2	5.65	4.3	3.2	2.3	2.0	2.0	1.7	1.6	1.85	2.6
20	3.2	4.0	6.45	4.4	3.9	2.2	2.0	1.95	1.7	1.7	2.0	2.9

Daily gage height, in feet, of Greenbrier River at Alderson, W. Va., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
21	3.1	3.5	5.25	4.0	4.55	2.3	1.8	1.9	1.65	1.65	2.1	2.8
22	3.2	3.3	4.5	3.75	4.3	2.4	2.1	1.9	1.7	1.65	2.15	2.6
23	3.5	3.2	4.1	3.4	5.5	2.2	2.1	1.9	1.7	1.65	2.1	2.5
24	3.7	3.1	4.15	3.2	4.3	2.2	2.25	1.85	1.65	1.7	2.1	2.4
25	3.3	3.0	4.0	3.15	4.1	2.6	2.3	1.9	1.65	1.7	2.0	2.4
26	2.9	3.0	3.7	4.0	4.6	2.4	2.75	2.8	1.65	1.8	2.0	3.0
27	3.6	3.0	3.5	4.5	3.9	2.3	3.75	3.2	1.6	1.85	1.95	2.9
28	4.0	2.9	3.2	3.9	3.5	2.3	4.15	2.9	1.6	1.9	1.9	2.8
29	3.8	2.85	3.35	3.5	3.4	2.2	3.75	2.6	1.6	1.9	1.9	2.8
30	3.6	.....	3.6	3.25	4.0	2.1	3.0	2.4	1.6	2.35	1.9	3.1
31	3.4	.....	7.1	.....	4.5	.....	2.7	2.25	.....	2.4	.....	4.4

Rating table for Greenbrier River at Alderson, W. Va., for 1907 and 1908.

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	103	3.10	1,952	4.60	5,570	7.20	13,860
1.70	143	3.20	2,152	4.70	5,845	7.40	14,600
1.80	195	3.30	2,360	4.80	6,120	7.60	15,350
1.90	258	3.40	2,576	4.90	6,400	7.80	16,120
2.00	330	3.50	2,800	5.00	6,680	8.00	16,910
2.10	414	3.60	3,030	5.20	7,243	9.00	21,030
2.20	511	3.70	3,265	5.40	7,818	10.00	25,560
2.30	623	3.80	3,505	5.60	8,412	11.00	30,420
2.40	748	3.90	3,750	5.80	9,031	12.00	35,620
2.50	888	4.00	4,000	6.00	9,675	13.00	41,060
2.60	1,044	4.10	4,250	6.20	10,340	14.00	46,700
2.70	1,214	4.20	4,505	6.40	11,025	15.00	52,500
2.80	1,390	4.30	4,765	6.60	11,725		
2.90	1,572	4.40	5,030	6.80	12,425		
3.00	1,760	4.50	5,300	7.00	13,140		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1903 to 1908, and is well defined below gage height 8.0 feet.

Monthly discharge of Greenbrier River at Alderson, W. Va., for 1907 and 1908.

[Drainage area, 1,340 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
May 10–31	5,960	748	1,690	1.26	1.03	A.
June	48,700	1,210	6,280	4.69	5.23	A.
July	6,260	511	1,450	1.08	1.24	A.
August	4,760	169	793	.592	.68	A.
September	3,260	330	983	.734	.82	A.
October	7,820	294	989	.738	.85	A.
November	9,350	414	3,440	2.57	2.87	A.
December	20,600	623	4,280	3.19	3.68	A.
1908.						
January	23,200	1,570	4,660	3.48	4.01	A.
February	46,700	1,040	5,730	4.28	4.62	A.
March	27,500	1,570	7,780	5.81	6.70	A.
April	28,700	2,050	5,470	4.08	4.55	A.
May	22,800	1,760	5,290	3.95	4.55	A.
June	5,030	414	1,320	.985	1.10	A.
July	4,380	195	1,290	.963	1.11	A.
August	2,150	226	700	.522	.60	A.
September	462	103	190	.142	.16	A.
October	748	103	189	.141	.16	A.
November	623	143	272	.203	.23	A.
December	5,030	169	1,100	.821	.95	A.
The year	46,700	103	2,830	2.11	28.74	

GAULEY RIVER AT ALLINGDALE, W. VA.

This station, which is located at the Baltimore and Ohio Railroad bridge about one-fourth mile south of the depot at Allingdale, W. Va., was established July 3, 1908, to obtain data for use in studying water supply, water power, flood control, and storage problems.

Rock Creek enters immediately above the station. The drainage area above the section is about 248 square miles.

The section at this station is located at a bridge on a curve. The bottom of the stream is rough, but with care accurate measurements can be obtained. Sufficient data have not been obtained to enable estimates of the flow to be made.

The datum of the gage has remained unchanged. The records are reliable and accurate.

Discharge measurements of Gauley River at Allingdale, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 4	O'Neill and Chapman	168	763	6.20	698
July 31	W. G. Hoyt	150	663	5.62	478
Do.[a]	do			5.62	458
September 26[b]	W. M. O'Neill	34	23	4.07	6

[a] Measured at wooden bridge. [b] Wading measurement.

Daily gage height, in feet, of Gauley River at Allingdale, W. Va., for 1908.

[Observers, H. N. Wood and J. L. Cogar.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5.42	4.70	4.10	5.05	4.71	16	5.24	4.91	4.11	4.31	4.40	5.50
2	.....	5.16	4.61	4.31	4.88	4.85	17	5.19	4.85	4.10	4.32	4.40	5.08
3	4.98	5.11	4.56	4.20	4.76	4.80	18	5.14	4.80	4.07	4.38	4.48	5.89
4	5.85	4.94	4.47	4.16	4.62	4.65	19	5.10	4.85	4.02	4.44	4.56	6.95
5	6.97	5.03	4.49	4.10	4.59	4.50	20	5.20	4.74	4.00	4.42	4.55	5.96
6	6.59	5.60	4.51	4.14	4.54	4.52	21	5.05	4.63	3.99	4.47	4.80	5.60
7	6.34	5.81	4.49	4.08	4.44	4.85	22	5.62	4.69	4.04	4.48	4.90	5.45
8	5.70	5.43	4.43	4.07	4.42	5.69	23	5.50	4.78	4.00	4.51	4.80	5.34
9	5.39	5.81	4.41	4.10	4.40	5.15	24	6.72	4.81	3.98	4.54	4.75	5.16
10	5.16	5.99	4.40	4.20	4.40	4.98	25	5.95	4.82	3.97	4.70	4.70	5.22
11	5.89	5.58	4.38	4.21	4.44	5.72	26	6.11	5.42	4.00	4.93	4.65	5.65
12	4.86	5.36	4.29	4.20	4.45	5.75	27	7.56	5.56	4.02	4.95	4.56	5.56
13	4.91	5.26	4.26	4.20	4.44	5.98	28	8.01	5.20	4.04	4.89	4.65	5.25
14	4.96	5.11	4.20	4.26	4.43	5.33	29	6.58	5.07	4.08	4.79	4.64	5.30
15	5.24	5.10	4.14	4.30	4.42	5.25	30	5.94	4.83	4.10	4.89	4.65	5.30
							31	5.58	4.75	.....	5.10	.....	6.40

GAULEY RIVER NEAR SUMMERSVILLE, W. VA.

This station is located at the highway bridge, known as Brock's bridge, about 2½ miles southeast of Summersville, W. Va. It was established July 6, 1908, to obtain data for use in studying water power, water supply, pollution, flood control, and storage problems.

Muddlety Creek enters about one-eighth mile above the station. The drainage area above the section is about 686 square miles.

The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Gauley River near Summersville, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 6	O'Neill and Chapman	202	962	6.99	1,640
July 30	W. G. Hoyt	202	1,110	7.30	2,060

Daily gage height, in feet, of Gauley River near Summersville, W. Va., for 1908.

[Observer, William R. Dooley.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5.88	4.34	3.52	4.94	4.06	16	5.56	4.72	3.51	3.59	3.76	5.44
2	.....	5.46	4.16	3.56	4.82	4.09	17	5.01	4.70	3.46	3.56	3.65	5.57
3	.....	5.18	4.55	3.57	4.65	4.04	18	4.92	4.58	3.40	3.55	3.79	6.41
4	.....	5.50	3.98	3.54	4.45	4.02	19	5.82	4.48	3.35	3.52	3.90	8.66
5	.....	4.76	3.92	3.48	4.24	4.02	20	5.75	4.42	3.32	3.46	4.18	7.58
6	6.99	5.26	3.92	3.42	4.48	4.09	21	5.28	4.34	3.29	3.42	4.35	6.50
7	8.44	6.42	3.88	3.34	4.20	4.45	22	6.48	4.25	3.24	3.39	4.28	6.17
8	6.99	5.59	3.86	3.30	3.93	5.46	23	6.55	4.34	3.20	3.34	4.19	5.90
9	5.96	6.45	3.82	3.28	3.84	5.65	24	7.48	4.62	3.18	3.29	4.14	5.72
10	5.67	7.29	3.80	3.29	3.78	5.48	25	6.79	4.48	3.18	3.29	4.34	5.89
11	5.40	6.32	3.78	3.40	3.72	5.78	26	7.88	4.92	3.21	3.42	4.16	6.52
12	5.05	5.75	3.72	3.88	3.66	7.41	27	9.60	5.82	3.25	3.88	4.14	6.12
13	4.91	5.39	3.66	3.82	3.88	7.38	28	10.30	5.18	3.28	3.98	4.11	5.79
14	4.80	5.04	3.58	3.76	3.82	6.38	29	8.72	4.81	3.34	3.92	4.05	5.80
15	5.76	4.84	3.56	3.68	3.76	5.76	30	7.34	4.66	3.30	4.42	4.01	6.19
							31	6.34	4.56	.....	5.25	.....	8.12

GAULEY RIVER AT BELVA, W. VA.

This station is located about one-half mile below Belva, W. Va. It was established August 25, 1908, to obtain data for use in studying water power, water supply, pollution, flood control, and storage problems.

Twentymile Creek enters on the right bank about one-eighth mile above the station. The drainage area above the section is about 1,420 square miles.

The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Gauley River at Belva, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 26	W. G. Hoyt	220	868	2.05	340
September 22 [a]	W. M. O'Neill	48	48	.94	50

[a] Wading measurement.

Daily gage height, in feet, of Gauley River at Belva, W. Va., for 1908.

[Observer, L. L. Davis.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.27	0.74	2.47	1.71	16	.....	1.24	1.34	1.62	3.06
2	.....	1.97	.76	2.32	1.70	17	.....	1.19	1.31	1.62	2.84
3	.....	1.85	.75	2.12	1.72	18	.....	1.14	1.26	1.57	2.78
4	.....	1.77	.76	1.92	1.78	19	.....	1.09	1.18	1.55	5.02
5	.....	1.71	.78	1.86	1.80	20	.....	1.04	1.10	1.54	4.78
6	.....	1.65	1.00	1.74	1.78	21	.....	.99	1.05	1.51	4.00
7	.....	1.62	1.06	1.69	1.80	22	.....	.94	1.02	1.75	3.62
8	.....	1.58	.98	1.56	1.95	23	.....	.90	.98	2.04	3.50
9	.....	1.56	.90	1.49	3.02	24	.....	.84	.92	2.02	3.38
10	.....	1.54	.96	1.46	2.85	25	.....	.82	.90	2.00	3.38
11	.....	1.46	1.00	1.40	2.70	26	.....	.80	.84	1.94	4.22
12	.....	1.46	.95	1.38	2.85	27	1.99	.78	.82	1.89	4.25
13	.....	1.39	.90	1.40	5.28	28	2.90	.76	.81	1.84	3.80
14	.....	1.34	.90	1.42	4.12	29	2.54	.74	1.49	1.78	3.60
15	.....	1.29	.93	1.52	3.45	30	2.28	.72	1.46	1.74	3.50
						31	2.17	.....	1.44	.....	4.48

NOTE.—Gage heights September 13–22 have been interpolated by comparison of other Gauley River stations.

CHERRY RIVER AT RICHWOOD, W. VA.

This station is located at the highway bridge in the town of Richwood, W. Va. It was established July 3, 1908, to obtain data for use in studying water supply, water power, flood control, and storage problems.

The datum of the gage has not been changed; the records are reliable and accurate. Sufficient data have not yet been obtained to enable estimates of the flow to be made.

Discharge measurements of Cherry River at Richwood, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 2	O'Neill and Chapman	108	176	2.54	54
July 28	W. G. Hoyt	119	367	4.24	970
September 26[a]	W. M. O'Neill	40	25	2.25	8

[a] Wading measurement.

Daily gage height, in feet, of Cherry River at Richwood, W. Va., for 1908.

[Observer, Dennis S. Connelly.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.80	2.50	2.30	2.80	2.48	16	2.65	2.60	2.20	2.26	2.35	2.84
2	.....	.....	2.50	2.26	2.73	2.42	17	2.62	2.50	2.20	2.24	2.35	3.10
3	2.50	2.70	2.40	2.21	2.66	2.40	18	2.81	2.55	2.20	2.24	2.39	3.98
4	2.55	2.65	2.40	2.20	2.50	2.44	19	2.98	2.50	2.20	2.23	2.54	3.88
5	3.00	2.70	2.45	2.20	2.46	2.42	20	2.82	2.50	2.20	2.22	2.66	.....
6	3.54	2.90	2.45	2.20	.....	2.41	21	2.76	2.45	2.15	2.22	2.66	.....
7	3.28	2.80	2.40	2.20	2.41	2.46	22	3.30	2.45	2.25	2.22	2.55	.....
8	3.10	2.70	2.35	2.12	2.40	3.25	23	3.40	2.45	2.30	2.24	2.54	.....
9	3.02	3.45	2.30	2.12	2.38	.....	24	3.70	2.40	2.30	2.58	2.51	2.90
10	2.90	3.05	2.30	2.17	2.37	.....	25	3.52	2.65	2.20	2.60	2.48	2.90
11	2.80	2.65	2.30	2.70	2.87	.....	26	3.22	3.20	2.22	2.53	2.46	3.00
12	2.70	.....	2.30	2.45	4.00	.....	27	4.85	2.80	2.21	2.36	2.45	3.00
13	2.72	.....	2.30	2.36	3.41	.....	28	4.28	2.70	2.22	2.36	2.45	3.00
14	2.55	2.70	2.30	2.30	2.34	.....	29	3.60	2.60	2.32	2.72	2.43	2.80
15	2.55	2.60	2.25	2.29	2.30	2.88	30	3.25	2.55	2.32	3.02	2.48	3.00
							31	3.05	2.50	.....	2.84	.....	3.60

MEADOW RIVER NEAR RUSSELLVILLE, W. VA.

This station is located at Bays Ferry, about 3 miles below Russellville, W. Va. It was established July 17, 1908, to obtain data for use in studying water power, flood control, and storage problems.

Youngs Creek enters about one-fourth mile above the section. The drainage area above the section is about 297 square miles.

This is a cable and boat station. Low-water measurements are made by wading.

The datum of the gage has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Meadow River near Russellville, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 18	O'Neill and Chapman	106	333	4.07	154
August 7 [a]	W. G. Hoyt	95	114	3.75	68

[a] Wading measurement.

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for 1908.

[Observer, Jacob R. Bays.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.28	3.38	2.81	3.94	3.38	16	.....	3.70	2.98	3.27	3.19	4.84
2	.....	4.05	3.32	2.83	3.73	3.48	17	.....	3.67	2.95	3.16	3.19	4.52
3	.....	3.89	3.24	2.83	3.52	3.39	18	.....	3.62	2.93	3.15	3.25	4.69
4	.....	3.77	3.18	2.84	3.38	3.38	19	4.08	3.52	2.92	3.13	3.24	5.59
5	.....	3.68	3.16	2.84	3.30	3.36	20	4.06	3.46	2.89	3.10	3.35	5.57
6	.....	3.74	3.16	2.85	3.24	3.35	21	4.00	3.39	2.87	3.09	3.95	5.19
7	.....	3.70	3.15	2.85	3.19	3.58	22	3.98	3.36	2.87	3.07	4.00	4.95
8	.....	3.64	3.14	2.85	3.16	4.21	23	4.25	3.36	2.85	3.04	3.85	4.83
9	.....	4.16	3.12	2.85	3.15	4.50	24	4.04	3.35	2.85	3.04	3.73	4.67
10	.....	5.31	3.10	2.87	3.13	4.46	25	3.97	3.36	2.85	3.02	3.61	4.61
11	.....	4.78	3.07	2.93	3.12	4.32	26	4.00	3.50	2.84	3.02	3.52	5.23
12	.....	4.39	3.04	2.94	3.13	5.94	27	5.08	4.44	2.83	3.02	3.47	5.20
13	.....	4.07	3.03	2.97	3.16	6.30	28	6.04	4.09	2.83	3.01	3.44	5.13
14	.....	3.88	3.02	3.04	3.21	5.62	29	5.58	3.82	2.82	3.28	3.42	5.13
15	.....	3.76	3.01	3.24	3.21	5.22	30	4.96	3.62	2.82	3.38	3.38	5.29
							31	4.60	3.49	.....	4.08	.....	6.88

ELK RIVER AT WEBSTER SPRINGS, W. VA.

This station is located at the suspension bridge on the grounds of the Webster Springs Hotel at Webster Springs, W. Va. It was established July 1, 1908, to obtain data for use in studying water supply, water power, flood control, and storage problems.

The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not yet been collected to enable estimates of the flow to be made.

The following discharge measurement was made July 27, 1908:

Width, 116 feet; area, 795 square feet; gage height, 3.90 feet; discharge, 1,230 second-feet.

Daily gage height, in feet, of Elk River at Webster Springs, W. Va., for 1908.

[Observer, Cherry Woodzell.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.94	2.45	1.76	1.61	1.78	1.53	16	2.18	1.89	1.44	1.40	1.50	2.10
2	2.56	2.30	1.74	1.54	1.69	1.60	17	2.02	1.84	1.39	1.40	1.48	2.10
3	2.06	2.16	1.68	1.50	1.60	1.70	18	1.98	1.81	1.38	1.40	1.45	2.85
4	3.82	2.06	1.64	1.45	1.68	1.70	19	2.06	1.80	1.36	1.40	1.45	3.20
5	3.27	2.00	1.65	1.42	1.55	1.65	20	1.94	1.75	1.35	1.40	1.45	2.85
6	3.25	2.45	1.62	1.40	1.54	1.60	21	1.94	1.70	1.72	1.39	1.7	2.60
7	3.00	2.58	1.60	1.39	1.50	1.70	22	3.28	1.71	1.70	1.38	1.65	2.40
8	2.75	2.28	1.59	1.36	1.45	2.34	23	2.84	1.88	1.60	1.38	1.6	2.38
9	2.52	2.41	1.60	1.35	1.40	2.20	24	4.95	1.87	1.50	1.38	1.6	2.30
10	2.34	2.80	1.60	1.35	1.40	2.00	25	3.65	1.79	1.50	1.38	1.6	2.35
11	2.18	2.48	1.50	1.40	1.45	2.00	26	3.55	2.10	1.41	1.59	1.58	2.45
12	2.08	2.34	1.48	1.45	1.46	2.95	27	3.90	2.50	1.40	1.68	1.58	2.40
13	2.18	2.20	1.40	1.42	1.45	2.85	28	4.15	2.30	1.41	1.60	1.58	2.39
14	2.12	2.02	1.40	1.41	1.45	2.50	29	3.35	2.05	1.42	1.65	1.55	2.34
15	2.37	1.99	1.45	1.41	1.50	2.25	30	2.88	1.90	1.42	1.58	1.53	2.39
							31	2.65	1.80	.....	1.78	.....	2.30

ELK RIVER AT GASSAWAY, W. VA.

This station is located at the Coal and Coke Railroad bridge in the northeastern part of Gassaway, W. Va. It was established July 1, 1908, to obtain data for use in studying water supply, water power, flood control, and storage problems.

Little Otter Creek is tributary immediately above the station.

The datum of the gage has not been changed. The records are reliable and accurate. Estimates of the flow are withheld until estimates can be made at the other stations on Elk River.

Discharge measurements of Elk River at Gassaway, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 29	O'Neill and Chapman	152	330	1.98	176
July 24	W. G. Hoyt	151	602	[a] 3.62	1,130
Do	do	167	766	[b] 4.55	2,070
Do	do	169	831	5.11	2,100
Do	do	168	778	4.88	1,760
July 25	do	175	1,160	7.00	3,450
Do	do	175	1,140	6.73	3,240
July 27	do	173	1,160	7.05	3,430
Sept. 23	W. M. O'Neill	143	336	1.92	112
Sept. 24 [c]	do	52	46	1.74	73
Do. [c]	do	74	62	1.74	74
Sept. 25	do	143	285	1.65	53
Sept. 28 [c]	do	45	56	1.51	30
Do	do	143	279	1.51	31

[a] River rose 1.3 feet during the measurement.
[b] River rose 0.5 foot during the measurement.
[c] Wading measurement.

Daily gage height, in feet, of Elk River at Gassaway, W. Va., for 1908.

[Observer, Henry A. Hays.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1								2.56	1.74	1.36	1.30	1.50
2								2.32	1.64	1.34	1.28	1.47
3								2.19	1.58	1.34	1.28	1.44
4								2.09	1.56	1.33	1.26	1.43
5							2.14	2.04	1.54	1.32	1.24	1.42
6							2.42	2.08	1.51	1.39	1.29	1.55
7							2.88	2.30	1.47	1.36	1.50	1.69
8							2.94	2.46	1.44	1.34	1.45	1.73
9							2.81	2.23	1.43	1.33	1.42	1.79
10							2.39	2.46	1.52	1.34	1.41	2.13
11							2.05	2.81	1.50	1.36	1.38	2.17
12							2.04	2.28	1.48	1.35	1.37	2.24
13							2.04	2.22	1.48	1.31	1.36	3.27
14							2.12	2.12	1.48	1.30	1.40	2.84
15							2.34	2.02	1.50	1.29	1.43	2.37
16							2.24	1.90	1.45	1.29	1.46	2.21
17							2.12	1.80	1.44	1.30	1.50	2.17
18							2.28	1.84	1.39	1.31	1.48	2.07
19							2.19	1.82	1.38	1.35	1.47	2.71
20							2.10	1.78	1.34	1.32	1.46	2.85
21							2.02	1.74	1.31	1.37	1.47	2.99
22							2.04	1.70	1.25	1.36	1.48	3.14
23							2.84	1.69	1.55	1.34	1.50	3.21
24							4.42	1.70	1.77	1.33	1.66	3.19
25							6.86	1.70	1.67	1.34	1.66	3.14
26							4.64	1.72	1.55	1.35	1.64	3.08
27							6.96	1.70	1.50	1.34	1.63	2.69
28							6.10	2.12	1.48	1.35	1.59	2.26
29						1.98	4.84	2.05	1.47	1.32	1.57	2.85
30						1.99	3.66	1.99	1.42	1.31	1.55	2.43
31							3.00	1.89		1.30		2.64

ELK RIVER AT CLENDENIN, W. VA.

This station, which is located at the highway bridge in the town of Clendenin, W. Va., was established June 27, 1908, to obtain data for use in studying water power, water supply, flood control, and storage problems.

Big Sandy River is tributary immediately below the section.

The datum of the gage has not been changed. The records are reliable and accurate, except that high water on the Big Sandy alone may produce backwater at the gage. This will not occur often, however, as the Big Sandy is a small stream. The gage reader has been instructed to note any backwater effect. Sufficient data have not yet been collected to enable estimates of discharge to be made.

Discharge measurements of Elk River at Clendennin, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 27	O'Neill and Chapman	139	500	3.00	577
July 23	W. G. Hoyt	161	513	2.94	437
September 23[a]	W. M. O'Neill	40	28	1.86	27
September 29[a]	do	50	52	2.11	69

[a] Wading measurement.

Daily gage height, in feet, of Elk River at Clendenin, W. Va., for 1908.

[Observers, Perry E. Young and E. C. Riley.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1							2.60	3.60	2.49	2.06	1.76	2.10
2							2.53	3.28	2.40	2.01	1.78	2.05
3							2.49	3.06	2.32	1.94	1.80	2.02
4							2.44	2.89	2.25	1.89	1.80	2.00
5							2.90	2.78	2.24	1.84	.....	2.02
6							4.11	2.76	2.22	1.81	.....	2.00
7							4.02	2.76	2.14	1.79	1.80	2.06
8							3.85	2.64	2.12	1.76	1.80	2.13
9							3.55	3.32	2.10	1.75	1.89	2.12
10							3.36	2.96	2.05	1.81	2.03	2.15
11							3.09	2.84	1.99	1.88	2.10	2.32
12							2.92	3.02	1.97	1.84	2.06	2.77
13							2.79	3.02	1.96	1.88	2.04	2.88
14							2.82	2.82	1.95	1.90	2.04	3.41
15							3.26	2.67	1.98	1.88	2.06	3.67
16							3.18	2.65	2.03	1.84	2.08	3.19
17							3.01	2.56	2.00	1.81	2.06	3.06
18							3.16	2.62	1.98	1.82	2.04	2.74
19							3.90	2.50	1.94	1.82	2.04	2.50
20							3.52	2.40	1.87	1.79	2.01	2.50
21							3.11	2.35	1.88	1.76	1.96	3.17
22							3.00	2.33	1.86	1.77	1.90	3.31
23							2.94	2.38	1.86	1.79	1.93	3.15
24							3.33	2.39	1.84	1.78	1.99	3.02
25							4.09	2.34	1.79	1.76	2.00	2.99
26							5.58	2.30	1.77	1.79	2.00	3.06
27							6.88	2.36	1.80	1.79	2.00	3.28
28						2.86	6.55	2.34	1.79	1.80	1.99	3.36
29						2.70	5.94	2.34	2.09	1.78	2.01	3.32
30						2.62	4.74	2.32	2.11	1.76	2.10	3.21
31							4.08	2.62	.....	1.75	.....	3.16

COAL RIVER AT BRUSHTON, W. VA.

This station, which is located at the Chesapeake and Ohio Railway bridge at Brushton station near Cobbs, W. Va., was established June 23, 1908, to obtain data for water power, water supply, flood control, and storage purposes.

The drainage area above the station is about 379 square miles. Brush Creek enters a short distance below the section.

The datum of the gage has remained unchanged. The records are reliable and accurate. Sufficient data have not yet been collected to enable estimates of the flow to be made.

Discharge measurements of Coal River at Brushton, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 23	A. H. Horton	122	221	2.60	392
July 20	W. G. Hoyt	123	113	1.60	70

Daily gage height, in feet, of Coal River at Brushton, W. Va., for 1908.

[Observer, George W. Fitzpatrick.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1							1.7	1.5	1.2	0.9	1.0	1.1
2							1.7		1.1	.9	1.0	1.1
3							1.85	1.35	1.1	.9	1.0	1.0
4							2.0	1.3	1.1	.9	1.0	1.0
5								1.3	1.1	.8	1.0	1.1
6							1.8	1.25	1.1	.8	1.0	1.1
7							1.7	1.25	1.1	.8	1.0	1.2
8							1.7	1.3	1.0	.8	1.0	1.3
9							1.7	1.35	1.0	.8	1.0	1.3
10							1.7	1.45	1.0	.8	1.0	1.3
11							1.6	1.95	1.0	1.1	1.1	1.4
12								1.65	1.0	1.0	1.15	1.75
13							1.45	1.55	.95	1.0	1.1	2.25
14							1.5	1.45	.9	1.0	1.1	2.1
15							1.55	1.4	.9	.9	1.2	1.85
16							1.45	1.35	.9	1.0	1.2	1.7
17							1.35	1.3	.9	1.0	1.2	1.55
18							1.5	1.4	.9	1.0	1.2	1.5
19								1.5	.9	1.0	1.2	1.6
20							1.6	1.4	.9	1.0	1.05	1.55
21							1.5	1.35	.9	1.0	1.1	1.5
22							1.5	1.4	.9	1.0	1.0	1.45
23						2.6	1.5	1.7	.85	1.0	1.0	1.75
24						2.25	1.4	1.5	.8	1.0	1.0	1.9
25						2.1	1.7	1.4	.8	1.0	1.0	2.1
26						2.8		1.35	.8	1.0	1.1	3.8
27						2.35	1.85	1.3	.8	1.0	1.1	3.1
28							2.05	1.25	.85	1.05	1.1	2.5
29						1.9	1.9	1.2	.9	1.1	1.1	2.3
30						1.75	1.75	1.2	.9	1.0	1.1	2.25
31							1.6	1.2		1.0		2.35

COAL RIVER AT TORNADO, W. VA.

This station is located at the highway bridge near Tornado, W. Va. It was established June 24, 1908, to obtain data for water-power, water-supply, flood-control, and storage purposes.

The datum of the gage has not been changed. The records are reliable and accurate. The low-water gage heights may be affected by a dam a short distance below the section. Sufficient data have not yet been collected to enable estimates of the discharge to be made.

Discharge measurements of Coal River at Tornado, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 22	A. H. Horton	152	845	2.76	353
June 24	O'Neill and Chapman	150	866	2.89	503
July 20	W. G. Hoyt	173	863	2.66	131
Do	do	173	830	2.55	[a]145

[a] Surface measurement.

Daily gage height, in feet, of Coal River at Tornado, W. Va., for 1908.

[Observer, Dr. P. E. Eagan.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1							2.25	2.50	2.30	2.22	2.29	2.46
2							2.17	2.50	2.26	2.22	2.29	2.45
3							2.10	2.42	2.16	2.22	2.29	2.48
4							.....	2.41	2.02	2.18	2.28	2.48
5							2.22	2.52	1.94	2.22	2.27	2.48
6							2.40	2.40	1.92	2.22	2.27	2.48
7							2.46	2.38	2.00	2.18	2.27	2.44
8							2.42	2.40	1.82	2.13	2.38	2.44
9							2.39	2.42	1.92	2.15	2.39	2.58
10							2.38	2.41	2.05	2.17	2.32	2.54
11							2.20	2.52	2.11	2.27	2.29	2.61
12							2.09	2.64	2.20	2.27	2.27	2.72
13							2.15	2.58	2.33	2.34	2.39	2.82
14							2.42	2.58	2.32	2.25	2.39	2.98
15							2.55	2.52	2.34	2.23	2.22	2.88
16							2.53	2.55	2.38	2.29	2.39	2.77
17							2.44	2.35	2.30	2.21	2.42	2.70
18							2.82	2.40	2.17	2.21	2.41	2.67
19							2.95	2.48	2.14	2.27	2.41	2.67
20							2.58	2.48	2.22	2.22	2.46	.....
21							2.54	2.48	2.17	2.21	2.41	.....
22						2.80	2.49	2.48	2.17	2.26	2.54	.....
23						2.99	2.46	2.52	2.22	2.32	2.44	.....
24						2.88	2.47	2.62	2.23	2.25	2.41	.....
25						2.74	2.70	2.58	2.23	2.35	2.41	.....
26						2.8	2.88	2.42	2.23	2.44	2.43	.....
27						2.88	2.88	2.37	2.22	2.47	2.51	.....
28						2.65	3.02	2.40	2.22	2.47	2.51	.....
29						2.52	2.84	2.42	2.28	2.47	2.56	.....
30						2.45	2.65	2.28	2.25	2.47	2.50	.....
31						.....	2.60	2.26	.....	2.39	.....	.....

POCOTALIGO RIVER AT SISSONVILLE, W. VA.

This station is located at the highway bridge near the post-office at Sissonville, W. Va. It was established June 26, 1908, to obtain data for use in studying water-power, water-supply, flood-control, and storage problems.

A dam and small power plant above the station may modify the flow in low water. The datum of the gage has not been changed. The records are reliable and accurate. Sufficient data have not been collected to enable estimates of the flow to be made.

Discharge measurements of Pocotaligo River at Sissonville, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 26	O'Neill and Chapman	75	100	2.16	65
July 22	W. G. Hoyt	79	108	2.32	68

Daily gage height, in feet, of Pocotaligo River at Sissonville, W. Va., for 1908.

[Observer, W. H. Sisson.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1							1.40	1.83	1.24	1.18	1.09	1.24
2							1.38	1.56	1.23	1.22	1.09	1.22
3							1.49	1.50	1.24	1.24	1.09	1.22
4							2.78	1.70	1.36	1.24	1.09	1.23
5							2.58	1.85	1.48	1.19	1.09	1.21
6							2.27	1.40	1.32	1.19	1.11	1.21
7							2.00	1.48	1.18	1.24	1.10	1.21
8							2.35	1.50	1.24	1.20	1.11	1.22
9							2.18	1.42	1.19	1.18	1.11	1.23
10							1.68	1.35	1.18	1.18	1.09	1.28
11							1.82	1.25	1.18	1.17	1.10	1.28
12							1.60	1.40	1.06	1.18	1.10	1.48
13							1.78	1.54	1.13	1.17	1.10	1.86
14							2.45	1.35	1.23	1.19	1.10	2.16
15							4.90	1.32	1.18	1.17	1.10	2.20
16							2.76	1.30	1.16	1.17	1.09	1.50
17							2.34	1.05	1.14	1.17	1.09	1.64
18							4.38	1.36	1.14	1.21	1.13	1.68
19							8.44	2.18	1.16	1.21	1.11	1.64
20							4.05	2.25	1.16	1.16	1.11	1.60
21							2.48	1.65	1.15	1.13	1.18	1.54
22							2.42	1.76	1.15	1.15	1.20	1.49
23							2.16	1.40	1.15	1.13	1.20	1.64
24							2.10	1.32	1.15	1.11	1.22	1.70
25							1.98	1.56	1.19	1.13	1.23	1.65
26						2.17	2.33	1.56	1.30	1.11	1.22	2.36
27						1.25	3.00	1.53	1.30	1.08	1.20	2.41
28						1.32	3.00	1.64	1.36	1.09	1.18	2.26
29						1.28	2.55	2.01	1.30	1.09	1.20	2.28
30						1.30	2.10	2.06	1.30	1.11	1.20	2.18
31							1.58	1.94		1.13		2.19

MIAMI RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The drainage basin of Miami River lies in southwestern Ohio and southeastern Indiana, one-third of the area being in the latter State. The river is formed in Logan County by small streams rising in Auglaize and Hardin counties, Ohio, flows in a slight southwesterly direction and joins Ohio River at the Indiana state line. Stillwater River from the west and Mad River from the east, both tributary near Dayton, are the only important tributaries in the upper part of the basin. Whitewater River is tributary from the west a few miles above the mouth of the river. Nearly all of the drainage area of the Whitewater is in Indiana. The length of the Miami is about 140 miles (map measurement). The total drainage area is about 5,400 square miles.

The drainage basin is fairly regular in shape. The valleys of the headwaters as far down as the vicinity of Dayton are narrow and comparatively shallow. Below Dayton the valley is broad and open, flanked by low hills. Along this section the river occupies the preglacial drainage lines which are only partially filled with glacial

deposits. The contrast between the southern and northern portion of the drainage basin is due not to the work of the present streams, but to the less complete concealment of preglacial drainage lines. The surface of the surrounding country is level or rolling. The elevation of the sources of the river is about 1,000 feet; at Dayton the elevation is about 725 feet; at Hamilton it is about 565 feet; at the mouth of the river the elevation is 428 feet.

There are no forested areas in this drainage basin, what timber there is being in small groves or wood lots. The mean annual rainfall is about 42 inches. The winters are comparatively mild in the northern part of the basin. The snowfall is not heavy and ice does not form very thick. In the southern part winter conditions are mild, snowfall is light, ice forms to some extent where the current is sluggish.

The basin affords a few opportunities for storage. Lewistown and Loramie reservoirs, near the headwaters of the Miami, are used to supply water for the Miami and Erie Canal. These reservoirs were constructed about 1830; construction of reservoirs at the present time would be prohibited by the cost of the overflowed land. It is probable that other sites might be found at the headwaters of the tributaries.

The average fall of Miami River is from 3 to 4 feet per mile. This high average slope is favorable to the development of water power. The bed and banks of the stream, however, are not as a rule suitable for the foundation of dams, as they are generally composed of gravel and alluvial soil, and the banks are low. These conditions are met by building low dams to divert the water into canals. The gravel and sandy soil is favorable for the formation of springs, of which there are a great many in the basin. These springs tend to keep up the flow during dry spells and increase the value of the stream for water power. At different places water is diverted from the river to feed the Miami and Erie Canal which parallels the river from Hamilton to Piqua and thence along Loramie River, crossing the divide at its sources. Numerous power plants situated along this canal have leased water rights from the State, in most cases very cheaply.

The following gaging stations have been maintained in this drainage basin:

Miami River at Dayton, Ohio, 1905–1908.
Mad River near Springfield, Ohio, 1904–1906.

MIAMI RIVER AT DAYTON, OHIO.

This station is located at the Main Street Bridge at Dayton, Ohio. The gage, which belongs to the United States Weather Bureau, was established October 1, 1892; it was repaired in 1903, and also in 1904.

On March 18, 1905, the United States Geological Survey began taking discharge measurements to obtain data for water-power, water-supply, and pollution problems. The United States Weather Bureau supplies the United States Geological Survey with daily gage heights. The station is one-half mile below the mouth of Mad River and 1 mile above Wolf Creek, which is tributary from the west. The drainage area above the station is about 2,450 square miles.

There is a power plant about 1 mile above the station which may divert water around the section, and there is also a dam on the Mad River about two miles above the section that diverts water into the Miami and Erie Canal.

The winter conditions are comparatively mild, and ice generally causes little trouble as it rarely lasts for a month at a time.

The datum of the gage has probably remained unchanged since the date of establishment in 1892.

This station has not been inspected since June, 1906, and nothing is known about the existing conditions, hence no monthly discharge is published for 1907 and 1908.

Daily gage height, in feet, of Miami River, at Dayton, Ohio, for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	4.5	3.1	2.5	2.0	2.3	5.0	2.0	2.2	1.0	1.5	1.2	1.3
2	4.0	3.4	2.5	2.4	2.2	4.0	1.9	2.1	1.0	1.3	1.3	1.3
3	4.1	3.1	4.2	2.3	2.1	4.3	1.8	2.0	1.0	1.2	1.2	1.2
4	11.2	3.1	3.5	2.3	2.1	4.0	1.7	2.0	1.2	2.9	3.4	1.2
5	11.7	3.0	3.1	2.3	2.1	4.3	1.7	1.9	1.3	2.4	3.5	1.1
6	8.0	3.4	3.0	2.2	2.1	4.3	1.6	2.6	1.3	2.1	2.9	1.1
7	6.1	2.9	2.9	2.3	2.0	3.6	1.7	2.5	1.2	1.8	2.5	1.1
8	6.0	2.9	2.8	2.2	2.0	6.5	1.8	2.1	1.0	2.0	2.3	1.1
9	7.3	2.8	2.8	2.2	2.0	5.5	1.7	1.9	1.0	2.0	2.1	1.0
10	6.7	2.8	2.8	2.2	2.0	5.3	2.9	1.7	2.0	1.9	1.8	1.0
11	5.7	2.8	2.8	2.1	2.0	7.9	4.6	1.6	3.0	1.6	1.8	1.4
12	4.5	2.7	2.8	2.1	2.0	4.6	7.3	1.5	2.4	1.5	1.7	1.7
13	4.4	2.7	10.8	2.1	1.9	5.9	5.1	1.4	2.0	1.3	1.6	1.7
14	5.0	2.7	15.2	2.1	1.9	7.0	3.5	1.3	1.6	1.3	1.5	1.5
15	5.9	2.8	11.8	2.0	1.9	5.2	3.1	1.2	1.3	1.3	1.4	1.8
16	6.4	2.7	8.0	2.0	1.8	4.0	2.8	1.1	1.3	1.2	1.4	1.8
17	6.0	2.7	6.2	1.9	1.8	3.3	3.0	1.1	1.3	3.3	1.3	2.2
18	8.1	2.7	5.0	1.9	1.8	3.0	4.7	1.3	1.2	2.6	1.3	2.0
19	8.6	2.7	4.6	1.8	1.9	2.7	5.5	1.2	3.3	2.1	1.3	1.9
20	12.0	2.8	4.6	1.8	1.9	2.5	4.8	1.1	2.6	1.3	1.3	1.8
21	10.5	2.9	4.5	1.7	1.8	2.3	4.0	1.1	2.1	1.1	1.5	1.6
22	7.4	2.9	4.1	1.7	1.8	2.0	3.3	1.1	2.5	1.1	1.5	1.7
23	5.3	2.8	3.5	1.7	1.6	2.9	3.0	1.0	2.1	1.0	1.5	3.8
24	4.5	2.6	3.1	3.0	1.6	2.6	3.0	1.0	1.8	1.0	1.6	6.5
25	4.0	2.6	2.8	2.9	1.7	2.5	2.7	1.0	1.6	1.0	1.5	5.5
26	3.4	2.5	2.8	3.3	2.5	2.4	3.5	1.0	1.4	1.0	1.4	4.2
27	3.4	2.5	2.6	3.8	2.7	2.5	3.7	1.0	1.3	1.3	1.3	3.6
28	3.3	2.4	2.4	3.2	2.3	2.4	3.1	1.2	1.2	1.2	1.3	3.2
29	3.2	.....	2.0	2.9	2.2	2.3	3.1	1.3	2.0	1.1	1.2	3.6
30	3.1	.....	2.0	2.5	2.0	2.1	2.5	1.3	1.8	1.1	1.2	4.0
31	3.0	.....	2.0	.....	1.9	.....	2.2	1.2	.....	1.1	.....	6.6
1908.[a]												
1	5.4	.....	3.1	3.6	2.4	1.9	1.4	1.1	1.9	.5	.8	1.0
2	5.4	.....	10.3	5.0	2.4	1.9	1.2	1.1	1.7	.5	.8	1.0
3	4.0	.....	13.3	4.9	2.5	1.9	1.3	1.0	.5	.5	.8	1.0
4	3.3	.....	8.3	3.3	2.6	1.8	1.3	1.0	.5	.5	.8	1.0
5	3.0	.....	6.4	3.1	5.5	1.8	2.2	1.2	.5	.5	.7	1.0

[a] See note at end of table, next page.

Daily gage height, in feet, of Miami River at Dayton, Ohio, for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
6	2.9	9.1	11.7	3.1	7.4	1.7	2.3	1.5	0.8	0.5	0.7	1.0
7	2.8	5.3	11.2	3.1	8.8	1.7	1.9	1.3	.5	.5	.6	1.4
8	2.7	3.5	7.5	3.2	9.4	1.7	1.7	1.2	.5	.5	.7	1.3
9	2.4	3.7	7.2	6.4	7.4	1.6	1.5	1.2	.5	.5	.7	1.4
10	2.2	3.0	6.5	5.7	5.9	1.6	1.4	1.1	.5	.5	.7	1.5
11	2.0	3.6	5.5	5.0	4.5	1.5	1.3	1.2	.5	.7	.7	1.4
12	2.8	4.4	4.8	4.3	3.9	1.5	1.3	1.5	.5	.5	1.0	1.5
13	5.5	4.5	4.2	3.5	3.4	1.5	1.3	1.3	.5	.5	.9	1.8
14	4.8	4.9	3.8	3.1	3.0	1.6	1.2	1.3	.5	.5	.8	1.9
15	3.7	13.0	3.5	3.0	2.9	1.4	1.8	1.2	.5	.5	1.4	1.9
16	3.2	13.0	3.6	3.1	2.8	1.4	1.4	1.0	.5	.4	.8	1.9
17	2.9	8.3	3.1	3.0	2.7	1.3	1.3	1.0	.5	.4	.8	1.9
18	2.7	5.5	3.2	2.9	2.5	1.3	1.4	1.0	.5	.9	.8	1.9
19	2.5	4.6	8.2	2.8	2.5	1.3	1.4	1.2	.5	.5	.9	1.9
20	2.3	3.8	10.8	2.7	2.7	2.2	1.6	1.1	.5	.5	.8	1.9
21	2.3	3.4	8.0	2.6	2.5	3.7	1.5	.9	.5	.7	.8	1.9
22	2.3	3.2	8.8	2.4	2.4	3.5	1.4	.9	.5	.7	1.4	1.9
23	2.5	3.0	5.8	2.3	2.3	3.1	1.3	.9	.5	.7	.9	1.9
24	2.3	2.7	4.6	2.2	2.1	2.4	1.2	.9	.5	.7	.9	1.9
25	2.3	4.5	4.1	2.2	2.0	1.8	2.5	2.0	.5	1.0	.9	1.9
26	2.3	4.9	3.6	2.2	2.0	1.7	1.9	2.0	.5	.7	.9	1.9
27	2.3	4.0	3.3	2.3	2.0	1.5	1.5	2.0	.5	.7	1.0	1.9
28	2.2	3.9	3.0	2.9	2.0	1.4	1.5	2.0	.5	.7	1.0	1.9
29	2.0	3.4	4.3	2.8	1.9	1.4	1.4	1.9	.5	.9	1.0	1.9
30	.....	.....	3.5	2.5	1.9	1.5	1.3	1.9	.5	1.0	1.0	1.9
31	.....	.....	3.6	.....	1.9	.....	1.2	1.9	.....	.8	.....	1.9

NOTE.—River was frozen, January 30 to February 5, 1908.

WABASH RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The drainage area of Wabash River lies in Ohio, Illinois, and Indiana, slightly more than two-thirds of the area being in the last-named State.

The Wabash rises in the southwestern part of Mercer County, Ohio, flows northwestward across the Indiana state line to Huntington in Huntington County, and thence slightly southwestward to Logansport in Cass County. At Logansport the river turns more to the southwest until it reaches Covington in Fountain County, where it finally turns south, continuing in this direction to Terre Haute, below which its course is slightly southwestward to its junction with Ohio River about 30 miles below Mount Vernon, Ind. From a point about 15 miles below Terre Haute to the mouth it forms the boundary line between Indiana and Illinois.

The important tributaries, beginning at the sources and following down the left bank, are as follows: Salamonie and Mississinewa rivers; Wild Cat, Sugar, and Raccoon creeks; White and Patoka rivers. On the right bank are: Little, Eel, Tippecanoe, Vermillion, Embarrass, Little Wabash, and Saline rivers. White River is much the largest tributary. The length of the Wabash is about 410 miles

(map measurement). The total drainage area is approximately 33,000 square miles.

The drainage basin is regular in shape. Only a small part of the entire drainage area lies outside the glaciated region. The Wabash and the West Branch of the White lie within that area for their entire length. The East Branch of the White leaves the glaciated area in the lower part of its course, and enters it again about 20 miles above its mouth. All the rock formations are more or less covered with glacial drift in the form of sand and gravel ridges, and till plains. In general the surface of the country is flat, with a general slope toward the southwest. In the unglaciated section in southern Indiana the country is more uneven. Rock outcrops at many places in the bed of the main stream and its tributaries.

Along Little Wabash River, which enters the Wabash about 15 miles above its mouth, the drainage and flood control are subjects of considerable interest. The Department of Agriculture is making a study of conditions, with a view of developing a plan for reclaiming and protecting areas that are overflowed during floods. Portions of the river have already been mapped for use in this study.

The elevation of the sources of Wabash River is about 1,000 feet; at Huntington the elevation is 699 feet; at Logansport it is 583 feet; at Terre Haute, 478 feet; at the mouth of White River, 376 feet; at the mouth, 311 feet.

The drainage basin can not be called forested, as it is thickly settled and highly cultivated. Any timber standing exists only as groves or woodlots, generally of small extent.

The mean annual rainfall is about 40 inches. The winter conditions in the northern part of the basin are comparatively severe. The snowfall is not heavy, but ice forms on the streams about 1 foot in thickness; in the lower part of the basin the conditions are mild and ice does not form very thick.

Storage possibilities have not been investigated; the high value of farm land in this section would undoubtedly prohibit the construction of reservoirs.

The main stream and its tributaries afford good opportunities for water power, especially on the East and West branches of the White, where the fall is much more than on the Wabash. In general, the water power is not being developed. In some sections water power has to compete with cheap fuel, and the point has not been reached where water power can successfully compete with steam power.

At the headwaters of Wabash River, in Mercer County, Ohio, is a large reservoir, called Grand Reservoir, that is used to store water which is supplied to the Miami and Erie Canal. This reservoir receives the drainage from about 200 square miles, and its capacity

is about 4,000,000,000 cubic feet. The water that is thus fed to the canal is diverted from the basin of the Wabash River.

The Wabash is navigable for part of its length.

The following gaging stations have been maintained in this drainage basin:

Wabash River at Logansport, Ind., 1903–1906.
Wabash River at Lafayette, Ind., 1901–1903.
Wabash River at Terre Haute, Ind., 1902–1903 and 1905–1906.
Wabash River, at Mount Carmel, Ind., 1884–1908 (gage height records by the U. S. Weather Bureau).
Tippecanoe River at Delphi, Ind., 1903–1906, 1908.
West Branch of White River at Indianapolis, Ind., 1904–1906.
Eel River at Cataract, Ind., 1903–1906.
East Branch of White River at Shoals, Ind., 1903–1906, 1908.
Little Wabash River[a] at Clay City, 1908.
Little Wabash River[a] at Golden Gate, 1908.
Little Wabash River[a] at Carmi, 1908.
Skillet Fork[a] at Wayne City, 1908.
Skillet Fork[a] at Mill Shoals, 1908.

WABASH RIVER AT MOUNT CARMEL, ILL.

This station is located at the Southern Railway bridge at Mount Carmel, Ill. The gage at this station was established June 16, 1884; it formerly belonged to the United States Engineer Corps, but was rebuilt in November, 1904, by the United States Weather Bureau, who furnish the gage readings. On October 10, 1908, the United States Geological Survey started taking discharge measurements to obtain data for water power, flood control, storage, and navigation problems.

Patoka River is tributary immediately above the station. Measurements of extreme floods may be difficult to obtain on account of the overflow channels about 2 miles east of the station.

Winter conditions are mild in this locality. Ice does not form very thick and rarely lasts a month at a time.

The datum of the gage has probably remained unchanged since it was established in 1884.

The following discharge measurement was made October 10, 1908:

Width, 772 feet; area, 5,400 square feet; gage height, 1.15 feet; discharge, 2,620 second-feet.

[a] Gaging stations on Little Wabash River are maintained in cooperation with the State of Illinois.

Daily gage height, in feet, of Wabash River at Mount Carmel, Ill., for 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct..	Nov.	Dec.
1	14.9	5.4	19.7	13.4	11.4	8.0	3.5	2.3	0.8	1.1	1.0	1.6
2	15.1	.....	19.4	14.3	11.4	7.8	3.3	2.2	.8	1.1	1.0	1.7
3	15.2	.....	19.2	15.4	11.1	7.0	3.1	2.2	.7	1.1	.8	1.7
4	15.4	.....	19.2	16.3	10.6	6.5	3.1	2.2	.7	1.1	.8	1.7
5	15.5	.....	19.3	16.4	12.4	6.5	3.1	2.2	.7	1.1	.8	1.6
6	15.3	7.9	19.3	16.5	16.7	6.2	3.1	2.1	.6	1.1	.8	1.6
7	14.9	12.1	19.7	16.1	18.9	6.0	3.1	2.0	.5	1.0	.8	1.6
8	13.9	13.4	20.1	16.0	20.5	5.8	3.1	1.9	.5	1.0	.8	1.6
9	13.8	14.7	20.8	16.6	22.3	5.6	3.1	1.9	.4	1.0	.8	1.6
10	13.0	15.1	21.4	17.0	23.5	5.6	3.1	1.9	.4	.9	.8	1.6
11	10.5	15.6	22.0	17.4	24.5	5.5	3.1	1.8	.4	.9	.8	1.6
12	9.5	15.6	22.6	17.7	24.8	5.3	3.1	1.7	.3	.9	.8	1.6
13	8.8	15.5	22.9	18.0	24.9	5.1	3.1	1.6	.8	.9	.8	1.5
14	10.6	16.1	23.3	18.3	24.7	4.9	3.0	1.6	1.2	.8	.8	1.5
15	12.0	18.1	23.5	18.5	24.5	4.7	2.9	3.1	1.3	.8	.8	1.5
16	12.9	19.6	23.4	18.5	24.0	4.5	2.7	2.6	1.3	.8	.8	1.5
17	13.3	20.1	22.9	18.0	23.7	4.4	2.5	2.6	1.2	.8	.8	1.5
18	13.4	20.8	22.2	16.8	22.9	4.3	2.4	3.2	1.1	.8	.8	1.4
19	12.2	21.5	21.3	15.3	21.9	4.2	2.3	3.0	1.1	.8	.8	1.4
20	10.9	22.0	20.3	13.6	21.0	4.1	2.2	3.0	1.0	.8	.8	1.4
21	9.1	22.2	19.0	12.0	20.0	4.0	2.1	2.3	1.0	.8	.8	1.4
22	8.2	22.6	18.0	11.1	19.3	3.9	2.3	2.0	.9	.8	.8	1.4
23	7.7	22.9	17.0	10.2	18.6	4.5	2.4	2.0	.8	.8	.8	1.4
24	7.2	23.2	16.6	9.2	17.9	4.4	2.4	1.9	.8	.8	.8	1.4
25	6.8	23.1	16.4	9.1	17.1	4.2	2.3	1.8	.8	.8	.8	1.4
26	6.4	22.8	16.3	10.2	16.4	4.2	2.3	1.6	.8	.8	.8	1.4
27	6.0	22.0	16.0	10.7	15.2	4.1	2.3	1.5	.8	.8	.8	1.4
28	5.7	21.1	15.2	11.5	13.8	4.0	2.4	1.2	.9	.8	1.0	1.4
29	5.6	20.3	14.8	11.8	11.3	3.9	2.8	1.1	1.0	.8	1.2	1.4
30	5.5	.....	14.1	11.4	9.4	3.7	2.6	1.0	1.1	.8	1.4	1.4
31	5.4	.....	13.4	.....	8.7	.....	2.3	.9	.....	.8	.....	1.4

NOTE.—River frozen February 2–5, 1908.

TIPPECANOE RIVER NEAR DELPHI, IND.

This station is located at the highway bridge at Springboro, Ind., 5 miles west of Delphi. It was established March 14, 1903; discontinued July 20, 1906; reestablished November 2, 1908; and again discontinued early in 1909. The data collected at this station are for use in studying water power, water supply, and pollution problems.

Winter conditions are quite severe in this vicinity and the relation between discharge measurements and gage heights is often affected during the winter periods by ice a foot or more in thickness.

The datum of the gage has remained unchanged since the establishment of the station. The bed of the river is rocky, rough, and permanent. A good rating curve has been developed at this point. The gage observer is paid by G. E. Waesche.

The following discharge measurement was made November 2, 1908:

Width, 214 feet; area, 188 square feet; gage height, 2.69 feet; discharge, 252 second-feet.

Daily gage height, in feet, of Tippecanoe River near Delphi, Ind., for 1908.

[Observer, Albert O. Imler.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	.....	3.00	11	2.68	2.70	21	2.67	2.72
2	2.67	2.95	12	2.60	2.70	22	2.70	2.70
3	2.68	2.90	13	2.60	2.72	23	2.75	2.68
4	2.78	2.85	14	2.59	2.75	24	2.75	3.00
5	2.72	2.82	15	2.60	2.73	25	2.80	2.95
6	2.62	2.80	16	2.60	2.75	26	2.82	2.90
7	2.62	3.00	17	2.59	2.82	27	2.85	2.85
8	2.68	2.90	18	2.65	2.80	28	2.86	2.82
9	2.63	2.82	19	2.70	2.78	29	2.89	2.80
10	2.64	2.75	20	2.70	2.75	30	2.95	2.75
						31	.....	2.70

Rating table for Tippecanoe River near Delphi, Ind., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.60	170	2.90	470
2.70	260	3.00	585
2.80	360		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on one discharge measurement made during 1908 and the form of the 1904 to 1906 curve, and is well defined.

Monthly discharge of Tippecanoe River near Delphi, Ind., for 1908.

[Drainage area, 1,890 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
November 2–30	528	162	268	0.142	0.15	A.
December	585	242	377	.199	.23	A.

EAST BRANCH OF WHITE RIVER AT SHOALS, IND.

This station is located at the highway bridge between East and West Shoals, Ind. The bridge is a short distance above the Baltimore and Ohio Southwestern Railroad bridge. This station was established June 25, 1903; discontinued July 21, 1906; and reestablished October 12, 1908. The data collected are for use in studying water power, water supply, and pollution problems.

The bed of the river is of solid rock and the estimates of the flow at this station should be excellent. Gage readings are taken from December 1 to May 31 by the United States Weather Bureau; 61.0 feet should be added to reduce their readings to the same datum as those in this publication. The winter conditions are mild in this vicinity and the winter flow is affected but little by ice. The datum

of the gage has remained unchanged. The records are reliable and accurate.

The following measurement was made October 12, 1908:

Width, 275 feet; area, 331 square feet; gage height, 63.20 feet; discharge, 345 second-feet.

Daily gage height, in feet, of East Branch of White River at Shoals, Ind., for 1908.

[Observer, O. H. Greist.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						65.50					63.20	63.40
2					67.40	65.50					63.20	63.40
3					67.80	65.40					63.19	63.40
4					68.00	65.30					63.19	63.40
5					77.50	65.20					63.19	63.30
6					81.80	65.00					63.19	63.30
7					83.80	64.90					63.19	63.30
8					85.60	64.80					63.20	63.30
9					87.10	64.90					63.19	63.30
10					87.90	64.80					63.19	63.30
11					88.20	64.70					63.20	63.30
12					88.20	64.70				63.18	63.20	63.30
13					87.50	64.70		64.80		63.19	63.20	63.30
14					85.90	64.60				63.19	63.20	63.30
15					82.60	64.60				63.19	63.20	63.30
16					76.60	64.50				63.19	63.20	63.30
17					69.70	64.50				63.19	63.20	63.30
18					67.40	64.40				63.20	63.20	63.30
19					66.70	64.40				63.19	63.20	63.30
20					66.50	64.30				63.20	63.20	63.30
21					66.30	64.30				63.19	63.20	63.30
22					66.20	64.20				63.20	63.20	63.30
23					66.00	64.20				63.18	63.21	63.30
24					66.00	64.20				63.20	63.28	63.30
25					65.70	64.60				63.19	63.25	63.30
26					65.50	64.60				63.19	63.30	63.30
27					65.40	64.40				63.19	63.40	63.30
28					65.30	64.30				63.19	63.50	63.30
29					65.40	64.20				63.22	63.45	63.30
30					65.40	64.10				63.20	63.40	63.30
31					65.50					63.19		63.30

Rating table for East Branch of White River at Shoals, Ind., for 1906 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
63.20	340	64.60	2,070	66.00	5,860	67.80	9,700
63.30	410	64.70	2,260	66.10	6,120	68.00	10,080
63.40	490	64.80	2,460	66.20	6,360	68.20	10,460
63.50	580	64.90	2,680	66.30	6,580	68.40	10,840
63.60	670	65.00	2,920	66.40	6,800	68.60	11,220
63.70	770	65.10	3,180	66.50	7,020	68.80	11,590
63.80	880	65.20	3,460	66.60	7,240	69.00	11,950
63.90	1,000	65.30	3,750	66.70	7,460	69.20	12,310
64.00	1,130	65.40	4,050	66.80	7,680	69.40	12,670
64.10	1,270	65.50	4,360	66.90	7,900	69.60	13,030
64.20	1,410	65.60	4,670	67.00	8,100	69.80	13,390
64.30	1,560	65.70	4,980	67.20	8,500	70.00	13,750
64.40	1,720	65.80	5,280	67.40	8,900	71.00	15,400
64.50	1,890	65.90	5,580	67.60	9,300	72.00	17,000

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 22 discharge measurements made during 1903 to 1906 and 1908. 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 1908.

[Drainage area, 4,900 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
May 2-31	41,300	3,750	18,200	0.371	4.14	B.
June	4,360	1,270	2,290	.467	.52	A.
October 12-31	354	328	336	.069	.05	A.
November	580	334	369	.075	.08	A.
December	490	410	420	.086	.10	A.

LITTLE WABASH RIVER NEAR CLAY CITY, ILL.

This station is located at the Baltimore and Ohio Southwestern Railroad bridge, 1½ miles east of Clay City, Ill. It was established October 3, 1908, to obtain data to be used in studying drainage and flood-control problems.

The drainage area above the station is about 818 square miles.

The gage datum has not been changed. The records are accurate and reliable. No discharge measurements were made at this station during 1908.

Daily gage height, in feet, of Little Wabash River near Clay City, Ill., for 1908.

[Observer, William F. Davis.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	5.8	6.3	11	.....	5.8	6.1	21	5.9	5.8	6.0
2	.....	5.8	6.3	12	5.9	5.8	6.1	22	5.9	5.8	5.9
3	.....	5.8	7.8	13	5.9	5.8	.....	23	5.9	5.8	5.9
4	.....	5.8	7.3	14	5.9	5.8	6.0	24	5.9	5.8	5.9
5	.....	5.8	7.3	15	5.9	5.8	6.0	25	5.9	6.0	5.9
6	.....	5.8	.....	16	5.9	5.8	6.0	26	5.9	6.0	5.9
7	.....	5.8	6.3	17	5.9	5.8	6.0	27	5.9	6.0	5.9
8	.....	5.8	6.3	18	5.9	5.8	6.0	28	5.9	6.0	5.9
9	.....	5.8	6.1	19	5.9	5.8	6.0	29	5.9	.....	5.9
10	.....	5.8	6.1	20	5.9	5.8	6.0	30	5.8	6.3	5.9
								31	5.9	.....	5.9

LITTLE WABASH RIVER NEAR GOLDEN GATE, ILL.

This station, which is located at the Southern Railway bridge 1 mile west of Golden Gate, Ill., was established August 17, 1908, to collect data for use in drainage and flood-control investigations. Elm Creek enters from the west about 3 miles above the station. The drainage area above the section is about 1,820 square miles.

The gage datum has not been changed and the records are accurate and reliable. Sufficient data have not been collected at this station to enable the flow to be determined. The low-water measurements should be used with caution until verified by additional measurements.

The following measurement was made July 17, 1908:

Width, 75 feet; area, 301 square feet; gage height, 2.6 feet; discharge, 19 second-feet.

Daily gage height, in feet, of Little Wabash River near Golden Gate, Ill., for 1908.

[Observer, Henry Chalcraft.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.0	2.0	1.9	2.6	16	.....	1.8	2.1	2.0	2.1
2	.....	2.0	2.0	1.8	2.6	17	1.9	1.7	2.0	2.0	2.1
3	.....	1.9	1.9	1.9	2.6	18	2.0	1.8	2.0	2.1	2.1
4	.....	1.9	1.9	1.9	2.5	19	2.0	1.8	2.0	2.1	2.1
5	.....	1.8	1.9	1.9	3.5	20	2.1	1.7	2.2	2.1	2.0
6	.....	1.9	2.0	1.9	3.5	21	2.2	1.7	2.1	2.1	2.0
7	.....	1.9	2.0	2.0	3.4	22	2.2	1.7	2.0	2.3	1.9
8	.....	1.9	2.0	2.0	3.1	23	2.0	1.7	1.9	2.2	1.9
9	.....	1.8	2.0	2.0	2.7	24	2.1	1.7	1.9	2.2	1.9
10	.....	1.8	2.0	2.1	2.5	25	2.1	1.7	1.9	2.2	1.7
11	.....	1.8	2.5	2.1	2.5	26	2.0	1.8	1.8	2.5	1.7
12	.....	1.8	2.1	2.1	2.4	27	2.2	1.8	1.8	2.6	1.6
13	.....	1.8	2.1	2.1	2.3	28	2.2	2.0	1.8	2.7	1.7
14	.....	1.8	2.1	2.0	2.2	29	2.0	2.0	1.8	2.7	1.7
15	.....	1.8	2.0	2.0	2.2	30	2.0	1.9	1.9	2.7	1.8
						31	2.0	.....	1.9	.....	1.8

LITTLE WABASH RIVER AT CARMI, ILL.

This station which is located at the highway bridge in the town of Carmi, Ill., was established October 9, 1908, to obtain data of use in studying drainage, flood control, and levee construction. Skillet Fork enters from the west about 6 miles above the station. The drainage area above the section is about 3,120 square miles.

Extreme floods on Ohio River or Wabash River produce backwater at this station.

The gage datum has not been changed. The records are reliable and accurate, but during floods are affected by backwater as stated above. No discharge measurements were made during 1908.

Daily gage height, in feet, of Little Wabash River at Carmi, Ill., for 1903.

[Observer, Noah Weigant.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	1.7	2.0	11	.....	1.6	2.1	21	2.1	1.7	1.9
2	.....	1.7	2.0	12	1.7	1.7	2.0	22	1.9	1.7	1.9
3	.....	1.6	1.9	13	1.7	1.7	2.0	23	1.8	1.7	1.9
4	.....	1.6	1.9	14	1.7	1.7	2.0	24	1.8	2.0	1.9
5	.....	1.6	1.9	15	1.7	1.7	1.9	25	1.7	2.0	1.9
6	.....	1.6	1.9	16	1.8	1.7	1.9	26	1.7	2.1	1.8
7	.....	1.6	2.0	17	1.8	1.7	1.9	27	1.7	2.1	1.8
8	.....	1.6	2.2	18	1.8	1.7	1.9	28	1.7	2.1	1.8
9	.....	1.6	2.2	19	1.8	1.7	1.9	29	1.7	2.1	1.8
10	.....	1.6	2.2	20	1.8	1.7	1.9	30	1.7	2.0	1.9
								31	1.7	.....	1.9

SKILLET FORK NEAR WAYNE CITY, ILL.

This station is located at the Southern Railway bridge, 1 mile east of Wayne City, Ill. It was established August 16, 1908, to obtain data for use in studying drainage and flood-control problems. The drainage area above the section is about 457 square miles.

The gage datum has remained unchanged and the records are reliable and accurate.

The following measurement was made below the regular section July 18, 1908:

Width, 19.5 feet; area, 36 square feet; gage height, 2.2 feet; discharge, 1 second-foot.

Daily gage height, in feet, of Skillet Fork near Wayne City, Ill., for 1908.

[Observer, Evert Higdon.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.0	1.7	2.0	2.3	16	2.2	1.8	1.6	1.7	2.0
2	.....	2.0	1.6	1.9	2.4	17	2.2	1.8	1.7	1.6	1.8
3	.....	2.0	1.6	1.8	2.2	18	2.2	1.8	1.8	1.8	2.1
4	.....	2.0	1.7	1.6	2.1	19	2.2	1.8	1.9	1.9	2.0
5	.....	2.0	1.9	1.9	2.1	20	2.2	1.7	1.8	1.7	1.9
6	.....	2.0	1.7	1.7	2.2	21	2.2	1.7	1.6	1.8	2.0
7	.....	2.0	1.9	1.8	2.3	22	2.2	1.6	1.7	1.8	2.1
8	.....	2.0	1.8	1.9	2.4	23	2.2	1.6	1.9	1.7	2.2
9	.....	2.0	1.6	2.0	1.9	24	2.2	1.6	1.8	1.9	2.0
10	.....	2.0	1.7	1.8	1.8	25	2.2	1.7	1.6	2.0	1.9
11	.....	1.9	1.8	1.7	1.7	26	2.2	1.7	1.5	1.8	2.0
12	.....	1.9	1.9	1.9	1.9	27	2.1	1.6	1.7	1.6	2.0
13	.....	1.9	1.8	2.0	2.1	28	2.1	1.9	1.8	1.7	2.0
14	.....	1.9	1.8	1.9	1.9	29	2.0	1.8	1.6	2.7	1.8
15	.....	1.8	1.7	1.8	1.8	30	2.0	1.8	1.7	2.5	2.0
						31	2.0	.....	1.8	.....	2.1

SKILLET FORK NEAR MILL SHOALS, ILL.

This station is located at the Baltimore and Ohio Southwestern Railroad bridge, 1 mile south of Mill Shoals, Ill. It was established October 9, 1908, for the purpose of obtaining data for use in studying drainage and flood control problems.

Haw Creek enters from the west about 3 miles above the station. The drainage area above the section is about 863 square miles.

The datum of the gage has not been changed. The records are reliable and accurate. No discharge measurements were made at this station during 1908.

Daily gage height, in feet, of Skillet Fork near Mill Shoals, Ill., for 1908.

[Observer, J. A. Clow.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	1.5	1.6	11	.....	1.5	1.6	21	1.5	1.5	1.6
2	.....	1.5	1.6	12	1.5	1.5	1.6	22	1.5	1.5	1.6
3	.....	1.5	1.6	13	1.5	1.5	1.6	23	1.5	1.5	1.6
4	.....	1.5	1.6	14	1.5	1.5	1.6	24	1.5	1.5	1.6
5	.....	1.5	1.6	15	1.5	1.5	1.6	25	1.5	1.5	1.6
6	.....	1.5	1.6	16	1.5	1.5	1.6	26	1.5	1.9	1.6
7	.....	1.5	1.6	17	1.5	1.5	1.6	27	1.5	1.6	1.6
8	.....	1.5	1.6	18	1.5	1.5	1.6	28	1.5	1.6	1.6
9	.....	1.5	1.6	19	1.5	1.5	1.6	29	1.5	1.6	1.6
10	.....	1.5	1.6	20	1.5	1.5	1.6	30	1.5	1.6	1.6
								31	1.5	.....	1.6

TENNESSEE RIVER BASIN.

DESCRIPTION OF BASIN.[a]

Tennessee River gathers its waters from seven States—Virginia, North Carolina, Georgia, Tennessee, Alabama, Mississippi, and Kentucky. The total area drained by it is about 39,000 square miles. Its extreme range discharge to the present time has been estimated at about 650,000 second-feet for flood stages and about 8,000 second-feet for low stages.

The exact point at which Tennessee River has its origin was long a matter of uncertainty. Rivière des Cheraquis, or Cherake, of the early French explorers, and Cherokee River as referred to in cessions to the English by the Indians in 1767, has been considered as being formed by the junction of what are now called Little Tennessee and Holston rivers, near the town of Lenoirs, Tenn. Tannassee, the chief town of the Cherokee Indians, was situated near this point, and the fact that the river derives its present name from that town seems to add additional weight to the arguments of the geographers who have placed the headwaters of the river at this junction. In some of the older geographies the head of this river has been placed at the mouth of Clinch River.

The legislature of the State of Tennessee in 1889 passed an act declaring "that the Tennessee extends from its junction with the Ohio River at Paducah, in the State of Kentucky, past the Clinch and French Broad rivers, to the junction of the north fork of the Holston River, with the Holston, at Kingsport, in Sullivan County, Tenn., all usages to the contrary notwithstanding."

Congressional legislation, however, in several laws appropriating money for the improvement of the upper Tennessee, between Knoxville and Chattanooga, has given authority for extending the name at least to the former city, but as the junction of Holston and French Broad rivers is but 4½ miles above Knoxville, this point is now generally taken as the head of Tennessee River, and in the river and harbor act of 1890 this point appears to have been definitely fixed by the specific language of the act providing for a survey of Tennessee River, from Chattanooga to the junction of Holston and French Broad rivers.

The Holston rises in the Allegheny Mountains, at an elevation of 2,500 feet above sea level. It is a rapid stream, about 400 feet in width, and flows through a narrow valley over a rocky bed. The French Broad heads in the Blue Ridge and winds through a broader and more fertile valley than that of the Holston. The French Broad, because of its greater drainage area, is here considered the main stream.

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[a] Description abstracted from Report Chief of Engineers, United States Army, 1893, pt. 3, p. 2330; 1897, pt. 3, pp. 2247, 2249, 2250.

Below the junction of its headwater streams, the Tennessee 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.

The channel of the bed of the Tennessee, as well as that of most of its tributaries, consists not of a smooth, even furrow like a ditch, but rather of a series of long and narrow and deep holes or troughs, these holes being separated from each other by ridges, which are generally broad and flat on top and of such length as to make the river considerably wider where they occur than it is at the deeper pools. The crest of any one of these ridges is generally a little lower than that of the one which immediately precedes it upstream. These ridges are generally composed of hard material—such as cemented gravel, loose rocks of considerable size, or more often of solid ledges, and are, in short, the bars or reefs—and are the places where in low water navigation is most inconvenient and difficult. They are found at the places where the bottom of the river is harder and offers more resistance to errosion than the banks and where in consequence the river, in its effort to secure a channel sufficiently commodious to carry its flood discharge, has cut away the banks instead of the bottom, naturally selecting the softer material.

In low water, then, the river is made up of a series of narrow ponds or pools, varying from a few hundred yards to several miles in length, in which the water is deep, the current gentle, and navigation generally free and unobstructed, these pools being separated by bars where the river is wide, the water shallow, and the current rapid, where islands frequently occur and divide and subdivide the channel, and where nearly all the fall is concentrated, where snags and bowlders are generally found, and where navigation is in consequence difficult, often dangerous, and sometimes impossible. This is the condition at low water.

When the river rises, the gain in cross section is greater on the wide bars than it is in the narrow pools, and consequently the area of discharge increases more rapidly on the bars than it does in the pools; the area of the cross section of discharges on the bars rapidly approaches that in the pools, and finally equals and then exceeds it. As a result the conditions with respect to the velocity of the current are reversed in high water and the current becomes sluggish, comparatively speaking, where before it was most rapid and swift. For this reason gravel, bowlders, sunken logs, and other débris are scoured from the bottom of the pools at high water and are often deposited on the bars, where they remain when the river falls, the

feebler currents due to the low-water discharge not being adequate to remove them.

The Tennessee has always held an important place in the projects for the improvement of the navigable waterways of the country. The Muscle Shoals Canal having been opened to navigation, the Tennessee is now navigable from its mouth for a distance of 673 miles, during several months of each year, and as work is continued upon other less formidable obstructions the season of navigation will be correspondingly lengthened. The radical improvement of this river, so as to make navigation continuous throughout its length for boats of moderate draft, is by no means an impossibility.

The important tributaries of the Tennessee include Clinch River, which enters near Kingston in Roan County; Hiwassee River, which rises in northern Georgia, enters the main stream from the south about 30 miles above Chattanooga; and Little Tennessee, which rises in the northeast corner of Georgia, flows across the southwestern part of North Carolina, and enters the Tennessee near Loudon, Tenn.

The following gaging stations have been maintained in this river basin:

French Broad River at Rosman, N. C., 1907–8.
French Broad River at Horseshoe, N. C., 1904–1906.
French Broad River near Asheville, N. C., 1895–1908.
French Broad River at Newport, Tenn., 1900–1905, 1907.
Tennessee River at Knoxville, Tenn., 1899–1908.
Tennessee River at Chattanooga, Tenn., 1895–1908.
Davidson River near Davidson River, N. C., 1904–1908.
Little River at Calhoun, N. C., 1907–8.
North Fork Mills River at Pinkbed, N. C., 1904–1908.
South Fork Mills River near Sitton, N. C., 1904–1908.
Mud Creek at Naples, N. C., 1907.
Swannanoa River at Swannanoa, N. C., 1907–8.
Swannanoa River at Biltmore, N. C., 1905.
Ivy River at Democrat, N. C., 1907.
Pigeon River at Canton, N. C., 1907–8.
Pigeon River at Newport, Tenn., 1900–1908.
Nolichucky River at Chucky Valley, Tenn., 1900–1901.
Nolichucky River near Greeneville, Tenn., 1903–1908.
North Toe River at Spruce Pine, N. C., 1907–8.
South Fork, Holston River, near Chilhowie, Va., 1907–8.
South Fork, Holston River, at Bluff City, Tenn., 1900–1908.
Holston River near Rogersville, Tenn., 1904–1908.
Middle Fork, Holston River, at Chilhowie, Va., 1907–8.
Roan Creek at Butler, Tenn., 1900–1901.
Watauga River at Butler, Tenn., 1900–1901.
Watauga River near Elizabethton, Tenn., 1903–1908.
Elk Creek at Lineback, Tenn., 1900–1901.
Doe River at Elizabethton, Tenn., 1907–8.
North Fork, Holston River, at Saltville, Va., 1907–8.
Little Tennessee River near Franklin, N. C., 1907–8.

Little Tennessee River at Judson, N. C., 1896–1908.
Little Tennessee River at McGhee, Tenn., 1905–1908.
Cullasaja River at Cullasaja, N. C., 1907–8.
Nantahala River near Nantahala, N. C., 1907–8.
Tuckaseegee River near East Laport, N. C., 1907–8.
Tuckaseegee River at Bryson, N. C., 1896–1908.
Scotts Creek near Dillsboro, N. C., 1907–8.
Oconolufty River near Cherokee, N. C., 1907–8.
Cheoah River at Millsaps, N. C., 1907–8.
Clinch River at Clinchport, Va., 1907–8.
Hiwassee River near Hayesville, N. C., 1907–8.
Hiwassee River at Murphy, N. C., 1896–1908.
Hiwassee River at Reliance, Tenn., 1900–1908.
Hiwassee River at Charlestown, Tenn., 1899–1901, 1903.
Tusquite Creek near Hayesville, N. C., 1907–8.
Valley River at Tomotla, N. C., 1904–1908.
Nottely River at Ranger, N. C., 1901–1905.
Toccoa River near Dial, Ga., 1907–8.
Toccoa River at Blueridge, Ga., 1899–1903.
Ocoee River at McCays, Tenn., 1903–1908.
Elk River near Elkmont, Ala., 1904–1908.
Duck River at Columbia, Tenn., 1904–1908.

FRENCH BROAD RIVER AT ROSMAN, N. C.

This station is located at a wagon bridge about 800 feet east of the railroad station at Rosman. It was originally established May 7, 1907, in cooperation with the Forest Service for the purpose of obtaining data for use in determining the water resources and water-power possibilities in the southern Appalachian Mountains and relating to the flow of the larger streams below. It is about one-half mile above the mouth of East Fork of the river, and the same distance below the junction of North and West forks.

Discharge measurements are made from a wooden truss bridge where the current is good and the conditions are favorable for a constant rating.[a]

Discharge measurements of French Broad River at Rosman, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 7	Warren E. Hall	71	297	2.31	235
July 16	do	67	258	2.00	132
September 23	do	70	337	2.90	538
Do	do	70	340	2.83	474
Do	do	70	331	2.78	440
December 16	do	63	259	2.50	289
1908.					
July 18	F. P. Thomas	61	251	2.10	163

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of French Broad River at Rosman, N. C., for 1907 and 1908.

[Observer, L. M. Glazener.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	3.2	1.9	1.9	1.9	2.1	1.9	2.1
2	.....	.....	.....	.....	.....	2.4	1.9	1.9	1.9	2.1	2.6	2.1
3	.....	.....	.....	.....	.....	2.2	1.9	1.9	1.9	2.0	2.3	2.0
4	.....	.....	.....	.....	.....	2.1	1.9	1.9	1.9	2.0	2.2	2.0
5	.....	.....	.....	.....	.....	2.1	1.9	1.8	1.9	2.0	2.0	2.0
6	.....	.....	.....	.....	.....	2.1	1.9	1.9	1.9	2.0	2.0	2.0
7	.....	.....	.....	.....	2.3	2.0	1.9	1.8	1.8	2.0	1.9	2.0
8	.....	.....	.....	.....	2.2	2.2	1.9	1.8	1.9	2.1	1.9	2.0
9	.....	.....	.....	.....	2.2	2.1	1.9	1.8	1.9	2.0	1.9	2.6
10	.....	.....	.....	.....	2.1	2.1	1.9	1.8	1.9	1.9	2.3	3.3
11	.....	.....	.....	.....	2.3	2.0	2.0	2.0	1.9	1.9	2.0	2.8
12	.....	.....	.....	.....	2.1	2.0	2.0	1.9	1.9	1.9	2.0	2.6
13	.....	.....	.....	.....	2.1	2.1	2.0	1.9	1.8	1.9	1.9	2.4
14	.....	.....	.....	.....	2.1	2.1	2.0	1.9	1.8	1.9	1.9	3.4
15	.....	.....	.....	.....	2.2	2.0	2.0	2.0	1.8	1.9	1.9	2.8
16	.....	.....	.....	.....	2.1	2.0	2.2	2.0	1.8	1.9	1.9	2.5
17	.....	.....	.....	.....	2.1	2.0	2.0	1.9	1.8	1.9	1.9	2.2
18	.....	.....	.....	.....	2.1	2.0	2.0	2.0	1.8	1.9	2.8	2.2
19	.....	.....	.....	.....	2.1	2.0	2.0	2.0	1.8	1.9	2.2	2.2
20	.....	.....	.....	.....	2.1	2.0	2.0	2.0	1.8	1.9	2.2	2.2
21	.....	.....	.....	.....	2.0	2.0	1.9	1.9	1.8	1.9	3.6	2.1
22	.....	.....	.....	.....	2.0	2.0	1.9	2.1	2.0	1.9	2.1	1.9
23	.....	.....	.....	.....	2.0	2.0	1.9	2.1	4.2	1.9	2.7	4.2
24	.....	.....	.....	.....	2.0	2.0	1.9	2.1	2.2	1.9	3.1	3.0
25	.....	.....	.....	.....	2.0	2.0	1.9	2.0	2.1	1.8	2.5	2.8
26	.....	.....	.....	.....	2.3	2.0	1.9	1.9	2.0	1.8	2.4	2.5
27	.....	.....	.....	.....	2.1	2.0	1.9	1.9	2.0	1.9	2.3	2.5
28	.....	.....	.....	.....	2.0	2.0	2.5	1.9	2.2	1.9	2.3	2.2
29	.....	.....	.....	.....	2.0	2.0	2.0	1.9	2.4	1.9	2.2	2.2
30	.....	.....	.....	.....	2.0	2.0	2.0	1.9	2.2	1.9	2.1	3.9
31	.....	.....	.....	.....	2.25	.....	1.9	1.9	.....	1.9	.....	2.5
1908.												
1	2.8	2.8	2.7	2.5	2.9	2.3	2.2	2.1	2.4	2.0	2.6	2.2
2	2.6	2.6	2.7	2.4	2.8	2.3	2.3	2.0	2.4	2.0	2.4	2.5
3	2.4	2.5	2.8	2.2	2.7	2.4	2.4	2.0	2.3	2.0	2.2	2.4
4	2.0	2.5	2.8	2.0	2.7	2.7	2.9	2.0	2.3	2.0	2.2	2.3
5	2.6	2.2	2.8	2.5	2.7	2.7	3.0	2.6	2.9	2.0	2.2	2.1
6	2.6	2.2	2.6	2.5	2.7	2.7	2.8	2.4	2.6	1.9	2.2	2.1
7	2.6	2.4	2.6	2.5	3.3	2.4	2.7	2.4	2.6	2.0	2.3	4.1
8	2.6	2.4	2.5	2.5	2.9	2.4	2.5	2.4	2.4	2.2	2.0	3.9
9	2.4	2.3	2.4	2.4	2.8	2.4	2.3	2.1	2.4	2.6	2.0	2.8
10	2.4	2.3	2.4	2.4	2.6	2.4	2.3	2.1	2.2	2.9	2.0	2.5
11	2.4	2.6	2.4	2.4	2.6	2.4	2.3	2.1	2.2	2.3	2.2	2.4
12	3.9	2.9	2.8	2.2	2.6	2.4	2.3	2.1	2.1	2.2	2.3	2.4
13	3.0	3.0	2.7	2.2	2.6	2.4	2.2	2.0	2.0	2.0	2.4	2.1
14	2.9	3.3	2.7	2.5	2.6	2.4	2.2	2.0	2.0	2.0	2.5	2.1
15	2.9	7.3	2.6	3.3	2.6	2.7	2.2	2.0	2.0	2.0	2.2	2.1
16	2.8	3.9	2.4	2.9	2.7	2.4	2.2	2.0	2.0	2.0	2.1	2.1
17	2.6	3.5	2.4	2.9	2.7	2.4	2.2	2.0	2.0	2.0	2.1	2.1
18	2.6	3.0	2.4	2.7	2.7	2.4	2.2	2.0	2.0	2.0	2.1	2.1
19	2.8	3.0	2.6	2.6	2.8	2.4	2.1	2.0	2.0	2.0	2.1	2.1
20	2.5	2.9	2.9	2.6	2.6	2.4	2.1	2.3	2.0	2.0	2.1	2.1
21	2.5	2.7	2.9	2.5	2.6	2.3	2.1	2.7	2.0	2.0	2.1	2.1
22	2.5	2.7	2.7	2.5	2.6	2.3	2.1	3.0	2.0	2.2	2.0	2.9
23	2.5	2.7	3.0	2.5	2.6	2.3	2.1	2.7	2.0	2.9	2.0	2.7
24	2.4	2.6	3.4	2.4	2.6	2.3	2.1	3.5	2.0	2.8	2.0	2.6
25	2.0	2.9	2.9	4.7	2.6	2.3	2.3	3.8	2.0	2.4	2.0	2.6
26	2.8	3.0	2.7	3.4	2.8	2.3	2.2	3.0	1.9	2.2	2.0	2.4
27	2.8	2.9	2.7	2.9	2.5	2.3	2.2	2.9	2.1	2.9	2.0	2.4
28	2.4	2.8	2.6	2.7	2.5	2.3	2.2	2.8	2.2	4.4	2.0	2.2
29	2.4	2.7	2.5	2.7	2.5	2.3	2.1	2.5	2.0	3.6	2.1	2.2
30	2.4	.....	2.6	2.9	2.5	2.3	2.1	2.4	2.0	3.0	2.1	2.2
31	2.6	.....	2.8	.....	2.3	.....	2.1	2.4	.....	2.9	.....	2.2

Daily discharge, in second-feet, of French Broad River at Rosman, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							110	110	110	160	110	160
2						260	110	110	110	160	345	160
3						190	110	110	110	133	223	133
4						160	110	110	110	133	190	133
5						160	110	90	110	133	133	133
6						160	110	110	110	133	133	133
7					223	133	110	90	90	133	110	133
8					190	190	110	90	110	160	110	133
9					190	160	110	90	110	133	110	345
10					160	160	110	90	110	110	223	
11					223	133	133	133	110	110	133	450
12					160	133	133	110	110	110	133	345
13					160	160	133	110	90	110	110	260
14					160	160	133	110	90	110	110	
15					190	133	133	133	90	110	110	450
16					160	133	190	133	90	110	110	300
17					160	133	133	110	90	110	110	190
18					160	133	133	133	90	110	450	190
19					160	133	133	133	90	110	190	190
20					160	133	133	133	90	110	190	190
21					133	133	110	110	90	110		160
22					133	133	110	160	133	110	160	110
23					133	133	110	160		110	395	
24					133	133	110	160	190	110		570
25					133	133	110	133	160	90	300	450
26					223	133	110	110	133	90	260	300
27					160	133	110	110	133	110	223	300
28					133	133	300	110	190	110	223	190
29					133	133	133	110	260	110	190	190
30					133	133	133	110	190	110	160	
31					206		110	110		110		300
1908.												
1	450	450	395	300	510	223	190	160	260	133	345	190
2	345	345	395	260	450	223	223	133	260	133	260	300
3	260	300	450	190	395	260	260	133	223	133	190	260
4	133	300	450	133	395	395	510	133	223	133	190	223
5	345	190	450	300	395	395	570	345	510	133	190	160
6	345	190	345	300	395	395	450	260	345	110	190	160
7	345	260	345	300		260	395	260	345	133	223	
8	345	260	300	300	510	260	300	260	260	190	133	
9	260	223	260	260	450	260	223	160	260	345	133	450
10	260	223	260	260	345	260	223	160	190	510	133	300
11	260	345	260	260	345	260	223	160	190	223	190	260
12		510	450	190	345	260	223	160	160	190	223	260
13	570	570	395	190	345	260	190	133	133	133	260	160
14	510		395	300	345	260	190	133	133	133	300	160
15	510		345		345	395	190	133	133	133	190	160
16	450		260	510	395	260	190	133	133	133	160	160
17	345		260	510	395	260	190	133	133	133	160	160
18	345	570	260	395	395	260	190	133	133	133	160	160
19	450	570	345	345	450	260	160	133	133	133	160	160
20	300	510	510	345	345	260	160	223	133	133	160	160
21	300	395	510	300	345	223	160	395	133	133	160	160
22	300	395	395	300	345	223	160	570	133	190	133	510
23	300	395	570	300	345	223	160	395	133	510	133	395
24	260	345		260	345	223	160		133	450	133	345
25	133	510	510		345	223	223		133	260	133	345
26	450	570	395		450	223	190	570	110	190	133	260
27	450	510	395	510	300	223	190	510	160	510	133	260
28	260	450	345	395	300	223	190	450	190		133	190
29	260	395	300	395	300	223	160	300	133		160	190
30	260		345	510	300	223	160	260	133	570	160	190
31	345		450		223		160	260		510		190

NOTE.—Daily discharges 1907 and 1908 are based on a well defined rating curve. The discharge was greater than 600 second-feet for all missing days beginning May 7, 1907.

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, and near the end of the Patton Avenue line of the Asheville Street Railway Company. It is about 2 miles below the mouth of Swannanoa River.

The United States Weather Bureau maintains a station at this place, and during 1904 a number of discharge measurements were made by the United States Geological Survey. Since the beginning of 1905 the discharge measurements have been continued and the gage heights have been furnished by the United States Weather Bureau.

Besides the general value of the data for stream-flow studies, they are especially valuable for water-power estimates, there being a great amount of fall in the river below.

The conditions of flow are favorable for accurate discharge measurements and for a constant rating curve, except that the rating was somewhat changed by bridge piers erected during 1907. The datum of the gage has not been changed.[a]

Discharge measurements of French Broad River near Asheville, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 2	Warren E. Hall	317	970	0.04	1,550
May 25	do	321	993	.06	1,610
December 12	do	316	1,050	.58	1,910
1908.					
April 13	Warren E. Hall	320	1,000	0.28	1,690
July 20	F. P. Thomas	312	851	−.04	1,160

Daily gage height, in feet, of French Broad River near Asheville, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.8	0.2	0.0	0.5	3.2	0.6	−0.2	−0.3	−0.6	−0.2	−0.7	0.0
2	1.8	.4	.4	.3	.1	1.4	− .3	− .3	− .6	− .4	− .7	− .1
3	1.4	.4	1.0	.1	.8	.8	− .1	− .4	− .6	− .4	.3	− .1
4	1.1	.4	.5	− .1	1.0	1.4	− .1	− .5	− .5	− .4	− .3	− .2
5	1.0	1.0	.2	− .2	.8	.2	− .2	− .6	− .4	− .4	− .6	− .2
6	.8	.7	.1	.0	.5	.1	− .3	− .6	− .4	− .4	− .6	− .3
7	.7	.4	.1	.7	.6	.0	− .3	− .6	− .6	− .4	− .6	− .3
8	.5	.3	.2	.4	.6	.1	− .4	− .5	− .6	− .5	− .6	− .3
9	.5	.1	.1	.3	.5	.3	− .4	− .5	− .6	− .3	− .6	− .2
10	.5	.1	.1	.2	.4	.9	− .4	− .6	− .6	− .4	− .5	.7
11	.5	.1	.4	.1	.4	.3	− .2	− .5	− .5	− .5	− .5	2.0
12	.4	.1	.3	.1	.4	.1	.0	− .3	− .5	− .5	− .5	.7
13	.4	.1	.2	.0	.3	− .1	− .1	− .2	− .5	− .6	− .5	.2
14	.4	.1	.1	.0	.2	.1	− .3	− .3	− .6	− .6	− .5	2.5
15	.4	.1	.3	− .1	.1	− .1	− .4	− .3	− .6	− .6	− .6	3.2

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of French Broad River near Asheville, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
16	0.3	0.1	0.3	−0.1	0.1	−0.2	−0.0	−0.4	−0.7	−0.6	−0.6	2.8
17	.3	.1	.2	− .1	.1	− .3	.0	− .2	− .6	− .6	− .6	1.0
18	.3	.0	.1	− .2	.1	− .3	.0	− .2	− .6	− .6	− .6	.7
19	.3	.0	.1	.1	.0	− .3	− .2	− .3	− .6	− .6	.1	.6
20	.2	− .1	.1	.1	− .1	− .3	− .2	− .3	− .7	− .6	.0	.5
21	.3	− .1	.0	− .1	− .2	− .1	− .3	− .4	− .6	− .6	.2	.3
22	.3	− .1	.0	2.0	− .2	.1	− .3	.0	− .6	− .6	1.7	.2
23	.2	− .1	.0	1.0	− .2	− .1	− .4	.1	1.4	− .7	1.5	3.0
24	.1	− .1	− .1	.9	− .2	.1	− .4	− .1	2.0	− .7	2.9	3.5
25	.1	.0	− .1	.4	− .2	.1	− .4	− .2	.3	− .7	2.5	2.0
26	.1	.1	− .2	.2	.7	.2	− .2	− .3	− .2	− .7	1.1	1.3
27	.2	.2	.1	1.6	.8	− .1	− .3	− .4	− .4	− .7	.8	1.0
28	.1	.1	.0	.6	.2	.3	− .4	− .5	− .3	− .6	.4	.7
29	.1	.....	− .1	.4	.0	.3	− .3	− .6	.4	− .7	.0	.6
30	.1	.....	− .2	.3	− .2	.1	.1	− .6	.1	− .7	.0	.8
31	.1	.....	.2	.....	.2	.....	− .2	− .6	.....	− .7	.....	2.7
1908.												
1	1.7	.3	1.2	.8	1.0	.2	− .3	.1	.3	− .1	1.7	.0
2	1.2	.3	1.1	.8	.8	.1	− .3	− .2	.2	− .2	1.1	.0
3	1.0	.3	1.1	.6	.8	.0	.4	− .2	.2	− .3	.8	.2
4	.8	.4	1.1	.5	.7	.1	.5	.2	.1	− .3	.6	.0
5	1.5	.4	1.0	.5	.5	.0	1.5	.0	.1	− .3	.4	.0
6	1.2	.5	1.0	.5	.4	.4	1.9	.4	2.7	− .3	.3	.0
7	1.0	.7	.9	.5	1.2	.2	1.3	.8	1.3	− .3	.2	1.1
8	1.3	.7	.8	.6	1.7	.1	1.3	.7	.4	− .4	.2	2.5
9	.9	.6	.8	.5	1.0	.0	1.0	.8	.4	− .3	.1	1.5
10	.7	.6	.7	.4	.8	.3	1.0	.5	.4	2.5	.1	1.0
11	.5	.7	.6	.4	.6	.3	.8	.2	.3	.9	.1	.7
12	5.9	1.8	.9	.3	.5	.1	.3	.0	.2	.7	.3	.8
13	4.5	1.9	.9	.3	.5	.1	.1	.0	.2	.0	.2	.6
14	3.5	2.1	.8	.2	.4	.3	.2	− .1	.2	.0	.4	.4
15	2.0	5.9	.7	.2	.3	.3	.1	− .1	.1	− .1	.7	.3
16	1.5	5.4	.6	1.8	.3	.3	.5	− .1	.0	− .1	.4	.2
17	1.2	4.8	.5	1.2	.6	.0	.2	.3	.0	− .2	.3	.1
18	1.0	3.8	.4	.9	.9	.0	.1	.0	.0	− .3	.2	.1
19	1.0	2.3	.4	.8	1.2	.0	.1	− .1	.0	− .3	.1	.1
20	.9	2.4	.5	.8	.9	.0	.0	− .1	− .1	− .3	.0	.1
21	.7	1.8	1.9	.6	.6	− .1	− .2	− .1	− .2	− .3	.0	.1
22	.5	1.7	1.4	.5	.4	.1	− .2	1.1	− .2	− .3	.0	.3
23	.5	1.4	1.1	.4	.4	.0	.3	1.1	− .2	1.2	.0	2.2
24	.5	1.3	3.0	.4	.5	.0	.2	1.8	− .2	3.4	.0	1.7
25	.4	1.2	2.9	1.1	.4	.0	.0	3.2	− .2	1.7	.0	1.2
26	.4	1.4	1.8	2.9	.4	− .1	.2	4.9	− .2	1.1	.0	.8
27	.6	1.8	1.4	1.7	.5	− .1	− .1	4.2	− .2	.8	.0	.8
28	.6	1.4	1.1	1.4	.4	− .2	.3	3.0	.1	.6	− .1	.6
29	.4	1.2	1.0	1.1	.4	− .2	.4	1.3	.2	2.6	− .1	.4
30	.3	.....	.9	.9	.5	− .2	.7	1.0	.0	3.6	− .1	.4
31	.3	.....	.8	.....	.3	.....	.4	.8	.....	2.1	.....	.8

Rating tables for French Broad River near Asheville, N. C.

FOR 1907.

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	340	−0.10	1,380	0.90	2,890	1.90	4,960
−1.00	420	.00	1,510	1.00	3,070	2.00	5,200
− .90	500	.10	1,650	1.10	3,250	2.20	5,700
− .80	590	.20	1,790	1.20	3,440	2.40	6,230
− .70	690	.30	1,930	1.30	3,640	2.60	6,770
− .60	790	.40	2,080	1.40	3,850	2.80	7,320
− .50	900	.50	2,230	1.50	4,060	3.00	7,890
− .40	1,010	.60	2,390	1.60	4,270	3.20	8,480
− .30	1,130	.70	2,550	1.70	4,490	3.40	9,080
− .20	1,250	.80	2,720	1.80	4,720		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on four discharge measurements made during 1906 and 1907, and is well defined. See also monthly discharge table footnote.

Rating tables for French Broad River near Asheville, N. C.—Continued.

FOR 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
−0.40	790	0.90	2,560	2.20	4,980	4.00	9,700
− .30	900	1.00	2,720	2.30	5,210	4.20	10,300
− .20	1,020	1.10	2,880	2.40	5,440	4.40	10,910
− .10	1,140	1.20	3,050	2.50	5,680	4.60	11,530
.00	1,260	1.30	3,220	2.60	5,920	4.80	12,160
.10	1,390	1.40	3,390	2.70	6,170	5.00	12,800
.20	1,530	1.50	3,570	2.80	6,420	5.20	13,460
.30	1,670	1.60	3,750	2.90	6,670	5.40	14,120
.40	1,810	1.70	3,940	3.00	6,930	5.60	14,800
.50	1,950	1.80	4,140	3.20	7,460	5.80	15,500
.60	2,100	1.90	4,340	3.40	8,000	6.00	16,200
.70	2,250	2.00	4,550	3.60	8,560		
.80	2,400	2.10	4,760	3.80	9,120		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on two discharge measurements made during 1908 and the general form of the previous curves, and is fairly well defined.

Monthly discharge of French Broad River near Asheville, N. C., for 1907 and 1908.

[Drainage area, 987 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907						
January	7,320	1,650	2,360	2.39	2.76	B.
February	3,070	1,380	1,750	1.77	1.84	B.
March	3,070	1,250	1,720	1.74	2.01	B.
April	5,200	1,250	2,010	2.04	2.28	B.
May	8,480	1,250	2,100	2.13	2.46	B.
June	3,850	1,130	1,810	1.83	2.04	B.
July	1,510	900	1,100	1.11	1.28	C.
August	1,320	545	775	.785	.90	C.
September	4,380	380	837	.848	.95	C.
October	900	420	553	.560	.65	D.
November	6,900	460	1,490	1.51	1.68	C.
December	8,630	845	2,900	2.94	3.39	B.
The year	8,630	380	1,620	1.64	22.24	
1908.						
January	15,800	1,670	3,450	3.50	4.04	B.
February	15,800	1,670	4,430	4.49	4.84	B.
March	6,930	1,810	2,920	2.96	3.41	B.
April	6,670	1,530	2,440	2.47	2.76	B.
May	3,940	1,670	2,180	2.21	2.55	B.
June	1,810	1,020	1,350	1.37	1.53	B.
July	4,340	900	1,870	1.89	2.18	B.
August	12,500	1,020	2,780	2.82	3.25	B.
September	6,170	1,020	1,580	1.60	1.78	B.
October	8,560	790	2,280	2.31	2.66	B.
November	3,940	1,140	1,640	1.66	1.85	B.
December	5,680	1,260	2,190	2.22	2.56	B.
The year	15,800	790	2,430	2.46	33.41	

NOTE.—During the last half of 1907 construction work on a bridge immediately below the station caused more or less backwater. The stage of construction and hence amount of obstruction was known from month to month and in addition one measurement was made while construction was going on and two have been made since the bridge was completed. From these data it was possible to estimate fairly well the amount of backwater effect and make the necessary corrections in gage heights. Before application of the 1907 rating table to the gage heights July to December, 1907, the following corrections were made to daily gage heights: July, −0.1 foot; August, −0.25 foot; September, −0.35 foot; October, −0.3 foot; November and December, −0.25 foot.

FRENCH BROAD RIVER NEAR NEWPORT, TENN.[a]

This station is located at the highway bridge about 2 miles north of Newport. It was originally established September 4, 1900, and was maintained for a portion of the time only during 1900 and 1901. The bridge was washed away in the spring of 1902, carrying with it the gage and all reference points. A new bridge having been built, the station was re-established October 27, 1902, and was maintained until the end of 1905, when it was discontinued.

In connection with the Appalachian Forest investigation the gage readings were again maintained from August 16 to December 31, 1907. Since October 27, 1902, the gage datum has remained the same.

Daily gage height, in feet, of French Broad River near Newport, Tenn., for 1907.

[Observer, T. B. Odell.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.1	1.5	1.2	1.6	16	1.4	1.1	1.2	1.3	2.9
2	.....	1.0	1.4	1.3	1.6	17	1.4	1.2	1.1	1.2	2.3
3	.....	1.1	1.3	1.2	1.6	18	1.5	1.2	1.1	1.3	2.1
4	.....	1.0	1.3	1.6	1.5	19	1.4	1.1	1.1	1.5	2.0
5	.....	1.2	1.5	1.3	1.5	20	1.4	1.1	1.0	1.7	1.9
6	.....	1.1	1.4	1.3	1.4	21	1.3	.9	1.2	1.9	1.8
7	.....	1.1	1.4	1.3	1.4	22	1.5	1.7	1.1	2.3	1.8
8	.....	1.1	1.3	1.3	1.5	23	1.6	4.7	1.3	2.9	1.8
9	.....	1.1	1.4	1.4	1.6	24	1.7	3.2	1.3	3.6	3.4
10	.....	1.2	1.4	1.9	1.7	25	1.5	2.3	1.2	3.3	3.3
11	.....	1.4	1.3	1.7	2.8	26	1.5	1.7	1.2	2.0	2.4
12	.....	1.3	1.2	1.8	2.3	27	1.5	1.5	1.2	1.8	2.3
13	.....	1.3	1.2	1.5	2.0	28	1.4	1.6	1.2	1.7	2.1
14	.....	1.0	1.1	1.5	1.8	29	1.3	1.6	1.3	1.7	2.0
15	.....	1.0	1.0	1.3	3.4	30	1.4	1.8	1.2	1.7	2.8
						31	1.5	.....	1.3	.....	3.6

Rating table for French Broad River near Newport, Tenn., for 1907.

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	500	1.80	2,290	2.70	4,950	3.60	8,420
1.00	640	1.90	2,550	1.80	5,290	3.70	8,840
1.10	790	2.00	2,820	2.90	5,640	3.80	9,270
1.20	960	2.10	3,100	3.00	6,010	3.80	9,700
1.30	1,150	2.20	3,390	3.10	6,390	4.00	10,140
1.40	1,350	2.30	3,690	3.20	6,780	4.20	11,050
1.50	1,570	2.40	3,990	3.30	7,180	4.40	11,980
1.60	1,800	2.50	4,300	3.40	7,590	4.60	12,920
1.70	2,040	2.60	4,620	3.50	8,000	4.80	13,860

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on three discharge measurements made during 1905 and 1906 and is fairly well defined.

[a] Formerly the Oldtown gaging station.

Monthly discharge of French Broad River near Newport, Tenn., for 1907.

[Drainage area, 1,740 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 16–31	2,040	1,150	1,480	0.851	0.51	B.
September	13,400	500	1,770	1.02	1.14	B.
October	1,570	640	1,060	.609	.70	B.
November	8,420	960	2,250	1.29	1.44	B.
December	8,420	1,350	3,390	1.95	2.25	B.

TENNESSEE RIVER AT KNOXVILLE, TENN.

This station is located at the Gay street or county highway bridge in the city of Knoxville. It is about 4 miles below the junction of French Broad and Holston rivers.

Daily records are kept by the United States Weather Bureau and are furnished to the Geological Survey, and since 1899 discharge measurements have been made by the Geological Survey. The gage heights for 1899 are from a gage different in location and datum from the present gage. For 1900 to 1908, inclusive, the same gage has been used.

The data are of use principally in connection with other station data in making general run-off studies.

The conditions are not favorable for a high degree of accuracy in discharge measurements, owing to the roughness of the bed and the great height of the bridge from which measurements are made. A number of wing dams for improvement of boat channel make liable changes in the rating curve.

Daily gage height, in feet, of Tennessee River at Knoxville, Tenn., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	7.9	2.2	4.3	3.7	3.4	1.9	2.9	2.9	1.1	2.3	0.9	2.4
2	7.8	2.9	6.5	3.4	3.1	2.5	2.7	2.2	1.0	2.0	.9	2.3
3	6.5	2.4	8.0	3.2	2.8	5.3	2.2	1.7	1.0	1.7	1.5	2.1
4	5.3	2.2	7.8	2.8	3.7	7.0	2.5	1.4	1.1	1.5	1.9	2.1
5	4.7	3.9	6.0	2.5	4.7	6.8	2.1	1.3	1.2	1.7	1.6	1.9
6	4.3	4.4	4.6	2.8	4.3	4.8	1.9	1.3	1.1	2.2	1.6	1.8
7	4.0	4.5	4.0	4.5	5.5	3.8	1.8	1.2	1.1	2.4	1.4	1.5
8	3.7	3.7	4.0	4.9	6.6	3.8	1.6	1.3	1.3	2.0	1.3	1.4
9	3.5	3.2	4.2	5.3	7.0	9.1	1.6	1.9	1.5	1.6	1.1	1.4
10	3.4	3.0	4.8	5.0	5.4	10.1	1.4	2.3	2.4	1.5	2.3	1.4
11	3.1	2.8	6.2	5.3	4.6	7.7	1.3	3.0	1.8	1.5	3.7	2.3
12	3.0	2.5	7.0	4.5	4.4	6.5	1.4	2.3	2.4	1.3	5.8	4.1
13	2.9	2.4	6.8	3.9	4.1	9.0	4.9	1.7	1.5	1.2	4.8	4.0
14	2.7	2.4	5.7	3.5	3.6	6.3	6.2	1.6	1.8	1.1	2.2	3.0
15	2.7	2.3	5.9	3.4	3.2	11.5	4.9	1.6	1.4	1.0	2.1	3.0
16	2.5	2.2	6.2	3.2	2.9	12.2	4.0	1.4	1.0	1.0	2.0	4.4
17	2.5	2.0	6.0	3.0	2.7	6.2	3.4	1.3	.9	1.0	1.9	4.1
18	2.5	2.0	5.0	3.0	2.6	4.6	3.3	1.3	.9	.9	1.9	3.3
19	2.5	1.9	4.5	3.4	2.4	3.8	2.9	1.7	.9	.9	2.1	2.9
20	2.7	1.8	4.0	4.0	2.3	3.2	3.0	2.4	.9	.9	2.5	2.4

Daily gage height, in feet, of Tennessee River at Knoxville, Tenn., for 1907 and 1908— Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	3.6	1.8	3.7	4.1	2.0	3.0	2.8	2.1	0.8	0.8	2.6	2.4
22	3.5	1.7	3.4	3.7	2.0	2.8	2.4	1.6	1.1	.8	2.5	2.3
23	3.0	1.8	3.0	3.8	1.9	2.6	1.9	1.9	4.1	.8	2.8	2.2
24	2.7	1.8	2.9	4.5	1.8	2.7	1.7	1.8	9.8	.7	5.3	2.7
25	2.6	2.3	2.7	5.3	1.8	3.3	1.5	2.8	10.5	.7	6.8	5.1
26	2.5	3.7	2.7	4.4	1.8	3.3	1.6	2.5	5.7	.7	6.4	4.5
27	2.4	4.3	2.5	5.2	1.8	2.8	1.8	2.1	3.5	.7	4.7	3.6
28	2.3	4.3	2.5	4.3	2.4	2.5	1.8	1.7	2.7	.7	4.0	3.0
29	2.2	.....	2.3	4.0	2.1	2.9	1.6	1.6	2.4	.8	3.5	3.6
30	2.1	.....	2.2	3.8	1.8	3.5	4.1	1.4	2.3	.8	3.3	6.5
31	2.0	.....	2.2	.....	1.7	.....	3.5	1.3	.....	.9	.....	10.3
1908.												
1	9.9	3.2	3.3	4.1	3.8	3.6	1.1	2.5	2.0	.7	5.3	1.4
2	7.4	3.8	4.1	4.1	3.8	2.7	1.1	1.9	1.7	.7	4.1	1.5
3	5.1	3.8	6.0	8.6	3.6	2.4	1.1	1.3	1.3	.6	3.3	3.0
4	4.1	2.9	6.5	11.9	3.0	2.4	1.6	1.1	1.2	.6	2.4	2.6
5	7.8	2.7	5.6	7.8	2.9	2.7	2.4	1.0	1.2	.6	2.3	2.1
6	8.2	2.9	5.5	5.6	2.7	3.2	2.6	1.4	1.9	.5	2.2	1.8
7	7.4	3.6	7.0	4.7	3.0	4.0	4.2	2.2	3.2	.4	2.0	4.0
8	6.2	3.8	6.3	4.1	4.4	2.9	5.1	3.3	2.6	.4	1.8	10.7
9	5.3	3.8	6.1	4.0	6.0	2.4	5.9	2.9	2.3	.3	1.6	11.1
10	4.2	3.3	5.3	3.8	5.3	2.2	5.1	2.7	1.7	.6	1.4	7.4
11	4.0	3.3	4.5	3.3	4.1	2.0	4.0	2.4	1.4	2.3	1.6	4.2
12	5.5	4.1	6.0	3.6	3.6	2.0	3.0	2.2	1.2	2.6	2.4	4.2
13	16.9	4.4	8.0	2.9	3.2	1.9	2.4	1.6	1.2	2.1	2.3	5.1
14	14.8	7.6	7.4	2.9	2.7	1.9	2.1	1.2	1.0	1.5	2.3	5.0
15	9.7	10.9	6.5	2.7	2.7	1.7	2.0	1.1	.8	1.2	2.2	4.1
16	7.0	15.2	5.6	2.7	2.6	3.3	2.1	1.0	.7	1.0	2.2	3.0
17	6.6	13.7	4.7	4.1	2.4	4.0	1.8	.6	.4	.7	2.2	2.7
18	6.0	9.9	4.5	4.5	2.4	2.6	1.6	.9	.4	.6	2.1	2.4
19	5.1	7.5	4.2	4.1	2.4	2.2	1.6	1.1	.3	.6	2.1	2.2
20	4.7	6.0	5.0	3.6	3.3	2.0	1.5	1.6	.3	.6	1.9	2.1
21	4.1	5.5	6.8	3.2	4.1	1.8	1.3	1.4	.3	.5	1.8	2.0
22	3.6	4.4	8.6	2.9	4.0	1.4	1.2	2.1	.3	.4	1.9	2.6
23	3.6	4.1	7.9	2.7	3.8	1.5	1.1	4.0	.3	.5	1.7	8.3
24	3.6	4.0	7.9	2.6	3.3	1.4	1.1	3.0	.3	1.0	1.7	9.6
25	3.3	3.8	11.0	2.9	2.7	2.7	1.2	2.9	.3	6.8	1.6	6.7
26	3.2	3.8	9.4	8.2	2.7	2.4	1.4	3.9	.3	5.3	1.5	5.0
27	3.0	3.9	7.4	10.8	2.6	2.3	1.1	7.4	.3	3.3	1.4	4.2
28	3.6	4.1	6.1	7.4	2.7	2.2	1.1	6.3	.3	2.3	1.2	4.7
29	3.8	3.8	5.3	5.6	2.4	1.6	1.3	4.0	.5	2.3	1.2	4.5
30	3.3	.....	4.7	4.4	2.7	1.2	2.3	2.9	.6	7.0	1.3	4.5
31	3.0	.....	4.4	.....	3.6	.....	2.0	2.6	.....	6.7	.....	4.5

Rating table for Tennessee River at Knoxville, Tenn., for 1906 to 1908.

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	3,220	1.90	8,580	3.50	15,300	6.20	26,660
0.40	3,470	2.00	9,000	3.60	15,720	6.40	27,520
0.50	3,730	2.10	9,420	3.70	16,140	6.60	28,380
0.60	4,000	2.20	9,840	3.80	16,560	6.80	29,240
0.70	4,280	2.30	10,260	3.90	16,980	7.00	30,100
0.80	4,570	2.40	10,680	4.00	17,400	8.00	34,400
0.90	4,870	2.50	11,100	4.20	18,240	9.00	38,900
1.00	5,190	2.60	11,520	4.40	19,080	10.00	43,600
1.10	5,520	2.70	11,940	4.60	19,920	11.00	48,500
1.20	5,860	2.80	12,360	4.80	20,760	12.00	53,700
1.30	6,220	2.90	12,780	5.00	21,600	13.00	59,200
1.40	6,590	3.00	13,200	5.20	22,440	14.00	65,000
1.50	6,970	3.10	13,620	5.40	23,280	15.00	71,000
1.60	7,360	3.20	14,040	5.60	24,120	16.00	77,000
1.70	7,760	3.30	14,460	5.80	24,960	17.00	83,000
1.80	8,170	3.40	14,880	6.00	25,800		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 31 discharge measurements made during 1899 to 1906, and is well defined between gage heights 0 feet and 24.0 feet. Above gage height, 14.0 feet the rating curve is a tangent, the difference being 600 per tenth.

Monthly discharge of Tennessee River at Knoxville, Tenn., for 1907 and 1908.

[Drainage area, 8,990 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Square mile.		
1907.						
January	34,000	9,000	15,100	1.68	1.94	A.
February	19,500	7,760	12,100	1.35	1.41	B.
March	34,400	9,840	19,800	2.20	2.54	A.
April	22,900	11,100	17,200	1.91	2.13	A.
May	30,100	7,760	14,200	1.58	1.82	B.
June	54,800	8,580	22,600	2.51	2.80	A.
July	26,700	6,220	11,600	1.29	1.49	B.
August	13,200	5,860	8,330	.927	1.07	B.
September	46,000	4,570	10,300	1.15	1.28	B.
October	10,700	4,280	6,110	.680	.78	B.
November	29,200	4,870	12,600	1.40	1.56	B.
December	45,000	6,590	13,900	1.55	1.79	B.
The year	54,800	4,280	13,700	1.52	20.61	
1908.						
January	82,400	13,200	26,200	2.91	3.36	A.
February	72,200	11,900	23,400	2.60	2.80	A.
March	48,500	14,500	26,700	2.97	3.42	A.
April	53,200	11,500	20,900	2.32	2.59	A.
May	25,800	10,700	14,500	1.61	1.86	B.
June	17,400	5,860	10,500	1.17	1.30	B.
July	25,400	5,520	9,830	1.09	1.26	B.
August	31,800	4,000	10,800	1.20	1.38	B.
September	14,000	3,220	5,540	.616	.69	B.
October	30,100	3,220	8,590	.956	1.10	B.
November	22,900	5,860	9,460	1.05	1.17	B.
December	49,000	6,590	19,300	2.15	2.48	A.
The year	82,400	3,220	15,500	1.72	23.41	

TENNESSEE RIVER AT CHATTANOOGA, TENN.

This station is located at the Hamilton County highway bridge in the city of Chattanooga.

The gage, consisting of a sloping section made of railroad rails bolted to solid rock and a vertical section of heavy timber bolted to the vertical face of the rock cliff, was established in 1873 by the United States Army engineers, but since July 1, 1891, it has been in charge of the United States Weather Bureau, by whom gage heights are furnished to the United States Geological Survey.

Discharge measurements were made by the army engineers in 1891 and 1892 and by the Weather Bureau in 1893, and have been continued by the United States Geological Survey since 1897. The data are of great value for scientific studies of run-off and for water-power estimates in connection with the great power possibilities below. A power plant is now under construction about 20 miles down the river, and the completed dam will raise the low-water surface several feet on the Chattanooga gage, thus destroying the usefulness of the gaging station.

Conditions for discharge measurements are good, as is also the station rating curve which has remained practically constant. The gage datum has not been changed and the original iron sloping gage is the standard gage, although a recording gage is also used.

Daily gage height, in feet, of Tennessee River at Chattanooga, Tenn., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	20.5	5.0	10.4	5.6	7.0	4.5	6.3	5.8	3.0	5.6	2.1	7.0
2	19.6	9.3	12.3	6.3	6.6	5.4	5.8	5.8	2.8	4.8	2.0	5.7
3	15.4	11.2	17.2	7.0	6.2	5.9	5.6	4.5	2.6	4.6	2.2	5.3
4	12.5	10.1	18.4	6.4	6.0	6.1	5.0	4.1	2.6	3.8	2.5	4.8
5	10.7	9.1	16.9	6.1	5.9	7.9	4.6	3.6	2.3	3.5	3.6	4.5
6	9.6	9.5	14.5	5.9	6.7	8.7	4.5	3.5	2.3	3.4	3.7	4.2
7	8.7	9.9	11.2	8.6	7.9	8.4	4.3	3.5	2.4	3.6	3.7	4.0
8	7.9	9.6	9.6	11.2	9.6	7.7	3.9	3.0	2.4	3.9	3.7	3.8
9	7.4	8.7	9.5	9.8	11.8	8.1	3.8	3.0	2.4	3.8	3.2	3.5
10	6.9	7.8	9.5	9.9	12.3	9.8	3.7	2.9	2.5	3.6	2.9	3.5
11	6.6	7.1	10.0	10.0	12.5	13.0	3.6	3.0	2.9	3.3	4.6	3.7
12	6.4	6.6	12.0	9.4	12.2	13.5	3.5	3.5	4.1	3.1	6.3	4.3
13	6.3	6.2	12.3	9.0	10.0	11.4	4.2	4.1	4.6	2.9	8.4	5.0
14	6.0	5.9	11.9	8.1	8.9	9.9	5.6	3.8	4.6	2.9	10.5	5.6
15	5.8	5.6	12.1	7.1	8.2	11.2	7.4	3.5	4.3	2.7	8.1	6.2
16	5.6	5.4	12.6	6.7	8.1	10.3	7.3	3.3	3.6	2.5	6.0	6.6
17	5.4	5.3	12.2	6.5	7.5	15.3	6.3	3.5	3.1	2.2	5.1	6.6
18	5.3	5.0	11.5	6.5	6.9	15.0	6.2	3.6	2.7	2.2	4.5	6.7
19	5.1	4.9	10.6	6.5	6.4	10.4	6.2	3.6	2.6	2.1	4.6	6.4
20	5.1	4.8	9.3	6.9	5.7	8.3	4.9	3.5	2.1	2.1	4.8	5.9
21	5.6	4.7	8.4	7.9	5.5	7.5	4.6	3.4	2.1	2.0	5.3	5.6
22	6.6	4.6	7.7	7.6	5.0	7.1	4.5	4.0	2.1	2.0	6.0	5.2
23	8.0	4.5	7.1	7.4	4.7	6.7	4.2	4.2	3.7	2.0	6.7	5.1
24	7.3	4.4	6.6	8.1	4.6	6.1	3.8	4.1	8.4	2.0	9.4	5.8
25	6.6	4.8	6.1	8.5	4.5	6.1	3.8	4.1	10.2	2.0	12.3	6.5
26	6.1	6.8	5.9	8.5	4.4	6.9	3.7	3.8	10.6	2.0	13.6	7.1
27	5.8	9.2	5.7	8.5	4.4	7.0	3.6	3.9	9.3	2.0	13.3	7.8
28	5.5	10.1	5.5	8.6	4.5	7.0	3.6	3.9	6.8	2.0	12.1	7.7
29	5.3	.....	5.4	8.7	4.5	6.8	3.3	3.6	5.8	2.0	9.3	7.0
30	5.2	.....	5.2	7.6	4.4	7.1	3.4	3.2	5.8	2.1	7.7	7.3
31	5.1	.....	5.0	.....	4.4	.....	4.3	3.0	.....	2.2	.....	14.6
1908.												
1	18.6	6.8	7.4	7.8	10.3	5.4	3.1	3.3	3.8	1.5	6.3	2.3
2	17.9	8.3	7.3	7.3	9.8	5.5	2.9	3.4	3.3	1.4	6.1	2.4
3	15.6	10.2	7.5	7.3	9.6	5.5	2.8	3.4	3.2	1.4	5.0	3.2
4	12.0	9.3	8.4	7.6	9.2	5.3	3.0	3.1	3.0	1.4	4.5	4.8
5	10.7	8.6	9.8	13.4	9.5	5.7	4.5	2.8	2.6	1.4	4.2	5.1
6	13.5	8.3	10.3	14.3	9.6	6.1	5.6	3.2	3.0	1.4	3.4	4.9
7	15.5	9.9	9.5	11.0	10.0	6.1	6.6	4.1	3.7	1.3	3.0	6.1
8	13.7	8.0	8.4	9.0	10.4	6.2	6.9	4.2	4.2	1.3	2.8	10.3
9	12.2	7.5	9.6	8.0	11.2	6.2	6.4	4.7	4.5	1.4	2.7	14.0
10	10.5	8.1	9.8	7.4	11.6	6.0	7.3	5.2	4.9	1.5	2.6	13.1
11	9.5	9.4	8.4	6.9	12.2	5.8	7.3	5.5	4.2	1.7	2.5	11.3
12	9.8	9.4	7.7	6.5	12.0	5.7	6.8	5.0	3.8	2.1	2.4	9.0
13	12.1	9.0	8.4	6.1	7.0	5.6	5.6	4.5	3.3	2.4	2.6	7.5
14	17.8	11.1	10.7	5.8	6.3	5.5	4.6	4.0	2.8	2.4	3.4	7.6
15	20.3	15.7	12.2	5.8	5.9	5.3	4.2	3.6	2.5	2.6	3.5	7.9
16	18.2	21.7	12.8	6.0	5.6	5.3	4.3	3.3	2.3	2.4	3.4	7.6
17	14.2	24.7	9.4	6.3	5.2	5.5	4.5	3.0	2.0	2.2	3.2	6.8
18	12.3	23.7	8.5	6.7	4.9	5.8	4.3	2.9	2.0	2.0	3.0	6.0
19	11.4	20.0	7.9	7.8	4.8	6.1	4.0	2.9	2.0	1.9	2.9	5.4
20	10.2	15.3	7.6	8.2	5.2	6.1	3.7	2.9	1.9	1.9	2.9	5.0
21	9.2	12.0	8.1	7.7	5.6	5.9	3.7	3.4	2.0	1.8	2.8	4.7
22	8.5	10.2	9.8	7.3	6.1	5.7	3.8	4.1	2.0	1.7	2.8	4.6
23	7.7	9.2	11.5	7.0	6.1	5.6	3.5	4.4	2.0	1.5	2.7	7.4
24	7.4	8.4	13.3	6.9	6.0	3.4	3.1	7.3	1.9	1.4	2.7	10.7
25	6.7	7.8	15.9	8.0	5.8	3.4	3.0	7.7	1.8	1.4	2.6	12.1
26	6.1	7.4	16.7	9.8	5.7	3.3	3.0	5.6	1.7	2.2	2.5	11.8
27	5.8	7.5	15.2	11.9	5.5	4.4	2.9	5.6	1.6	3.7	2.5	10.0
28	5.6	7.7	12.9	13.9	5.5	4.4	2.9	5.7	1.6	5.0	2.4	7.9
29	5.6	7.6	10.8	13.8	5.3	4.0	2.8	7.1	1.6	3.8	2.4	7.1
30	6.2	.....	9.3	11.7	5.3	3.7	2.9	6.8	1.5	3.2	2.3	7.2
31	6.1	.....	8.4	.....	5.2	.....	3.1	4.9	.....	3.5	.....	7.6

Rating table for Tennessee River at Chattanooga, Tenn., for 1874 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.30	8,960	3.10	17,390	4.90	27,680	10.00	62,000
1.40	9,350	3.20	17,920	5.00	28,300	11.00	68,800
1.50	9,750	3.30	18,460	5.20	29,550	12.00	75,600
1.60	10,160	3.40	19,000	5.40	30,820	13.00	82,400
1.70	10,580	3.50	19,550	5.60	32,120	14.00	89,200
1.80	11,010	3.60	20,100	5.80	33,450	15.00	96,000
1.90	11,450	3.70	20,660	6.00	34,800	16.00	102,800
2.00	11,900	3.80	21,220	6.20	36,160	17.00	109,600
2.10	12,360	3.90	21,790	6.40	37,520	18.00	116,400
2.20	12,830	4.00	22,360	6.60	38,880	19.00	123,200
2.30	13,310	4.10	22,940	6.80	40,240	20.00	130,000
2.40	13,800	4.20	23,520	7.00	41,600	21.00	136,800
2.50	14,300	4.30	24,100	7.20	42,960	22.00	143,600
2.60	14,800	4.40	24,690	7.40	44,320	23.00	150,400
2.70	15,310	4.50	25,280	7.60	45,680	24.00	157,200
2.80	15,820	4.60	25,870	7.80	47,040	25.00	164,000
2.90	16,340	4.70	26,470	8.00	48,400		
3.00	16,860	4.80	27,070	9.00	55,200		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 63 discharge measurements made during 1891 to 1906 and is well defined between gage heights 0 foot and 35.0 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 1907 and 1908.

[Drainage area, 21,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	133,000	28,900	47,500	2.22	2.56	A.
February	70,200	24,700	41,800	1.95	2.03	A.
March	119,000	28,300	62,700	2.93	3.38	A.
April	70,200	32,100	47,200	2.21	2.47	A.
May	79,000	24,700	41,900	1.96	2.26	A.
June	98,000	25,300	52,800	2.47	2.76	A.
July	44,300	18,500	26,800	1.25	1.44	A.
August	33,400	16,300	21,100	.986	1.14	A.
September	66,100	12,400	23,900	1.12	1.25	A.
October	32,100	11,900	16,400	.766	.88	B.
November	86,500	11,900	37,600	1.76	1.96	A.
December	93,300	19,600	34,500	1.61	1.86	A.
The year	133,000	11,900	37,800	1.77	23.99	
1908.						
January	132,000	32,100	71,000	3.32	3.83	A.
February	162,000	40,200	69,700	3.26	3.52	A.
March	108,000	43,600	62,800	2.93	3.38	A.
April	91,200	33,400	52,300	2.44	2.72	A.
May	77,000	27,100	45,000	2.10	2.42	A.
June	36,200	18,500	30,300	1.42	1.58	A.
July	43,600	15,800	24,600	1.15	1.33	A.
August	46,400	15,800	25,300	1.18	1.36	A.
September	27,700	9,750	15,500	.724	.81	B.
October	28,300	8,960	12,600	.589	.68	B.
November	36,800	13,300	18,200	.850	.95	B.
December	89,200	13,300	45,100	2.11	2.43	A.
The year	162,000	8,960	39,400	1.84	25.01	

DAVIDSON RIVER NEAR DAVIDSON RIVER, N. C.

Davidson River, which empties into French Broad River near Davidson River, N. C., is a typical small mountain stream, rising very rapidly after a rain and falling almost as fast after it is over. The rapid fluctuation to which the stream is subject makes it difficult to catch the floods to measure flood stages which carry off a large per cent of the total flow.[a]

The gaging station which was established May 19, 1904, at the request and by cooperation of Dr. C. A. Schenck of the Biltmore estate, for the purpose of studying the water resources and power possibilities of that section, is located at English bridge, about 2 miles from Davidson River, N. C., and 500 feet from the mouth of Avery Creek. It is about 2 miles above the mouth of the river.

Discharge measurements of Davidson River near Davidson River, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 5	Warren E. Hall	68	98	0.90	68
May 4	do	70	128	1.30	151
July 16	do	70	109	1.05	93
September 21	do	75	88	.72	34
December 14	do	70	156	1.62	275
1908.					
July 18	F. P. Thomas	62	114	1.08	109

Daily gage height, in feet, of Davidson River near Davidson River, N. C., for 1907 and 1908.

[Observer, Mrs. C. T. Rankin.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	1.5	1.1	1.5	0.95	1.0	1.9	0.85	0.8	0.75	0.95	0.75	0.95
2	1.35	1.05	1.2	.9	1.0	1.25	.8	.8	.70	.9	1.1	.95
3	1.3	1.0	1.1	.9	1.4	1.25	.8	.8	.8	.9	.85	.95
4	1.25	1.25	1.1	.9	1.45	1.1	.8	.8	.8	.85	.8	.95
5	1.2	1.2	1.05	.9	1.2	1.05	.8	.75	.75	.85	.8	1.0
6	1.2	1.1	1.0	1.6	1.15	1.0	.8	.85	.7	.8	.75	1.2
7	1.2	1.1	1.0	1.1	1.35	1.0	.8	.75	.7	.8	.75	1.05
8	1.15	1.05	1.1	1.05	1.25	1.5	.8	.8	.8	.9	.75	.9
9	1.15	1.05	1.0	1.05	1.2	1.05	.8	.75	.75	.8	.75	1.25
10	1.1	1.0	1.1	1.0	1.2	1.0	.8	.75	.9	.8	.8	1.6
11	1.1	1.0	1.05	1.0	1.2	1.0	.8	1.25	.85	.8	(b)	1.25
12	1.1	1.0	1.05	1.0	1.1	1.0	.8	.95	.75	.8	(b)	1.05
13	1.1	1.0	1.0	.95	1.1	.95	.9	.8	.75	.75	(b)	1.1
14	1.05	.95	1.1	.95	1.1	.95	.8	.9	.75	.75	(b)	1.7
15	1.05	.95	1.05	1.0	1.15	.95	1.3	.9	.75	.75	(b)	1.4
16	1.05	.95	1.0	.95	1.05	.9	1.1	.9	.75	.75	(b)	1.3
17	1.0	.95	1.0	.95	1.05	.9	1.0	.9	.75	.75	.75	1.2
18	1.0	.95	1.0	.9	1.05	.9	.9	.9	.75	.75	1.2	1.25
19	1.0	.95	1.0	1.15	1.0	.9	.9	.85	.75	.75	.95	1.2
20	1.2	.95	1.0	.95	.95	.9	.9	.8	.75	.75	.8	1.1

[a] All records of discharge at this station have been collected by engineers of the United States Geological Survey, and will be republished by the North Carolina Geological Survey, by Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

[b] No record November 11 to 16.

Daily gage height, in feet, of Davidson River near Davidson River, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	1.05	0.9	0.95	0.95	0.95	0.9	0.85	0.9	0.7	0.75	1.7	1.1
22	1.0	.9	.95	1.2	.95	.9	.8	.9	.9	.75	1.25	1.5
23	1.0	.9	.9	1.3	1.4	.9	.8	.9	2.7	.75	1.6	2.1
24	1.0	1.0	.9	1.2	1.0	.9	1.15	.85	1.05	.75	1.6	1.5
25	1.0	1.1	.9	1.1	1.0	.9	1.25	.8	.95	.75	1.3	1.4
26	1.0	1.05	1.05	1.05	1.4	.85	.85	.8	.9	.75	1.2	1.3
27	1.0	1.0	.95	1.2	1.05	.85	.8	.8	.85	.9	1.1	1.25
28	1.0	1.0	.95	1.05	1.0	.95	1.05	.75	1.3	.8	1.05	1.75
29	.95	.....	.9	1.0	.95	1.0	.9	.75	1.15	.75	1.0	1.2
30	.95	.....	.9	1.0	.95	.85	.85	.75	1.0	.75	1.0	2.2
31	.95	.....	1.0	.....	1.2	.....	.8	.75	.....	.75	.....	1.45
1908.												
1	1.35	1.25	1.45	1.25	1.3	1.15	.95	.95	1.25	1.0	1.25	.9
2	1.3	1.2	1.4	1.25	1.3	1.15	1.0	.95	1.2	.95	1.15	.9
3	1.25	1.35	1.4	1.2	1.25	1.1	1.25	.95	1.2	.95	1.15	1.05
4	1.2	1.45	1.35	1.2	1.2	1.1	1.75	1.0	1.15	.9	1.1	.95
5	1.35	1.1	1.35	1.2	1.2	1.15	1.8	1.2	1.65	.9	1.1	.95
6	1.3	1.2	1.35	1.2	1.2	1.15	1.4	1.1	1.45	.9	1.1	.9
7	1.3	1.15	1.3	1.15	1.9	1.2	1.5	1.05	1.4	.9	1.05	1.35
8	1.2	1.15	1.3	1.15	1.4	1.15	1.45	1.1	1.3	.9	1.0	1.3
9	1.15	1.1	1.3	1.15	1.35	1.15	1.35	1.15	1.25	1.3	1.0	1.2
10	1.1	1.15	1.25	1.1	1.3	1.1	1.3	1.05	1.25	1.2	1.0	1.15
11	2.0	1.25	1.25	1.1	1.25	1.1	1.2	1.1	1.2	1.0	1.05	1.1
12	2.1	1.55	1.45	1.1	1.2	1.1	1.15	1.1	1.15	1.0	1.0	1.2
13	1.65	1.7	1.25	1.1	1.2	1.15	1.15	1.0	1.1	.95	1.0	1.1
14	1.5	1.8	1.25	1.1	1.2	1.15	1.15	.95	1.1	.95	1.15	1.1
15	1.45	3.2	1.2	1.7	1.15	1.5	1.15	.95	1.05	.95	1.15	1.05
16	1.4	2.05	1.2	1.45	1.15	1.15	1.1	.95	1.05	.95	1.0	1.05
17	1.35	1.8	1.2	1.35	1.5	1.1	1.05	.95	1.05	.95	1.0	1.05
18	1.3	1.65	1.15	1.3	1.3	1.1	1.05	.95	1.0	.9	1.0	1.0
19	1.25	1.6	1.15	1.25	1.35	1.05	1.05	1.1	1.0	.9	1.0	1.0
20	1.25	1.55	1.35	1.2	1.2	1.05	1.0	1.1	1.0	.9	1.0	1.0
21	1.25	1.5	1.4	1.2	1.2	1.1	1.0	1.05	1.0	.9	1.0	1.0
22	1.2	1.45	1.3	1.15	1.15	1.1	1.0	2.0	1.0	.9	.95	1.7
23	1.2	1.4	1.75	1.15	1.1	1.05	1.1	1.55	1.0	1.8	.95	1.3
24	1.15	1.4	1.8	1.15	1.15	1.05	1.0	2.5	1.0	1.3	.95	1.25
25	1.3	1.35	1.55	2.25	1.15	1.05	1.1	2.65	1.0	1.15	.95	1.2
26	1.15	1.4	1.45	1.6	1.15	1.0	1.05	2.0	.95	1.1	.95	1.1
27	1.25	1.3	1.4	1.45	1.25	1.0	1.0	1.65	.95	1.05	.95	1.1
28	1.15	1.35	1.35	1.4	1.15	1.0	1.05	1.55	1.2	1.3	.95	1.1
29	1.1	1.3	1.25	1.35	1.45	.95	1.0	1.45	1.0	2.3	.9	1.1
30	1.1	.....	1.25	1.4	1.3	.95	1.0	1.35	1.0	1.45	.9	1.1
31	1.1	.....	1.25	.....	1.2	.....	.95	1.3	.....	1.3	.....	1.2

Rating table for Davidson River near Davidson River, N. C., for 1906 to 1908.

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	32	1.40	176	2.10	520	2.80	1,075
0.80	44	1.50	210	2.20	590	2.90	1,170
0.90	60	1.60	250	2.30	660	3.00	1,265
1.00	79	1.70	295	2.40	735	3.10	1,360
1.10	100	1.80	345	2.50	815	3.20	1,460
1.20	122	1.90	400	2.60	895	3.30	1,560
1.30	147	2.00	460	2.70	985	3.40	1,660

NOTE.—The above table is applicable only for open-channel conditions. It is based upon 25 discharge measurements made during 1904 to 1909 and is well defined between gage heights 0.7 feet and 1.3 feet. Above gage height 1.3 feet it is based on one measurement at gage height 2.74 feet. Above gage height 3.1 feet the rating curve is a tangent, the difference being 100 per tenth.

Monthly discharge of Davidson River near Davidson River, N. C., for 1907 and 1908.

[Drainage area, 41 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	210	70	101	2.46	2.84	B.
February	134	60	82.8	2.02	2.10	B.
March	210	60	85.5	2.09	2.41	B.
April	250	60	89.9	2.19	2.44	B.
May	193	70	108	2.63	3.03	B.
June	400	52	88.9	2.17	2.42	B.
July	147	44	60.4	1.47	1.70	B
August	134	38	51.1	1.25	1.44	B.
September	985	32	82.7	2.02	2.25	B.
October	70	38	44.1	1.08	1.24	B.
November[a]	295	38	84.7	2.07	2.31	B.
December	590	60	166	4.05	4.67	B.
The year	985	32	87.1	2.12	28.85	
1908.						
January	520	100	163	3.98	4.59	B.
February	1,460	100	237	5.78	6.23	B.
March	345	111	165	4.02	4.64	B.
April	625	100	156	3.80	4.24	B.
May	400	111	142	3.46	3.99	B.
June	210	70	102	2.49	2.78	B.
July	345	70	122	2.98	3.44	B.
August	940	70	185	4.51	5.20	B.
September	272	70	110	2.68	2.99	B.
October	660	60	114	2.78	3.20	B.
November	134	60	84.6	2.06	2.30	B.
December	295	60	106	2.59	2.99	B.
The year	1,460	60	141	3.43	46.59	

[a] November 11–16, 1907, discharge interpolated.

LITTLE RIVER AT CALHOUN, N. C.

This station is located at a wooden wagon bridge about one-half mile above the mouth of the river, which is tributary to French Broad River. The station was formerly used for making miscellaneous measurements, but on May 4, 1907, was equipped with a gage which was maintained in cooperation with the Forest Service for the purpose of studying the water resources of the section.

The current is rather slow at low stage and is also irregular, making conditions rather poor for accurate work.

The station was discontinued on June 30, 1908.[a]

Discharge measurements of Little River at Calhoun, N. C., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 4	Warren E. Hall	42	104	2.00	198
July 16	do	36	63	1.20	96
September 21	do	34	49	.80	51
December 16	do	45	158	3.18	408

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Little River at Calhoun, N. C., for 1907 and 1908.

[Observer, P. S. Shuford.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						3.25	1.25	0.9	0.8	1.0		1.4
2						2.0	1.20	.9	.8	1.0	1.5	1.35
3						1.7	1.15	.9	1.0	1.0		1.3
4					2.0	1.5	1.1	.8	1.0	.9		1.3
5					1.8	1.5	1.1	.9	.9	.9	.9	1.45
6					1.8	1.4	1.0	.9	.9	1.0	.9	1.3
7					2.1	1.35	.9	1.0	.8	1.5	.9	1.2
8					1.9	1.7	.9	1.0	1.0	1.1	.8	1.9
9					1.8	1.45	.8	.9	.9	1.0	.8	1.4
10					1.7	1.7	.9	.9	.9	1.0	1.5	4.4
11					1.8	1.45	1.9	1.55	.8	.9	1.0	3.0
12					1.7	1.4	1.3	1.2	.8	.9	1.0	2.7
13					1.6	1.3	1.25	1.0	.8	.8	1.0	3.6
14					1.5	1.25	1.3	1.0	.8		1.0	7.1
15					1.6	1.25	1.25	1.5	.8		.9	4.5
16					1.6	1.2	1.2	1.2	.8		.9	3.15
17					1.5	1.2	1.15	1.0	.8		.9	2.85
18					1.4	1.15	1.2	1.3	.8		2.85	2.5
19					1.4	1.1	1.2	1.2	.8		1.8	2.1
20					1.3	1.1	1.15	1.4			4.2	2.0
21					1.3	1.15	1.1	1.1			3.4	1.95
22					1.3	1.1	1.0	1.0	1.0		2.6	1.8
23					1.3	1.6	.9	1.0	5.4		2.7	8.2
24					1.3	1.3	1.1	2.0			5.2	4.5
25					1.25	1.3	1.2	1.0	1.3		2.95	4.1
26					2.2	1.3	1.1	.9	1.1		2.3	3.5
27					1.5	2.3	1.0	.9	.9		2.0	3.2
28					1.4	1.3	1.0	.8	1.0		1.8	2.5
29					1.35	2.0	.0	.8	1.4		1.5	2.25
30					1.3		1.0	.8	1.0		1.2	4.5
31					1.4		1.0	.8				3.65

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	3.0	1.9	2.65	2.2	3.4	1.5	16	2.8	8.4	2.0	3.4	1.7	1.5
2	2.65	2.0	2.6	2.1	3.2	1.45	17	2.6	3.8	1.9	3.35	3.0	1.4
3	2.45	2.1	2.55	2.0	3.0	1.4	18	2.5	3.7	1.85	2.75	2.0	1.3
4	2.2	2.1	2.5	2.0	2.7	1.35	19	2.3	3.3	1.8	2.5	2.5	1.2
5	2.7	2.2	2.4	1.9	2.45	2.5	20	2.1	3.1	2.35	2.4	2.1	1.15
6	2.45	1.15	2.35	2.0	2.3	1.7	21	2.0	3.0	2.5	2.25	1.85	1.3
7	2.5	2.1	2.3	2.3	2.85	1.55	22	2.0	2.9	3.0	2.2	1.75	1.25
8	2.3	2.0	2.2	2.0	2.35	1.45	23	1.95	2.8	4.4	2.15	1.7	1.25
9	2.15	2.4	2.15	2.0	2.15	1.4	24	1.9	2.75	5.8	2.1	2.0	1.35
10	2.0	2.9	2.1	1.9	2.0	1.55	25	1.85	2.7	4.1	5.2	1.9	1.3
11	4.2	3.5	2.1	1.85	1.9	1.5	26	1.9	3.7	3.2	3.4	1.75	1.25
12	8.1	3.9	2.45	1.8	1.8	1.45	27	1.85	3.5	2.75	3.0	1.6	1.2
13	4.2	4.5	2.2	1.7	1.8	1.5	28	1.8	3.0	2.55	2.9	1.55	1.15
14	3.55	5.8	2.1	1.7	1.75	1.6	29	1.9	2.8	2.4	2.8	1.6	1.1
15	3.3	10.0	2.0	4.2	1.7	1.55	30	1.8		2.3	3.6	1.7	1.1
							31	1.8		2.25		1.55	

Daily discharge, in second-feet, of Little River at Calhoun, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	101	61	51	71	46	119
2	.....	.....	.....	.....	.....	199	95	61	51	71	131	113
3	.....	.....	.....	.....	.....	157	89	61	71	71	71	107
4	.....	.....	.....	.....	199	131	83	51	71	61	66	107
5	.....	.....	.....	.....	171	131	83	61	61	61	61	125
6	.....	.....	.....	.....	171	119	71	61	61	71	61	107
7	.....	.....	.....	.....	214	113	61	71	51	131	61	95
8	.....	.....	.....	.....	185	157	61	71	71	83	51	185
9	.....	.....	.....	.....	171	125	51	61	61	71	51	119
10	.....	.....	.....	.....	157	157	61	61	61	71	131	.....
11	.....	.....	.....	.....	171	125	185	137	51	61	71	370
12	.....	.....	.....	.....	157	119	107	95	51	61	71	316
13	.....	.....	.....	.....	143	107	101	71	51	51	71	.....
14	.....	.....	.....	.....	131	101	107	71	51	46	71	.....
15	.....	.....	.....	.....	143	101	101	131	51	46	61	.....
16	.....	.....	.....	.....	143	95	95	95	51	46	61	400
17	.....	.....	.....	.....	131	95	89	71	51	46	61	343
18	.....	.....	.....	.....	119	89	95	107	51	46	343	280
19	.....	.....	.....	.....	119	83	95	95	51	46	171	214
20	.....	.....	.....	.....	107	83	89	119	46	46	.....	199
21	.....	.....	.....	.....	107	89	83	83	46	46	.....	192
22	.....	.....	.....	.....	107	83	71	71	71	46	298	171
23	.....	.....	.....	.....	107	143	61	71	.....	46	316	.....
24	.....	.....	.....	.....	107	107	107	83	199	46	.....	.....
25	.....	.....	.....	.....	101	107	95	71	107	46	361	.....
26	.....	.....	.....	.....	230	107	83	61	83	46	246	.....
27	.....	.....	.....	.....	131	246	71	61	61	46	199	410
28	.....	.....	.....	.....	119	107	71	51	71	46	171	280
29	.....	.....	.....	.....	113	199	61	51	119	46	131	238
30	.....	.....	.....	.....	107	.....	71	51	71	46	95	.....
31	.....	.....	.....	.....	119	.....	71	51	.....	46	.....	.....

NOTE.—Discharge for September 20 to 21 and October 14 to November 1, 1907, estimated from comparison of gage heights of adjacent streams.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	370	185	307	230	.....	131	16	334	.....	199	.....	157	131
2	307	199	298	214	410	125	17	298	.....	185	.....	370	119
3	271	214	289	199	370	119	18	280	.....	178	325	199	107
4	230	214	280	199	316	113	19	246	.....	171	280	280	95
5	316	230	262	185	271	280	20	214	390	254	262	214	89
6	271	89	254	199	246	157	21	199	370	280	238	178	107
7	280	214	246	246	343	137	22	199	352	370	230	164	101
8	246	199	230	199	254	125	23	192	334	.....	222	157	101
9	222	262	222	199	222	119	24	185	325	.....	214	199	163
10	199	352	214	185	199	137	25	178	316	.....	.....	185	107
11	.....	.....	214	178	185	131	26	185	.....	410	.....	164	101
12	.....	.....	271	171	171	125	27	178	.....	325	370	143	95
13	.....	.....	230	157	171	131	28	171	370	289	352	137	89
14	.....	.....	214	157	164	143	29	185	334	262	334	143	83
15	.....	.....	199	.....	157	137	30	171	.....	246	.....	157	83
							31	171	.....	238	.....	137	.....

NOTE.—Daily discharges for 1907 and 1908 based on a well defined rating curve. From May 4, 1907, to June 30, 1908, the discharge was greater than 420 second-feet for all missing days.

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

This station is located at the wagon bridge in the village of Pinkbed, and is 1 mile above the junction of North and South forks. It was established May 18, 1904, and was originally maintained in

cooperation with the Biltmore estate, in whose forest reserves the drainage area lies. The data obtained are useful for water-power estimates and for general run-off studies, including those of the larger rivers below.

This is a small stream, very swift-running at most places. At the station the ordinary water stage is shallow with a relatively rough bed of loose rock, conditions which are not very favorable for accurate measurements or a constant rating curve.[a]

Discharge measurements of North Fork of Mills River at Pinkbed, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq.ft.*	*Feet.*	*Sec.-ft.*
April 3	Warren E. Hall	37	25	0.95	44
Do	do	35	25	.95	46
July 15	do	35	22	.85	40
September 20	do	32	14	.56	18
December 13	do	37	25	.90	44
1908.					
July 17	F. P. Thomas	40	33	.85	45
Do	do	40	36	.80	49

Daily gage height, in feet, of North Fork of Mills River at Pinkbed, N. C., for 1907 and 1908.

[Observers, J. T. Davenport and R. K. Whitaker.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	1.5	1.0	1.0	1.0	1.1	1.5	0.9	0.9	0.65	0.8	0.75	0.85
2	1.4	1.0	1.2	1.0	1.05	1.2	.9	.85	.65	.75	1.0	.8
3	1.35	1.0	1.1	1.0	1.7	1.2	.9	.8	.65	.75	.8	.8
4	1.25	1.05	1.05	1.0	1.6	1.15	.9	.8	.65	.7	.7	.8
5	1.2	1.1	1.05	.95	1.4	1.1	.9	.8	.65	.7	.7	.8
6	1.15	1.0	1.0	1.5	1.4	1.1	.9	.75	.65	.7	.7	.8
7	1.15	1.0	1.0	1.1	1.4	1.05	.9	.75	.65	.7	.7	.8
8	1.15	1.1	1.0	1.1	1.25	1.3	.9	.7	.65	.7	.7	.8
9	1.1	1.05	1.0	1.05	1.2	1.1	.9	.7	.7	.7	.7	.85
10	1.1	1.0	1.0	1.05	1.2	1.1	.9	.7	.7	.7	.7	1.2
11	1.1	1.0	1.0	1.0	1.2	1.05	.9	.7	.7	.7	.7	1.15
12	1.1	1.0	1.0	1.0	1.2	1.0	.9	.75	.7	.7	.7	1.15
13	1.1	1.0	1.0	1.0	1.2	1.0	.9	.75	.7	.7	.7	.95
14	1.1	1.0	1.0	1.0	1.15	1.0	.9	.75	.7	.7	.7	1.35
15	1.1	.95	1.0	1.0	1.15	1.0	.9	.7	.7	.7	.7	1.2
16	1.1	.95	1.0	1.0	1.1	1.0	.9	.7	.7	.7	.7	1.15
17	1.1	.95	1.0	1.0	1.1	.95	.9	.7	.7	.7	.7	1.0
18	1.1	.95	1.0	1.0	1.1	.95	.9	.8	.7	.7	1.0	1.0
19	1.05	.95	.95	1.1	1.1	.95	.85	.8	.65	.7	.95	1.0
20	1.05	.95	.95	1.0	1.1	1.0	.8	.8	.65	.7	.95	1.0
21	1.05	.95	.95	1.0	1.1	1.05	.8	.8	.65	.7	1.45	.95
22	1.05	.95	.9	1.2	1.05	1.0	.8	.8	.65	.7	.95	.9
23	1.0	.95	.9	1.1	1.0	1.0	.8	.8	2.3	.7	1.0	2.5
24	1.0	1.0	.9	1.1	1.1	1.0	.8	.8	.9	.7	1.2	1.4
25	1.0	1.0	.9	1.05	1.1	1.0	.9	.7	.8	.7	1.1	1.25

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of North Fork of Mills River at Pinkbed, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907												
26	1.0	1.0	0.9	1.05	1.3	0.95	0.9	0.7	0.75	0.7	1.05	1.1
27	1.0	1.0	.9	1.2	1.2	1.0	.9	.7	.8	.7	1.0	1.1
28	1.0	1.0	.9	1.1	1.1	1.0	.9	.7	.9	.7	.95	1.1
29	1.0	.....	.9	1.1	1.1	1.1	.9	.7	.9	.7	.9	1.1
30	1.0	.....	.9	1.1	1.0	.9	1.0	.7	.85	.7	.85	1.7
31	1.0	.....	.9	.....	1.1	.....	.9	.65	.....	.7	.....	1.3
1908.												
1	1.25	1.1	1.35	1.2	1.25	1.0	.8	1.0	1.2	.9	1.45	.9
2	1.2	1.1	1.35	1.2	1.2	1.0	.8	1.0	1.05	.85	1.35	.9
3	1.15	1.2	1.3	1.15	1.2	1.0	.9	.9	1.0	.85	1.3	.95
4	1.1	1.2	1.3	1.15	1.15	1.0	1.6	.9	1.0	.85	1.25	.95
5	1.1	1.2	1.3	1 1	1.15	1.1	1.1	.9	1.5	.85	1.2	.9
6	1.1	1.1	1.3	1.1	1.15	1.05	1.1	1.25	1.3	.85	1.15	.95
7	1.15	1.05	1.25	1.1	1.6	1.05	1.1	1.1	1.2	.8	1.1	1.8
8	1.1	1.05	1.25	1.1	1.35	1.0	1.2	1.05	1.1	.8	1.1	1.3
9	1.05	1.05	1.25	1.1	1.3	.9	1.5	1.0	1.1	1.05	1.1	1.2
10	1.0	1.05	1.2	1.05	1.25	1.0	1.25	1.0	1.05	1.15	1.1	1.1
11	1.05	1.1	1.2	1.05	1.2	1.05	1.25	1.0	1.05	1.0	1.1	1.1
12	2.3	1.4	1.2	1.05	1.2	1.0	1.1	.95	1.0	.9	1.05	1.1
13	1.3	1.6	1.2	1.05	1.15	.95	1.0	.9	1.0	.8	1.05	1.1
14	1.25	1.8	1.2	1.0	1.1	.95	.9	.9	1.0	.8	1.15	1.05
15	1.2	3.4	1.1	1.5	1.1	1.05	.9	.9	1.0	.8	1.1	1.05
16	1.2	2.7	1.1	1.2	1.1	1.0	.9	.9	1.0	.8	1.05	1.05
17	1.2	2.2	1.1	1.15	1.5	.95	.9	.85	.95	.8	1.05	1.0
18	1.2	1.7	1.1	1.1	1.15	.95	.9	1.0	.95	.8	1.05	1.0
19	1.2	1.6	1.1	1.1	1.15	.9	.85	.9	.9	.8	1.0	1.0
20	1.15	1.5	1.1	1.1	1.3	.9	.85	.95	.9	.8	1.0	1.0
21	1.1	1.5	1.1	1.1	1.15	.9	.85	.95	.9	.8	1.0	1.0
22	1.1	1.4	1.1	1.1	1.1	.85	.85	1.5	.9	.85	1.0	1.7
23	1.1	1.4	1.35	1.05	1.1	.85	1.15	1.3	.9	1.9	1.0	1.4
24	1.1	1.35	1.35	1.05	1.1	.85	.9	1.7	.9	1.4	1.0	1.25
25	1.1	1.35	1.3	2.25	1.1	.85	.85	2.3	.9	1.15	1.0	1.2
26	1.1	1.5	1.3	1.55	1.05	.85	.85	2.1	.9	1.1	1.0	1.15
27	1.05	1.35	1.3	1.4	1.05	.8	.85	1.7	.9	1.05	.95	1.15
28	1.05	1.35	1.25	1.3	1.0	.8	1.0	1.5	1.1	1.4	.95	1.15
29	1.05	1.3	1.25	1.25	1.1	.8	1.1	1.4	.9	3.1	.9	1.1
30	1.05	.....	1.2	1.3	1.1	.8	1.35	1.3	.9	1.9	.9	1.1
31	1.1	.....	1.2	.....	1.05	.....	1.1	1.25	.....	1.6	.....	1.15

Rating table for North Fork of Mills River at Pinkbed, N. C., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.60	24	1.40	125	2.20	340	3.00	640
.70	30	1.50	150	2.30	370	3.10	685
.80	37	1.60	175	2.40	405	3.20	730
.90	46	1.70	200	2.50	440	3.30	780
1.00	57	1.80	225	2.60	475	3.40	830
1.10	70	1.90	250	2.70	515		
1.20	85	2.00	280	2.80	555		
1.30	103	2.10	310	2.90	595		

NOTE.—The above table is applicable only for open-channel conditions. It is based upon four discharge measurements made during 1907 and one high-water measurement of 1906, and is fairly well defined.

Monthly discharge of North Fork of Mills River at Pinkbed, N. C., for 1907 and 1908.

[Drainage area, 24 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	150	57	73.3	3.05	3.52	C.
February	70	52	56.8	2.37	2.47	C.
March	85	46	54.7	2.28	2.63	C.
April	150	52	66.2	2.76	3.08	C.
May	200	57	86.3	3.60	4.15	C.
June	150	46	66.0	2.75	3.07	C.
July	57	37	44.8	1.87	2.16	C.
August	46	27	33.7	1.40	1.61	C.
September	370	27	42.7	1.78	1.99	C.
October	37	30	30.5	1.27	1.46	C.
November	138	30	45.7	1.90	2.12	C.
December	440	37	80.0	3.33	3.84	C.
The year	440	27	56.7	2.36	32.10	
1908.						
January	370	57	84.4	3.52	4.06	C.
February	830	64	160.0	6.67	7.19	C.
March	114	70	90.4	3.77	4.35	C.
April	355	57	90.7	3.78	4.22	C.
May	175	57	83.8	3.49	4.02	C.
June	70	37	51.1	2.13	2.38	C.
July	175	37	65.0	2.71	3.12	C.
August	370	42	94.9	3.95	4.55	C.
September	150	46	61.1	2.55	2.84	C.
October	685	37	89.4	3.72	4.29	C.
November	138	46	69.4	2.89	3.22	C.
December	225	46	78.1	3.25	3.75	C.
The year	830	37	84.9	3.54	47.99	

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

This station is located at a footbridge about 1 mile below Sitton's mill, Sitton, N. C., and 1 mile above the junction of North and South forks.

It was established May 18, 1904, for the purpose of determining general run-off data, and like the station on North Fork of Mills River was originally maintained in cooperation with the Biltmore estate.[a]

Discharge measurements of South Fork of Mills River near Sitton, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 3	Warren E. Hall	50	83	1.22	93
Do	do	50	83	1.22	91
July 15	do	50	83	1.27	90
Do	F. P. Thomas	50	83	1.27	91
September 19	Warren E. Hall	50	66	.91	34
September 20	do	50	68	.91	36
December 13	do	55	85	1.35	105
1908.					
July 17	F. P. Thomas	45	85	1.25	98
Do	do	45	87	1.25	94

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of South Fork of Mills River near Sitton, N. C., for 1907 and 1908.

[Observer, W. E. Field.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.0	1.35	1.3	1.35	1.35	2.3	1.3	1.1	0.95	1.15	1.0	1.25
2	1.8	1.35	2.1	1.25	1.3	1.85	1.3	1.1	.95	1.1	1.3	1.2
3	1.7	1.35	1.55	1.25	2.2	1.7	1.35	1.1	1.05	1.05	1.15	1.2
4	1.7	1.4	1 45	1.2	2.15	1.6	1.3	1.05	1.1	1.05	1 05	1.2
5	1.6	1.5	1.4	1.2	1.8	1.55	1.25	1.05	1.1	1.05	1.0	1 25
6	1.6	1.4	1.35	1.75	1.7	1.5	1.25	1.1	1.0	1.0	1.0	1.3
7	1.55	1.35	1 35	1.45	1.8	1.45	1.2	1.05	1.0	1.0	1.0	1.2
8	1.55	1.3	1.4	1.4	1.65	1.6	1.15	1.1	1.0	1.15	1.0	1.1
9	1 5	1 3	1.3	1.4	1.6	1.5	1.15	1.05	1.0	1.05	1.0	1.4
10	1.5	1.3	1.35	1.35	1.55	1.5	1.15	1.25	1.1	1.0	1 05	2.1
11	1.45	1.3	1.35	1.3	1.6	1.4	1.25	1.15	1.05	1.0	1.1	1.5
12	1.45	1.3	1.3	1.3	1.5	1.4	1.2	1.25	1.0	1.0	1.05	1.45
13	1.45	1.3	1.3	1.3	1.45	1.35	1.25	1.1	.95	1.0	1.05	1.4
14	1.4	1.3	1.3	1.3	1.45	1.35	1.15	1.1	.95	1.0	1.0	2.1
15	1.4	1.25	1.45	1.25	1.45	1.35	1.3	1.1	.95	1.0	1.0	1.85
16	1.4	1.25	1.3	1.25	1.45	1.3	1.35	1.1	1.0	1.0	1.0	1.65
17	1.4	1.25	1.3	1.25	1.4	1.3	1.3	1.3	.95	1.0	1.0	1.55
18	1.4	1.25	1.3	1.25	1.4	1.25	1.4	1.1	.95	1.0	1.35	1.5
19	1.4	1.25	1.3	1.4	1.35	1.25	1.25	1.1	.9	.95	1.2	1.45
20	1.45	1.25	1.3	1.25	1.35	1.6	1.15	1.05	.9	.95	1.15	1.4
21	1.4	1.2	1.25	1.25	1.3	1.5	1.1	1.05	.9	.95	2.45	1.35
22	1.35	1.2	1.25	1.35	1.3	1.35	1.1	1.1	.95	.95	1.85	1.35
23	1.35	1.2	1.2	1.8	1.3	1.35	1.15	1.15	4.10	.95	2 0	3.1
24	1.35	1.3	1.2	1.5	1.3	1.35	1.15	1.1	1.3	.95	2.1	2.1
25	1.3	1.35	1.2	1.4	1.4	1.5	1 4	1.05	1.15	.95	1.7	1.85
26	1.35	1.35	1.25	1.4	2.6	1.45	1.2	1.05	1.1	.95	1.5	1.7
27	1.3	1.35	1.25	1.5	1.75	1.55	1.15	1.0	1.05	1.05	1.4	1.65
28	1.3	1.3	1.2	1.4	1.55	1.55	1.35	1.0	1.35	1.05	1.35	1.6
29	1.3	.....	1.2	1.4	1.50	1.4	1.2	1.0	1.4	1.0	1.3	1.5
30	1.3	.....	1.2	1.35	1.45	1.3	1.25	1.0	1.2	1.0	1.25	2.45
31	1.3	.....	1.3	.....	1.6	.....	1.15	1.0	.....	1.0	.....	2.0
1908.												
1	1.7	1.55	1.85	1.5	1.6	1.25	1.05	1.25	1.6	1.15	1.8	1.3
2	1.6	1.45	1.9	1.5	1.55	1.25	1.05	1.2	1.55	1.15	1.7	1.25
3	1.55	1.65	1.9	1.45	1.5	1.25	1.3	1.25	1.5	1.15	1.65	1.2
4	1.5	1.45	1.85	1.4	1.5	1.25	1.6	1.2	1.45	1.15	1.6	1.2
5	1.75	1.3	1.8	1.4	1.45	1.3	2.45	1.15	2.35	1.15	1.5	1.2
6	1.55	1.4	1.8	1.45	1.45	1.3	1.9	1.4	2.0	1.15	1.45	1.2
7	1.55	1.35	1.75	1.4	2.25	1.35	1.85	1.4	1.7	1.1	1.45	2.7
8	1.45	1.3	1.7	1.4	1.75	1.3	1.75	1.3	1.6	1.1	1.4	1.75
9	1.4	1.3	1.65	1.4	1.7	1.25	2.1	1.4	1.55	1.3	1.4	1.55
10	1.4	1.3	1.65	1.4	1.6	1.25	1.8	1.3	1.5	1.8	1.4	1.45
11	2.35	1.35	1.6	1.35	1.55	1.3	1.55	1.25	1.45	1.3	1.4	1.4
12	3.1	1.7	1.7	1.3	1.5	1.2	1.45	1.2	1.4	1.25	1.35	1.55
13	2.2	2.25	1.6	1.3	1.5	1.2	1.35	1.15	1.4	1.2	1.3	1.4
14	2.05	2.35	1.6	1.3	1.45	1.3	1.3	1.1	1.35	1.2	1.4	1.4
15	1.85	6.1	1.55	1.85	1.45	1.3	1.3	1.1	1.3	1.15	1.4	1.35
16	1.75	2.9	1.55	1.65	1.4	1.25	1.4	1.2	1.3	1.15	1.35	1.3
17	1.7	2.45	1.55	1.55	1.6	1.2	1.25	1.35	1.3	1.15	1.3	1.3
18	1.6	2.1	1.5	1.5	1.5	1.2	1.2	1.5	1.25	1.15	1.3	1.3
19	1.55	2.15	1.5	1.5	1.55	1.2	1.2	1.3	1.25	1.15	1.3	1.3
20	1.5	2.0	1.9	1.4	1.45	1.2	1.2	1.35	1.25	1.1	1.25	1.3
21	1.5	2.05	1.75	1.4	1.45	1.35	1.15	1.6	1.2	1.1	1.25	1.25
22	1.5	2.0	1.65	1.4	1.4	1.2	1.15	2.8	1.2	1.25	1.25	2.1
23	1.45	1.9	1.95	1.4	1.35	1.2	1.4	3.0	1.2	2.35	1.25	1.65
24	1.45	1.85	2.2	1.35	1.4	1.15	1.2	3.85	1.2	1.9	1.25	1.6
25	1.5	1.85	1.9	2.6	1.35	1.3	1.15	4.3	1.2	1.55	1.25	1.55
26	1.35	1.95	1.75	2.05	1.3	1.15	1.4	3.05	1.15	1.45	1.25	1.5
27	1.5	1.8	1.7	1.8	1.35	1.1	1.15	2.4	1.15	1.4	1.25	1.45
28	1.35	1.7	1.6	1.7	1.3	1.1	1.3	2.15	1.55	1.65	1.2	1.45
29	1.35	1.75	1.55	1.6	1.3	1.1	1.6	1.9	1.25	2.75	1.2	1.4
30	1.3	.....	1.55	1.7	1.4	1.05	1.5	1.8	1.2	2.3	1.2	1.45
31	1.3	.....	1.5	.....	1.3	.....	1.35	1.7	.....	2.0	.....	1.55

Rating table for South Fork of Mills River near Sitton, N. C., for 1907 and 1908.

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	35	2.00	265	3.10	620	4.40	1,200
1.00	51	2.10	295	3.20	660	4.60	1,300
1.10	68	2.20	325	3.30	700	4.80	1,400
1.20	86	2.30	355	3.40	740	5.00	1,500
1.30	105	2.40	385	3.50	780	5.20	1,600
1.40	125	2.50	415	3.60	825	5.40	1,700
1.50	146	2.60	445	3.70	870	5.60	1,800
1.60	168	2.70	480	3.80	915	5.80	1,900
1.70	191	2.80	515	3.90	960	6.00	2,000
1.80	215	2.90	550	4.00	1,005	6.20	2,100
1.90	240	3.00	585	4.20	1,100		

NOTE.—The above table is applicable only for open-channel conditions. It is based upon 10 discharge measurements made during 1906 and 1907, and is fairly well defined between gage heights 0.9 feet and 1.7 feet. Above gage height 2.2 feet the rating is the same as for 1906. 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 1907 and 1908.

[Drainage area, 40.5 square miles.]

Month.	Discharge in second-feet.			Per square mile.	Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.			
1907.						
January	265	105	139	3.43	3.95	C.
February	146	86	106	2.62	2.73	C.
March	295	86	113	2.79	3.22	C.
April	215	86	118	2.91	3.25	C.
May	445	105	165	4.07	4.69	C.
June	355	96	144	3.56	3.97	C.
July	125	68	92.5	2.28	2.63	C.
August	105	51	66.8	1.65	1.90	C.
September	1,050	35	92.2	2.28	2.54	C.
October	77	43	52.9	1.31	1.51	C.
November	400	51	108	2.67	2.98	C.
December	620	68	178	4.40	5.07	C.
The year	1,050	35	115	2.91	38.44	
1908.						
January	620	105	183	4.52	5.21	C.
February	2,050	105	285	7.04	7.59	C.
March	325	146	195	4.81	5.54	C.
April	445	105	157	3.88	4.33	C.
May	340	105	146	3.60	4.15	C.
June	115	60	90.8	2.24	2.50	C.
July	400	60	137	3.38	3.90	C.
August	1,150	68	235	5.80	6.69	C.
September	370	77	131	3.23	3.60	C.
October	498	68	137	3.38	3.90	C.
November	215	86	120	2.96	3.30	C.
December	480	86	143	3.53	4.07	C.
The year	2,050	60	163	4.03	54.78	

MUD CREEK AT NAPLES, N. C.

The station here, located at a wagon bridge one-half mile east of Naples, was established May 10, 1907, as one of the stations maintained in connection with the Forest Service investigations for the study of the water resources of the southern Appalachian Mountains.

The station was discontinued on December 31, 1907.[a]

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Discharge measurements of Mud Creek at Naples, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 10	Warren E. Hall	33	79	2.41	188
July 17	do	32	50	1.78	88
Do	F. P. Thomas	32	51	1.78	94
August 17	Warren E. Hall	33	61	1.80	113
Do	do	33	60	1.80	112
September 18	do	29	39	1.51	68
Do	do	29	37	1.50	61
December 10	do	39	164	4.08	525
Do	do	39	164	4.10	522
1908.					
April 10	Warren E. Hall	35	92	2.42	214

Daily gage height, in feet, of Mud Creek at Naples, N. C., for 1907.

[Observer, W. F. Byers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						4.2	2.1	1.9	1.2	1.6	1.3	1.8
2						3.0	2.1	1.9	1.3	1.4	1.2	1.5
3						2.7	2.3	2.1	1.7	1.6	1.2	1.6
4						2.5	2.2	2.0	1.8	1.7	1.3	1.4
5						2.3	2.0	1.8	1.5	1.7	1.5	1.2
6						2.2	1.9	1.9	1.4	1.7	1.6	1.1
7						2.2	1.8	1.8	1.5	1.7	1.4	1.3
8						2.6	1.8	1.8	1.8	1.8	1.6	1.9
9						2.5	1.7	1.9	1.7	1.6	1.6	4.0
10					2.4	4.0	1.7	1.9	1.6	1.8	2.0	4.2
11					2.65	2.9	1.7	1.9	2.2	1.6	1.8	4.0
12					2.4	2.5	1.8	2.0	1.6	1.7	1.9	3.8
13					2.3	2.1	1.8	1.8	1.6	1.5	1.8	5.0
14					2.2	2.1	1.8	1.9	1.2	1.3	1.6	8.5
15					2.2	2.1	1.8	1.9	1.2	1.1	1.7	7.0
16					2.2	2.1	1.8	1.9	1.3	1.2	1.5	5.9
17					2.2	2.1	1.8	1.8	1.1	1.5	1.9	4.7
18					2.1	2.0	2.0	1.7	1.2	1.3	3.0	3.0
19					2.1	2.0	1.9	1.8	1.3	1.6	2.7	2.8
20					2.1	2.2	1.8	1.9	1.5	1.5	2.0	2.6
21					2.0	2.4	1.8	1.8	1.2	1.2	4.0	2.9
22					2.0	2.2	1.8	1.9	1.3	1.5	3.6	2.2
23					2.0	2.2	1.7	2.0	4.0	1.5	6.0	8.0
24					2.0	2.3	1.7	1.8	3.2	1.5	5.3	6.0
25					2.0	2.3	1.8	1.7	2.0	1.4	3.9	5.0
26					3.9	2.2	1.7	1.6	1.8	1.5	3.4	4.9
27					3.1	2.2	1.7	1.5	1.2	1.2	2.8	3.0
28					2.4	2.1	1.7	1.5	2.0	1.1	1.9	3.0
29					2.2	2.1	2.0	1.6	2.2	1.5	1.7	3.5
30					2.2	2.2	2.0	1.3	1.8	1.6	1.5	5.0
31					3.0		1.9	1.2		1.2		4.9

Daily discharge, in second-feet, of Mud Creek at Naples, N. C., for 1907.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						550	136	106	37	72	45	94
2						310	136	106	45	53	37	62
3						250	172	136	82	72	37	72
4						210	154	120	94	82	45	53
5						172	120	94	62	82	62	37
6						154	106	106	53	82	72	30
7						154	94	94	62	82	53	45
8						230	94	94	94	94	72	106
9						210	82	106	82	72	72	510
10					190	510	82	106	72	94	120	550

Daily discharge, in second-feet, of Mud Creek at Naples, N. C., for 1907—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11					240	290	82	106	154	72	94	510
12					190	210	94	120	72	82	106	470
13					172	136	94	94	72	62	94	710
14					154	136	94	106	37	45	72	1,410
15					154	136	94	106	37	30	82	1,110
16					154	136	94	106	45	37	62	890
17					154	136	94	94	30	62	106	650
18					136	120	120	82	37	45	310	310
19					136	120	106	94	45	72	250	270
20					136	154	94	106	62	62	120	230
21					120	190	94	94	37	37	510	290
22					120	154	94	106	45	62	430	154
23					120	154	82	120	510	62	910	1,310
24					120	172	82	94	350	62	770	910
25					120	172	94	82	120	53	490	710
26					490	154	82	72	94	62	390	690
27					330	154	82	62	37	37	270	310
28					190	136	82	62	120	30	106	310
29					154	136	120	72	154	62	82	410
30					154	154	120	45	94	72	62	710
31					310	.....	106	37	.....	37	.....	690

NOTE.—The above daily discharges are based on a fairly well-defined rating.

SWANNANOA RIVER AT SWANNANOA, N. C.

This station is located at the iron highway bridge one-fourth mile from the railroad station at Swannanoa. It was established May 28, 1907, in connection with the special investigations of water resources and power possibilities in the southern Appalachian Mountains. The station is about 2 miles below the North Fork of the river and the same distance above Beetree Creek.

The discharge measurements are made from the highway bridge, where the bank, river bed, current, and other conditions are fairly good.[a]

Discharge measurements of Swannanoa River at Swannanoa, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 28	Warren E. Hall	54	112	1.65	84
July 12	do	54	127	1.91	134
Do	F. P. Thomas	54	128	1.89	130
August 17	B. M. Hall, jr	50	100	1.36	47
Do	do	50	103	1.37	52
Do	do	50	107	1.37	50
September 25	Warren E. Hall	49	109	1.48	66
Do	do	49	109	1.47	63
December 11	do	55	111	1.87	107
December 12	do	55	106	1.76	92
1908.					
April 21	Warren E. Hall	57	114	1.90	109
March 19	do	60	135	2.27	196
July 21	F. P. Thomas	50	89	1.51	58
Do	do	50	90	1.49	56

[a] Records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Swannanoa River at Swannanoa, N. C., for 1907 and 1908.

[Observer, W. D. Patton.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	2.5	2.1	1.6	1.1	1.4	1.2	1.5
2	.....	.....	.....	.....	.....	2.4	2.0	1.5	1.1	1.4	1.1	1.4
3	.....	.....	.....	.....	.....	2.7	1.9	1.5	1.3	1.4	1.1	1.4
4	.....	.....	.....	.....	.....	2.5	2.1	1.5	1.3	1.4	1.1	1.4
5	.....	.....	.....	.....	.....	2.2	1.9	1.5	1.2	1.4	1.2	1.4
6	.....	.....	.....	.....	.....	2.0	1.8	1.5	1.2	1.4	1.2	1.4
7	.....	.....	.....	.....	.....	2.0	1.8	1.4	1.3	1.4	1.3	1.4
8	.....	.....	.....	.....	.....	2.1	1.7	1.7	1.3	1.3	1.3	1.5
9	.....	.....	.....	.....	.....	2.1	1.7	1.5	1.2	1.3	1.3	1.5
10	.....	.....	.....	.....	.....	2.0	1.7	1.5	1.4	1.3	1.4	2.7
11	.....	.....	.....	.....	.....	2.0	1.7	1.5	1.4	1.2	1.4	2.0
12	.....	.....	.....	.....	.....	1.9	1.9	1.6	1.3	1.2	1.4	1.8
13	.....	.....	.....	.....	.....	1.9	1.9	1.5	1.2	1.2	1.4	1.7
14	.....	.....	.....	.....	.....	1.9	1.7	1.4	1.2	1.2	1.4	2.7
15	.....	.....	.....	.....	.....	1.8	1.8	1.5	1.2	1.2	1.4	2.6
16	.....	.....	.....	.....	.....	1.8	1.9	1.4	1.2	1.2	1.4	2.5
17	.....	.....	.....	.....	.....	1.7	3.45	1.4	1.2	1.2	1.5	1.9
18	.....	.....	.....	.....	.....	1.7	2.5	1.7	1.2	1.2	1.5	1.7
19	.....	.....	.....	.....	.....	1.7	2.1	1.5	1.2	1.2	1.5	1.6
20	.....	.....	.....	.....	.....	1.6	2.0	1.5	1.1	1.2	1.5	1.6
21	.....	.....	.....	.....	.....	1.8	2.0	1.4	1.1	1.2	1.8	1.6
22	.....	.....	.....	.....	.....	1.9	1.8	1.4	1.1	1.1	1.9	1.6
23	.....	.....	.....	.....	.....	2.4	1.8	1.4	4.8	1.1	1.95	3.0
24	.....	.....	.....	.....	.....	2.2	1.8	1.5	1.9	1.1	2.0	2.9
25	.....	.....	.....	.....	.....	2.2	1.7	1.4	1.5	1.2	1.9	2.8
26	.....	.....	.....	.....	.....	2.6	1.6	1.4	1.4	1.2	1.9	2.7
27	.....	.....	.....	.....	.....	2.45	1.6	1.3	1.3	1.2	1.8	2.6
28	.....	.....	.....	.....	1.7	2.7	1.6	1.2	1.5	1.3	1.8	1.8
29	.....	.....	.....	.....	1.6	2.5	1.6	1.2	1.4	1.3	1.7	1.8
30	.....	.....	.....	.....	1.6	2.3	2.0	1.1	1.4	1.2	1.5	3.05
31	.....	.....	.....	.....	1.7	.....	2.7	1.2	.....	1.2	.....	3.0
1908.												
1	2.0	1.7	2.1	2.0	2.0	2.0	1.4	1.7	2.1	1.5	2.5	1.8
2	1.9	1.7	2.1	2.0	2.0	2.0	1.4	1.7	2.0	1.5	2.4	1.8
3	1.9	1.7	2.1	1.9	1.9	1.9	1.7	1.6	1.9	1.5	2.4	1.8
4	1.9	1.7	2.0	1.9	1.9	1.8	1.7	1.9	1.9	1.4	2.3	1.7
5	2.1	1.7	2.1	1.9	1.9	1.8	1.9	1.9	3.1	1.4	2.3	1.7
6	1.9	1.8	2.1	1.9	1.9	1.9	2.45	1.9	3.6	1.4	2.1	1.7
7	1.9	1.7	2.2	1.9	2.4	1.9	2.1	1.9	2.3	1.4	2.1	2.5
8	1.9	1.7	2.1	1.8	2.0	1.8	2.5	1.8	2.1	1.4	2.0	2.2
9	1.8	1.7	2.1	1.8	2.0	1.8	2.3	2.1	2.0	2.8	2.0	2.0
10	1.8	1.7	2.1	1.8	2.0	1.8	2.0	1.9	2.0	3.0	1.9	1.9
11	2.3	2.0	2.2	1.8	1.9	1.8	1.9	1.8	1.9	2.8	1.9	1.9
12	3.8	2.4	2.5	1.8	1.9	1.8	1.8	1.8	1.9	2.0	1.9	2.0
13	3.8	2.9	2.3	1.7	1.8	1.7	1.8	1.7	1.8	1.8	2.0	2.0
14	3.6	3.0	2.2	1.7	1.8	1.7	1.9	1.7	1.6	1.8	2.4	1.9
15	4.3	7.8	2.1	1.9	1.8	1.7	1.9	1.6	1.5	1.7	2.1	1.9
16	2.2	4.0	2.1	2.2	1.7	1.6	1.7	1.7	1.5	1.6	2.0	1.8
17	2.1	3.8	2.1	2.1	2.0	1.6	1.6	1.7	1.6	1.6	1.9	1.8
18	2.1	3.6	2.1	2.1	1.8	1.6	1.5	1.7	1.6	1.6	1.9	1.8
19	1.9	3.6	2.0	2.0	2.5	1.6	1.5	1.7	1.7	1.6	1.9	1.8
20	1.9	3.4	2.2	2.0	2.1	1.6	1.5	1.7	1.6	1.6	1.9	1.8
21	1.9	3.0	2.2	1.9	1.9	1.6	1.5	1.6	1.6	1.6	1.8	1.8
22	1.9	2.8	2.2	1.9	1.9	1.6	1.5	2.0	1.6	1.6	1.8	2.5
23	1.9	2.4	3.0	1.9	1.9	1.6	2.0	2.2	1.5	6.7	1.8	2.4
24	1.8	2.1	3.5	1.8	1.9	1.5	1.7	4.4	1.6	3.9	1.8	2.3
25	1.8	2.1	2.7	3.4	1.9	1.5	1.7	4.2	1.6	3.8	1.8	2.1
26	1.8	2.0	2.5	2.7	1.9	1.5	1.6	3.6	1.5	3.7	1.7	2.0
27	1.8	2.1	2.3	2.4	2.2	1.5	1.6	3.0	1.5	3.4	1.7	2.0
28	1.8	2.1	2.3	2.3	2.2	1.5	1.6	2.8	1.5	2.8	1.7	2.0
29	1.7	2.1	2.2	2.2	2.3	1.4	1.8	2.4	1.5	3.8	1.7	2.0
30	1.7	.....	2.1	2.1	2.3	1.4	2.1	2.2	1.4	3.0	1.7	2.3
31	1.7	.....	2.0	.....	2.1	.....	1.9	2.1	.....	2.9	.....	2.3

Daily discharge, in second-feet, of Swannanoa River at Swananoa, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						250	158	74	30	52	36	62
2						226	138	62	30	52	30	52
3						300	120	62	44	52	30	52
4						250	158	62	44	52	30	52
5						180	120	62	36	52	36	52
6						138	102	62	36	52	36	52
7						138	102	52	44	52	44	52
8						158	88	88	44	44	44	62
9						158	88	62	36	44	44	62
10						138	88	62	52	44	52	300
11						138	88	62	52	36	52	138
12						120	120	74	44	36	52	102
13						120	120	62	36	36	52	88
14						120	88	52	36	36	52	300
15						102	102	62	36	36	52	275
16						102	120	52	36	36	52	250
17						88	.....	52	36	36	62	120
18						88	250	88	36	36	62	88
19						88	158	62	36	36	62	74
20						74	138	62	30	36	62	74
21						102	138	52	30	36	102	74
22						120	102	52	30	30	120	74
23						226	102	52	.....	30	129	390
24						180	102	62	120	30	138	360
25						180	88	52	62	36	120	330
26						275	74	52	52	36	120	300
27						238	74	44	44	36	102	275
28					88	300	74	36	62	44	102	102
29					74	250	74	36	52	44	88	102
30					74	202	138	30	52	36	62	405
31					88	.....	300	36	.....	36	.....	390
1908.												
1	138	88	158	138	138	138	52	88	158	62	250	102
2	120	88	158	138	138	138	52	88	138	62	226	102
3	120	88	158	120	120	120	88	74	120	62	226	102
4	120	88	138	120	120	102	88	120	120	52	202	88
5	158	88	158	120	120	102	120	120	.....	52	202	88
6	120	102	158	120	120	120	238	120	.....	52	158	88
7	120	88	180	120	226	120	158	120	202	52	158	250
8	120	88	158	102	138	102	250	102	158	52	138	180
9	102	88	158	102	138	102	202	158	138	330	138	138
10	102	88	158	102	138	102	138	120	138	390	120	120
11	202	138	180	102	120	102	120	102	120	330	120	120
12	.....	226	250	102	120	102	102	102	120	138	120	138
13	.....	360	202	88	102	88	102	88	102	102	138	138
14	.....	390	180	88	102	88	120	88	74	102	226	120
15	.....	.....	158	120	102	88	120	74	62	88	158	120
16	180	.....	158	180	88	74	88	88	62	74	138	102
17	158	.....	158	158	138	74	74	88	74	74	120	102
18	158	.....	158	158	102	74	62	88	74	74	120	102
19	120	.....	138	138	250	74	62	88	88	74	120	102
20	120	.....	180	138	158	74	62	88	74	74	120	102
21	120	390	180	120	120	74	62	74	74	74	102	102
22	120	330	180	120	120	74	62	138	74	74	102	250
23	120	226	390	120	120	74	138	180	62	.....	102	226
24	102	158	.....	102	120	62	88	.....	74	.....	102	202
25	102	158	300	.....	120	62	88	.....	74	.....	102	158
26	102	138	250	300	120	62	74	.....	62	.....	88	138
27	102	158	202	226	180	62	74	390	62	.....	88	138
28	102	158	202	202	180	62	74	330	62	330	88	138
29	88	158	180	180	202	52	102	226	62	.....	88	138
30	88	.....	158	158	202	52	158	180	52	390	88	202
31	88	.....	138	.....	158	.....	120	158	.....	360	.....	202

NOTE.—Daily discharge for 1907 and 1908 based on a rating curve which is well defined between gage heights 1.3 feet and 2.5 feet. Beginning May 28, 1907, the discharge was greater than 400 second-feet for all missing days.

IVY RIVER AT DEMOCRAT, N. C.

Ivy River rises on the western slopes of the Great Craggy Mountains, near Yeates Knob, the headwaters being at an elevation of about 5,000 feet above sea level, and flows in a general westerly direction, joining the French Broad about 2½ miles above Marshall. Its drainage area comprises about 164 square miles.

The gaging station, which is located at Democrat, about 18 miles west of Asheville, N. C., was established May 26, 1907, in connection with the study of the water resources of the Southern Appalachian Mountains. The station is about 4 miles above West Fork.

The banks are high and the bed is rocky and rough. The current is irregular and the flow is disturbed by a mill above.

The station was abandoned at the end of 1907.[a]

Discharge measurements of Ivy River at Democrat, N. C., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 27	Warren E. Hall	60	114	1.00	81
July 11	do	55	87	.89	58
Do	F. P. Thomas	55	87	.89	51
September 24	Warren E. Hall	55	94	1.00	64

Daily gage height, in feet, of Ivy River at Democrat, N. C., for 1907.

[Observer, W. R. Maney.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						1.7	1.3	1.0	0.7	0.8	0.7	0.8
2						1.1	1.2	1.0	.7	.8	.8	.8
3						1.5	1.1	.9	.7	.8	.9	.8
4						1.3	1.1	.9	.7	.8	.8	.8
5						1.2	1.0	.9	.8	1.0	.8	.8
6						1.1	1.0	.9	.7	.8	.8	.7
7						1.1	1.0	.9	.7	.8	.8	.7
8						1.2	1.0	.9	.9	.8	.8	.8
9						1.4	1.0	.9	.8	.8	.8	1.0
10						1.2	.9	.9	.8	.7	1.0	1.7
11						1.3	.9	.8	.9	.7	1.0	1.3
12						1.3	1.2	.9	.7	.7	.9	1.0
13						1.2	1.2	1.0	.7	.7	.9	1.0
14						1.2	1.1	.9	.6	.7	.9	1.7
15						1.2	1.0	.9	.7	.7	.8	1.3
16						1.1	1.1	.8	.9	.7	.8	1.2
17						1.1	1.1	.8	.7	.7	.8	1.0
18						1.0	1.5	1.1	.7	.7	1.0	1.0
19						1.0	1.3	1.0	.7	.8	.9	1.0
20						1.2	1.2	1.0	.6	.7	.9	1.0
21						1.1	1.1	.9	.6	.7	1.1	1.0
22						1.0	1.0	.8	.8	.7	1.0	1.0
23						1.1	1.0	.8	3.8	.8	1.1	1.7
24						1.2	1.1	.9	1.1	.8	1.3	1.4
25						1.2	1.1	.8	1.0	.8	1.0	1.2
26						1.3	1.0	.8	.8	.7	1.0	1.1
27					1.0	1.2	1.0	.7	.8	.8	1.0	1.1
28					1.0	1.3	1.0	.7	.8	.9	1.0	1.1
29					.9	1.6	1.0	.8	1.0	.9	.9	1.1
30					.9	1.4	1.3	.8	.8	.8	.9	1.9
31					1.0		1.1	.9		.8		1.4

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily discharge, in second-feet, of Ivy River at Democrat, N. C., for 1907.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	.....	.....	.....	.....	70	32	43	32	43
2	.....	.....	.....	.....	.....	.....	.....	70	32	43	43	43
3	.....	.....	.....	.....	.....	.....	88	55	32	43	55	43
4	.....	.....	.....	.....	.....	.....	88	55	32	43	43	43
5	.....	.....	.....	.....	.....	.....	70	55	43	70	43	43
6	.....	.....	.....	.....	.....	88	70	55	32	43	43	32
7	.....	.....	.....	.....	.....	88	70	55	32	43	43	32
8	.....	.....	.....	.....	.....	.....	70	55	55	43	43	43
9	.....	.....	.....	.....	.....	.....	70	55	43	43	43	70
10	.....	.....	.....	.....	.....	.....	55	55	43	32	70	.....
11	.....	.....	.....	.....	.....	.....	55	43	55	32	70	.....
12	.....	.....	.....	.....	.....	.....	.....	55	32	32	55	70
13	.....	.....	.....	.....	.....	.....	.....	70	32	32	55	70
14	.....	.....	.....	.....	.....	.....	88	55	.....	32	55	.....
15	.....	.....	.....	.....	.....	.....	70	55	32	32	43	.....
16	.....	.....	.....	.....	.....	88	88	43	55	32	43	.....
17	.....	.....	.....	.....	.....	88	88	43	32	32	43	70
18	.....	.....	.....	.....	.....	70	.....	88	32	32	70	70
19	.....	.....	.....	.....	.....	70	.....	70	32	43	55	70
20	.....	.....	.....	.....	.....	.....	.....	70	.....	32	55	70
21	.....	.....	.....	.....	.....	88	88	55	.....	32	88	70
22	.....	.....	.....	.....	.....	70	70	43	43	32	70	70
23	.....	.....	.....	.....	.....	88	70	43	.....	43	88	.....
24	.....	.....	.....	.....	.....	.....	88	55	88	43	.....	.....
25	.....	.....	.....	.....	.....	.....	88	43	70	43	70	.....
26	.....	.....	.....	.....	.....	.....	70	43	43	32	70	88
27	.....	.....	.....	.....	70	.....	70	32	43	43	70	88
28	.....	.....	.....	.....	70	.....	70	32	43	55	70	88
29	.....	.....	.....	.....	55	.....	70	43	70	55	55	88
30	.....	.....	.....	.....	55	.....	.....	43	43	43	55	.....
31	.....	.....	.....	.....	70	.....	88	55	.....	43	.....	.....

NOTE.—The above daily discharges are based on an approximate rating curve. Beginning June 5 the discharge was greater than 90 second-feet for all missing days.

PIGEON RIVER AT CANTON, N. C.

Pigeon River rises among the Balsam and Pisgah mountains, cuts its way through the Unaka Mountains, and joins French Broad River on the Tennessee Plain. It drains an interior agricultural basin which is oval in outline, the longer axis northwest, parallel to the general course of the stream, and almost entirely within the Appalachian Mountain region. It is circumscribed by lofty mountains, with many peaks more than 6,000 feet in altitude. Many minor ranges springing from the surrounding mountains converge toward the middle of the basin, dividing it into deep, narrow valleys, except near its upper end, between the towns of Canton and Waynesville, where there is a broad open valley of alluvial plains and rolling hills, dotted with low mountains.

The basin has an area of about 667 square miles.

The soils are loams and sandy loams, mostly fine grained, derived from gneiss and schists, though in the mountains they are more siliceous and coarser, being the product of metamorphosed sandstones, quartzites, and conglomerates.

The gaging station, which is located at the wagon bridge about 1,000 feet above the railroad bridge of the Southern Railway at

Canton, N. C., was established May 25, 1907, in cooperation with the Forest Service for the purpose of studying the water resources and power possibilities of the southern Appalachian Mountains.

Discharge measurements are made from the single span highway bridge, where the flow is confined between the bridge abutments. The current is rather sluggish and at low stages is possibly affected by a low dam about one-fourth of a mile below.[a]

Discharge measurements of Pigeon River at Canton, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 25	F. A. Murray	129	298	3.07	274
August 24	F. P. Thomas	119	240	2.60	141
Do	do	119	247	2.58	144
October 22	O. P. Hall	110	261	2.50	105
1908.					
April 14	Warren E. Hall	129	419	3.05	246
July 23	F. P. Thomas	130	381	2.88	186

Daily gage height, in feet, of Pigeon River at Canton, N. C., for 1907 and 1908.

[Observer, J. D. Holtsclaw.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						3.5	2.9	2.6	2.5	2.8	2.6	2.9
2						3.2	3.05	2.6	2.5	2.8	2.65	2.85
3						3.2	3.1	2.6	2.5	2.75	2.8	2.8
4						3.1	2.9	2.6	2.5	2.7	2.7	2.8
5						3.05	2.8	2.6	2.5	2.7	2.6	2.7
6						3.0	2.8	2.6	2.5	2.7	2.6	2.7
7						3.0	2.8	2.6	2.5	2.7	2.6	2.7
8						3.35	2.8	2.6	2.65	2.7	2.6	2.7
9						3.2	2.7	2.6	2.6	2.6	2.65	2.9
10						3.15	2.7	2.6	2.5	2.6	3.05	3.85
11						3.05	2.7	2.6	2.5	2.6	2.85	3.2
12						3.0	3.05	2.75	2.5	2.55	2.75	3.1
13						3.0	2.9	2.65	2.5	2.5	2.6	3.05
14						3.0	2.9	2.6	2.5	2.5	2.6	3.1
15						3.0	3.0	2.6	2.5	2.5	2.6	3.4
16						2.9	3.2	2.7	2.5	2.5	2.6	3.25
17						2.9	2.9	2.65	2.5	2.5	2.6	3.2
18						2.9	3.0	2.6	2.5	2.5	2.6	3.15
19						2.9	2.95	2.6	2.5	2.5	2.75	3.05
20						2.9	2.9	2.6	2.5	2.5	2.8	3.0
21						2.9	2.8	2.6	2.6	2.5	3.85	3.0
22						2.9	2.7	2.6	2.75	2.5	3.2	3.0
23						3.0	2.7	2.7	6.1	2.5	3.25	4.8
24						3.15	2.75	2.65	3.15	2.5	3.6	3.65
25					3.1	3.0	2.8	2.6	2.85	2.5	3.4	3.5
26					3.15	2.9	2.7	2.5	2.75	2.5	3.2	3.4
27					3.05	2.95	2.7	2.5	2.7	2.5	3.0	3.25
28					3.0	3.1	2.7	2.5	2.9	2.7	2.9	3.2
29					3.0	3.0	2.7	2.5	3.2	2.65	2.9	3.2
30					3.0	2.9	2.7	2.5	2.85	2.6	2.9	4.0
31					3.2		2.7	2.5		2.6		4.1

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled, "Water powers of North Carolina."

Daily gage height, in feet, of Pigeon River at Canton, N. C., for 1907 and 1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	3.8	3.25	3.3	3.3	3.4	3.0	2.9	2.8	3.2	2.8	3.9	3.1
2	3.6	3.2	3.3	3.25	3.4	3.0	2.9	2.8	3.2	2.8	3.8	3.1
3	3.3	3.2	3.3	3.2	3.4	3.0	2.95	2.8	3.15	2.8	3.75	3.1
4	3.4	3.25	3.35	3.2	3.4	3.0	3.1	2.9	3.1	2.8	3.65	3.1
5	3.6	3.3	3.4	3.2	3.35	3.1	3.65	3.05	3.7	2.7	3.55	3.1
6	3.4	3.2	3.5	3.2	3.3	3.15	3.4	3.5	3.5	2.7	3.45	3.1
7	3.4	3.1	3.5	3.15	3.65	3.2	3.55	3.3	3.4	2.65	3.4	4.8
8	3.35	3.1	3.45	3.1	3.6	3.1	3.55	3.0	3.35	2.6	3.4	3.95
9	3.3	3.1	3.35	3.1	3.5	3.1	3.45	2.8	3.3	3.2	3.35	3.55
10	3.3	3.1	3.3	3.05	3.4	3.1	3.35	2.8	3.2	4.0	3.3	3.45
11	4.5	3.35	3.3	3.0	3.4	3.1	3.25	2.8	3.1	3.2	3.3	3.4
12	4.6	3.75	3.8	3.0	3.35	3.0	3.15	2.9	3.0	3.2	3.2	3.65
13	3.9	3.95	3.4	3.0	3.3	3.0	3.1	2.9	3.0	3.1	3.2	3.55
14	3.7	4.3	3.35	3.0	3.3	3.0	3.1	2.9	3.0	3.1	3.25	3.5
15	3.55	7.7	3.3	3.25	3.25	3.3	3.1	2.9	3.0	3.05	3.4	3.4
16	3.5	4.4	3.3	3.45	3.2	3.15	3.05	2.9	3.0	3.0	3.4	3.4
17	3.45	4.1	3.3	3.45	3.2	3.1	3.0	2.9	2.9	3.0	3.3	3.3
18	3.4	3.9	3.3	3.4	3.2	3.05	2.9	2.95	2.9	3.0	3.3	3.3
19	3.3	3.7	3.3	3.35	3.2	3.0	3.05	3.05	2.9	3.0	3.2	3.3
20	3.3	3.55	3.95	3.3	3.2	3.3	2.9	3.15	2.9	2.9	3.2	3.3
21	3.25	3.5	3.7	3.2	3.1	3.0	2.9	3.6	2.9	2.9	3.2	3.3
22	3.2	3.45	3.5	3.2	3.1	3.0	2.85	3.95	2.8	2.95	3.2	3.3
23	3.1	3.4	4.2	3.2	3.1	3.0	2.8	3.35	2.8	5.0	3.2	3.9
24	3.1	3.4	4.1	3.2	3.1	3.0	2.8	3.4	2.8	4.0	3.2	3.6
25	3.1	3.4	3.8	5.2	3.1	2.9	2.85	4.9	2.8	3.7	3.1	3.45
26	3.1	3.4	3.65	3.85	3.1	2.9	3.05	4.4	2.8	3.65	3.1	3.4
27	3.25	3.3	3.6	3.75	3.0	2.9	2.9	3.8	2.8	3.6	3.1	3.4
28	3.1	3.3	3.55	3.65	3.0	2.9	3.15	3.65	2.8	3.95	3.1	3.35
29	3.1	3.3	3.5	3.5	3.0	2.9	3.05	3.5	2.8	4.6	3.1	3.3
30	3.1	.....	3.4	3.45	3.0	2.9	2.95	3.35	2.8	4.1	3.1	3.45
31	3.3	.....	3.35	.....	3.0	.....	2.9	3.3	.....	3.95	.....	3.45

Daily discharge, in second-feet, of Pigeon River at Canton, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	205	125	105	175	125	205
2	.....	.....	.....	.....	.....	300	250	125	105	175	138	190
3	.....	.....	.....	.....	.....	300	265	125	105	162	175	175
4	.....	.....	.....	.....	.....	265	205	125	105	150	150	175
5	.....	.....	.....	.....	.....	250	175	125	105	150	125	150
6	.....	.....	.....	.....	.....	235	175	125	105	150	125	150
7	.....	.....	.....	.....	.....	235	175	125	105	150	125	150
8	.....	.....	.....	.....	.....	.....	175	125	138	150	125	150
9	.....	.....	.....	.....	.....	300	150	125	125	125	138	205
10	.....	.....	.....	.....	.....	282	150	125	105	125	250	.....
11	.....	.....	.....	.....	.....	250	150	125	105	125	190	300
12	.....	.....	.....	.....	.....	235	250	162	105	115	162	265
13	.....	.....	.....	.....	.....	235	205	138	105	105	125	250
14	.....	.....	.....	.....	.....	235	205	125	105	105	125	265
15	.....	.....	.....	.....	.....	235	235	125	105	105	125	.....
16	.....	.....	.....	.....	.....	205	300	150	105	105	125	.....
17	.....	.....	.....	.....	.....	205	205	138	105	105	125	300
18	.....	.....	.....	.....	.....	205	235	125	105	105	125	282
19	.....	.....	.....	.....	.....	205	220	125	105	105	162	250
20	.....	.....	.....	.....	.....	205	205	125	105	105	175	235
21	.....	.....	.....	.....	.....	205	175	125	125	105	.....	235
22	.....	.....	.....	.....	.....	205	150	125	162	105	300	235
23	.....	.....	.....	.....	.....	235	150	150	.....	105	.....	.....
24	.....	.....	.....	.....	.....	282	162	138	282	105	.....	.....
25	.....	.....	.....	.....	265	235	175	125	190	105	.....	.....
26	.....	.....	.....	.....	282	205	150	105	162	105	300	.....
27	.....	.....	.....	.....	250	220	150	105	150	105	235	.....
28	.....	.....	.....	.....	235	265	150	105	205	150	205	300
29	.....	.....	.....	.....	235	235	150	105	300	138	205	300
30	.....	.....	.....	.....	235	205	150	105	190	125	205	.....
31	.....	.....	.....	.....	300	.....	150	105	.....	125	.....	.....

(See note at foot of table on next page.)

Daily discharge, in second-feet, of Pigeon River at Canton, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1						235	205	175	300	175		265
2		300				235	205	175	300	175		265
3		300		300		235	220	175	282	175		265
4				300		235	265	205	265	175		265
5				300		265		250		150		265
6		300		300		282				150		265
7		265		282		300				138		
8		265		265		265		235		125		
9		265		265		265		175		300		
10		265		250		265		175	300			
11				235		265		175	265	300		
12				235		235	282	205	235	300	300	
13				235		235	265	205	235	265	300	
14				235		235	265	205	235	265		
15							265	205	235	250		
16					300	282	250	205	235	235		
17					300	265	235	205	205	235		
18					300	250	205	220	205	235		
19					300	235	250	250	205	235	300	
20					300		205	282	205	205	300	
21				300	265	235	205		205	205	300	
22	300			300	265	235	190		175	220	300	
23	265			300	265	235	175		175		300	
24	265			300	265	235	175		175		300	
25	265				265	205	190		175		265	
26	265				265	205	250		175		265	
27					235	205	205		175		265	
28	265				235	205	282		175		265	
29	265				235	205	250		175		265	
30	265				235	205	220		175		265	
31					235		205					

NOTE.—Daily discharge 1907 and 1908 based on a well-defined rating curve. Beginning May 25, 1907, the discharge was greater than 320 second-feet on all missing days.

PIGEON RIVER AT NEWPORT, TENN.

This station is located at the highway bridge in the eastern part of Newport, 1 mile from the railroad station and 300 feet above the railroad bridge of the Southern Railway.

The station was originally established September 4, 1900, but as the gage was damaged a number of times the records were not continuous until after December 14, 1902. The station was discontinued on December 31, 1905, but on December 1, 1906, the United States Weather Bureau began reading the gage and since that time has furnished the gage heights to the United States Geological Survey. The chain gage formerly used by the Geological Survey is the one now used by the Weather Bureau, and the datum has remained the same.

The section at the station is rather poor for discharge measurements, and a water power on the river 1 mile below the station would possibly affect the low water flow in case the pond should be considerably lowered.[a]

[a] All records of discharge at this station have been collected by engineers of the United States Geological Survey, and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Discharge measurements of Pigeon River at Newport, Tenn., in 1906 and 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1906.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 24	O. P. Hall	186	608	1.34	663
1907.					
August 16	Warren E. Hall	137	942	1.54	696

Daily gage height, in feet, of Pigeon River at Newport, Tenn., for 1906 to 1908.

Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.
1906.		1906.		1906.		1906.	
1	1.8	9	1.7	17	1.7	25	1.8
2	1.7	10	1.7	18	2.8	26	1.8
3	1.9	11	2.0	19	2.1	27	1.9
4	1.8	12	1.9	20	2.2	28	3.4
5	1.8	13	1.8	21	2.2	29	3.2
6	1.8	14	1.7	22	2.1	30	3.6
7	2.0	15	1.7	23	2.0	31	3.0
8	1.8	16	1.7	24	1.8		

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.0	1.6	1.7	2.1	2.0	1.9	1.8	1.4	0.9	.....	.....	1.6
2	2.5	2.0	1.9	1.8	1.9	2.2	1.6	.....	.9	.....	.....	1.5
3	2.4	1.9	2.4	1.7	2.1	1.9	2.0	.....	2.6	.....	.....	1.4
4	2.3	1.7	2.1	1.7	3.0	1.8	1.8	1.4	.9	.....	.....	1.3
5	2.2	2.6	1.9	1.6	2.6	1.7	1.7	1.3	.9	.....	.....	1.3
6	2.0	2.3	1.8	1.8	2.3	1.6	1.8	1.1	1.0	.....	.....	1.2
7	2.1	2.0	1.5	1.9	3.2	1.5	1.6	1.0	1.0	.....	1.2	1.2
8	2.0	1.9	2.4	1.8	2.9	3.4	1.4	1.1	1.3	.....	1.1	1.4
9	2.0	1.9	2.2	2.1	2.7	2.8	1.4	1.3	1.3	.....	1.0	1.5
10	2.0	1.8	2.3	1.8	2.5	2.2	1.3	1.6	1.0	.....	1.5	1.7
11	1.9	1.7	2.8	1.9	2.4	2.4	1.4	1.6	1.2	.....	2.2	2.5
12	1.9	1.7	2.4	1.8	2.4	2.0	1.4	1.3	1.4	.....	1.7	1.9
13	1.9	1.6	2.2	1.8	2.3	1.9	2.0	1.2	1.1	.....	1.6	1.7
14	1.8	1.6	2.3	1.7	2.2	1.9	1.8	1.2	1.0	.....	1.5	1.9
15	1.7	1.6	2.6	1.7	2.1	1.8	1.6	1.1	.9	.....	1.4	2.3
16	1.7	1.6	2.4	1.7	2.1	1.7	1.9	1.0	.8	.....	1.3	2.2
17	1.7	1.6	2.3	1.8	2.0	1.6	1.7	1.4	.....	.....	1.3	2.0
18	1.8	1.5	2.2	1.7	1.9	1.5	1.9	1.8	.....	.....	1.4	2.0
19	1.6	1.3	2.0	2.1	1.8	1.5	1.7	1.3	.....	.....	1.9	1.8
20	1.7	1.5	1.9	2.4	1.7	1.6	1.7	1.2	.....	.....	1.8	1.7
21	1.8	1.6	1.9	2.2	1.7	1.6	1.6	1.2	.....	.....	1.9	1.6
22	1.5	1.5	1.8	2.0	1.7	1.5	1.4	1.3	.....	.....	2.2	1.7
23	1.5	1.4	1.7	2.3	1.7	1.5	1.4	1.3	.....	.....	2.1	1.8
24	1.5	1.6	1.7	2.3	1.8	1.8	1.3	1.5	.....	.....	3.9	2.6
25	1.5	1.8	1.6	2.1	1.7	1.9	1.5	1.8	.....	.....	2.7	2.0
26	1.6	1.7	1.7	2.0	1.7	1.7	1.3	1.5	.....	.....	2.3	2.0
27	1.6	1.9	1.9	2.2	1.8	1.6	1.3	1.1	.....	.....	2.0	1.9
28	1.6	1.7	1.7	2.0	1.6	2.0	1.3	1.0	.....	.....	1.8	1.8
29	1.5	.....	1.6	2.2	1.6	3.7	1.2	1.2	.....	.....	1.7	1.9
30	1.5	.....	1.5	2.0	1.6	2.0	1.8	1.1	.....	.....	1.6	2.4
31	1.5	.....	1.8	.....	1.5	.....	1.4	.9	.....	.....	.....	3.5
1908.												
1	3.0	3.0	2.0	3.2	2.4	1.7	1.3	1.3	1.6	1.0	2.4	1.6
2	2.5	2.5	2.5	2.2	2.2	1.6	1.4	1.2	1.5	1.0	2.1	2.1
3	2.3	2.2	2.6	2.2	2.1	1.5	1.5	1.2	1.4	.9	2.0	1.6
4	2.0	2.0	2.5	2.1	2.0	1.8	1.4	1.5	1.3	.9	1.9	1.5
5	4.3	2.4	2.4	2.0	2.0	1.7	1.8	1.5	1.3	.9	1.7	1.6
6	3.3	2.3	2.4	2.2	1.9	1.8	2.1	1.8	2.6	.9	1.6	1.5
7	3.0	2.0	2.3	2.1	2.1	1.8	2.6	2.0	1.7	1.0	1.6	5.3
8	2.5	2.0	2.4	2.0	2.4	1.7	3.0	2.2	1.5	.9	1.6	3.9
9	2.3	1.9	2.4	1.9	2.1	1.6	2.2	1.9	1.4	1.0	1.5	3.2
10	2.2	2.0	2.3	1.9	2.1	1.5	2.2	1.8	1.3	3.0	1.5	2.4
11	2.0	2.0	2.2	1.8	2.0	1.7	1.9	1.7	1.3	1.7	1.6	1.9
12	7.0	2.2	3.5	1.7	1.9	1.6	1.7	1.5	1.2	1.6	1.7	3.6
13	4.2	2.7	3.0	1.7	1.9	1.5	1.6	1.4	1.2	1.2	1.6	2.6
14	3.4	3.0	2.7	1.7	1.8	1.5	1.7	1.3	1.2	1.0	1.6	2.4
15	2.8	6.9	2.5	1.8	1.8	2.2	1.5	1.3	1.1	1.0	1.9	1.9

Daily gage height, in feet, of Pigeon River at Newport, Tenn., for 1906 to 1908—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	2.4	4.5	2.4	2.6	1.7	2.0	1.8	1.2	1.1	1.0	1.7	2.0
17	2.9	3.5	2.3	2.2	2.0	1.7	1.6	1.3	1.0	1.0	1.6	1.8
18	2.2	3.0	2.2	2.0	1.9	1.6	1.5	1.8	1.0	.9	1.6	1.8
19	2.2	2.9	2.2	1.9	2.4	1.5	1.4	1.5	1.0	.9	1.6	1.9
20	2.1	2.8	2.3	1.8	2.5	1.5	1.4	1.7	.9	.9	1.5	1.6
21	2.1	2.5	4.0	1.8	2.1	1.5	1.3	1.5	.9	.9	1.5	1.5
22	2.1	2.4	3.5	1.7	2.0	1.5	1.3	3.1	1.0	1.0	1.3	1.6
23	2.4	2.3	3.2	1.7	1.9	1.8	1.4	3.0	.9	1.2	1.1	3.6
24	2.2	2.2	5.7	1.7	1.9	1.5	1.2	2.8	1.0	3.2	1.1	2.8
25	2.0	2.2	4.0	1.9	1.8	1.5	1.3	2.9	1.0	1.9	1.5	2.6
26	2.0	2.3	3.2	4.0	1.7	1.7	1.2	3.3	.9	1.8	1.5	2.5
27	2.2	2.3	3.0	2.9	2.0	1.5	1.3	2.4	.9	1.5	1.4	2.3
28	2.3	2.2	2.7	2.6	1.8	1.4	1.4	2.1	.9	1.5	1.3	2.2
29	2.2	2.1	2.6	2.4	1.9	1.3	1.9	1.9	1.5	3.0	1.4	2.7
30	2.0	.....	2.5	2.2	2.3	1.3	1.5	1.8	1.4	3.2	1.3	2.5
31	1.9	.....	2.4	.....	1.9	.....	1.5	1.7	.....	2.7	.....	2.7

Rating table for Pigeon River at Newport, Tenn., for 1905 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.80	300	2.00	1,220	3.20	2,930	4.80	5,970
.90	345	2.10	1,340	3.30	3,100	5.00	6,370
1.00	400	2.20	1,460	3.40	3,280	5.20	6,770
1.10	460	2.30	1,590	3.50	3,460	5.40	7,170
1.20	525	2.40	1,720	3.60	3,640	5.60	7,580
1.30	595	2.50	1,860	3.70	3,830	5.80	8,000
1.40	665	2.60	2,000	3.80	4,020	6.00	8,420
1.50	740	2.70	2,140	3.90	4,210	6.20	8,840
1.60	820	2.80	2,290	4.00	4,400	6.40	9,260
1.70	910	2.90	2,440	4.20	4,780	6.60	9,690
1.80	1,010	3.00	2,600	4.40	5,170	6.80	10,130
1.90	1,110	3.10	2,760	4.60	5,570	7.00	10,570

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on dischagre measurements made during 1904 to 1907 and is fairly well defined between gage heights 1.6 feet and 4.5 feet.

Monthly discharge of Pigeon River at Newport, Tenn., for 1906 to 1908.

[Drainage area, 655 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1906.						
December	3,640	910	1,380	2.11	2.43	B.
1907.						
January	2,600	740	1,090	1.66	1.91	B.
February	2,000	595	967	1.48	1.54	B.
March	2,290	740	1,260	1.92	2.21	B.
April	1,720	820	1,170	1.79	2.00	B.
May	2,930	740	1,370	2.09	2.41	B.
June	3,830	740	1,230	1.88	2.10	B.
July	1,220	525	823	1.26	1.45	B.
August	1,010	345	597	.911	1.05	C.
September 1-16	2,000	300	529	.808	.48	C.
November 7-30	4,210	400	1,100	1.68	1.50	B.
December	3,460	525	1,120	1.71	1.97	B.
1908.						
January	10,600	1,110	2,210	3.37	3.88	A.
February	10,400	1,110	2,180	3.33	3.59	A.
March	7,790	1,220	2,340	3.57	4.12	A.
April	4,400	910	1,440	2.20	2.46	B.
May	1,860	910	1,250	1.91	2.20	B.
June	1,460	595	848	1.29	1.44	B.
July	2,600	525	912	1.39	1.60	B.
August	3,100	525	1,170	1.79	2.06	B.
September	2,000	345	576	.879	.98	C.
October	2,930	345	848	1.30	1.50	B.
November	1,720	460	836	1.28	1.43	B.
December	6,970	740	1,820	2.78	3.20	B.
The year	10,600	345	1,370	2.09	28.46	

NOLICHUCKY RIVER NEAR GREENVILLE, TENN.

Nolichucky River is formed by the junction of Toe and Caney rivers about 8 or 9 miles east of the Tennessee state line. The river flows almost due north for several miles, then turns toward the northwest and flows in a deep gorge through the Unaka Mountains into Tennessee, where, preserving its general westerly direction, it finally enters French Broad River about 7½ miles southeast of Morristown. The whole area is subject to sudden and violent rains, producing great floods, while in the winter the ice moving downstream sometimes forms ice dams, which do a great deal of damage.

The rainfall over the basin is about 51.2 inches per annum. The tributaries, like the main stream, rise near the summits of mountain chains and flow over rocky and precipitous beds through narrow valleys.

The fall of the river, although less than might naturally be expected in a stream draining so high and mountainous an area, is considerable. The total fall between the junction of the North and South Toe and Embreville is about 850 feet in a distance, following the course of the river, of about 40 miles, an average of about 21 feet to the mile. Throughout this part of its course the river flows in a gorge with steep and rocky sides and the fall per mile is large. About 1½ miles below the mouth of Caney River, where the stream is about 200 feet wide, there is a fall of 25 feet or a little more in half a mile.

The gaging station is located at Jones Bridge, 5 miles southeast of Greenville and one-half mile below Camp Creek. It was established May 7, 1903, for obtaining general run-off data.

The station was discontinued December 31, 1908.[a]

Daily gage height, in feet, of Nolichucky River near Greeneville, Tenn., for 1907 and 1908.

[Observer, B. H. Jones.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.8	0.7	1.35	0.9	1.2	0.8	1.1	0.75	0.3	0.7	0.3	0.7
2	2.25	.85	1.9	.9	1.2	3.5	.95	.65	.3	.6	.3	.65
3	1.85	.9	2.0	.75	1.1	3.2	1.05	.55	.5	.5	.4	.6
4	1.7	.9	1.9	.7	1.5	2.9	1.0	.5	.6	.5	.55	.55
5	1.6	1.1	1.7	.7	1.65	2.1	.8	.5	.55	1.2	.4	.5
6	1.45	1.2	1.2	.75	1.4	1.7	.75	.45	.45	1.05	.4	.45
7	1.4	1.0	1.1	1.5	1.9	1.4	.7	.55	.4	.8	.4	.4
8	1.3	.9	1.2	1.4	1.7	1.55	.65	.75	.4	.7	.35	.45
9	1.25	.9	1.4	1.5	1.5	3.6	.6	1.0	.6	.65	.35	.5
10	1.2	.85	1.4	1.5	1.4	2.75	.6	.75	.55	.6	.35	.65
11	1.15	.85	2.8	1.3	1.3	2.25	.55	.55	.5	.5	.3	1.6
12	1.15	.8	2.15	1.4	1.25	2.0	.65	.5	.8	.5	.4	1.15
13	1.05	.7	1.75	1.2	1.15	1.7	1.8	.45	.5	.45	.35	.95
14	1.0	.7	1.6	1.1	1.1	2.4	1.45	.4	.45	.4	.3	.8
15	1.0	.7	1.7	1.0	1.0	2.0	1.55	.35	.35	.4	.3	.9
16	1.0	.65	1.75	1.0	.95	1.7	1.4	.3	.3	.4	.3	1.4
17	.95	.65	1.5	1.0	.9	1.5	1.15	.35	.35	.35	.6	1.1
18	.95	.65	1.35	1.0	.85	1.15	1.2	.5	.35	.35	.6	.9
19	.95	.65	1.3	1.2	.8	1.1	2.15	.75	.4	.4	.65	.7
20	.9	.65	1.2	1.7	.75	1.0	1.2	.5	.5	.35	.7	.7

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Nolichucky River near Greeneville, Tenn., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	0.9	0.6	1.15	1.4	0.7	1.0	1.0	0.55	0.95	0.35	0.6	0.65
22	.8	.6	1.05	1.2	.7	.95	.85	.5	.9	.35	.65	.65
23	.8	.55	1.0	1.5	.65	1.0	.75	.65	3.00	.3	.9	.8
24	.8	.55	.95	2.2	.65	1.1	.65	.9	3.45	.3	1.6	2.2
25	.75	.75	.9	1.7	.65	1.2	.6	1.0	1.75	.3	1.7	1.45
26	.75	1.35	.85	1.2	.85	1.0	.6	.9	1.2	.3	1.3	1.1
27	.8	1.3	.8	1.4	.85	1.1	.85	.8	.9	.3	1.0	1.0
28	.75	1.35	.8	1.55	.65	.9	.65	.7	.8	.3	.9	.95
29	.65	.....	.75	1.35	.65	1.45	.55	.45	.8	.3	.85	.9
30	.65	.....	.75	1.35	.55	1.45	1.5	.4	.8	.3	.75	1.5
31	.65	.....	.75	.....	.55	.....	.9	.4	.....	.3	.....	3.1
1908.												
1	1.9	.9	1.8	1.45	1.55	1.1	.5	.9	.9	.35	2.0	.9
2	1.5	.85	2.2	1.65	1.4	1.0	.8	.7	.8	.25	1.65	.95
3	1.3	.8	2.1	2.1	1.3	.9	.65	.65	.75	.2	1.45	.9
4	1.15	.95	1.95	1.55	1.2	1.1	1.0	.65	.65	.2	1.3	.85
5	2.3	1.1	1.8	1.45	1.15	1.25	1.0	.75	.6	.2	1.2	.85
6	2.2	1.1	2.3	1.4	1.15	1.0	1.25	.85	.8	.2	1.05	.85
7	1.75	1.2	2.25	1.35	1.45	.9	2.0	1.25	.7	.15	1.0	2.6
8	1.6	1.2	2.2	1.25	2.1	1.1	4.3	1.0	.7	.15	.9	3.0
9	1.35	1.1	1.9	1.2	1.55	.95	2.25	1.25	.75	.2	.9	2.45
10	1.2	1.1	1.7	1.2	1.4	.8	1.9	1.1	.6	.15	.8	1.75
11	1.0	1.35	1.55	1.1	1.3	.9	1.4	.85	.55	1.8	.9	1.45
12	9.1	1.75	2.0	2.1	1.15	.8	1.05	.8	.5	.95	1.2	1.55
13	4.2	2.65	2.7	1.0	1.15	.7	.9	.6	.45	.65	1.0	2.0
14	2.8	3.2	2.2	1.0	1.1	.7	.9	.5	.45	.5	.9	1.65
15	2.2	4.9	1.9	.95	1.1	2.2	1.0	.5	.4	.45	1.0	1.65
16	1.95	4.4	1.8	1.4	1.0	2.0	.8	.45	.4	.4	1.0	1.5
17	1.85	3.8	1.65	2.2	1.1	1.3	.8	.45	.35	.3	.9	1.15
18	1.65	2.8	1.6	1.75	1.1	1.0	.7	.55	.35	.3	.9	1.1
19	1.5	2.0	1.65	1.6	1.3	.9	.7	.55	.3	.3	.9	1.1
20	1.4	1.85	1.65	1.45	1.9	.8	.55	1.15	.3	.25	.9	1.05
21	1.3	1.65	2.6	1.25	2.0	.8	.55	.65	.3	.25	.9	1.0
22	1.25	1.55	2.6	1.15	1.6	.9	.5	.7	.3	.25	.8	1.65
23	1.25	1.4	2.5	1.1	1.3	1.0	.7	.9	.3	.45	.75	3.1
24	1.25	1.3	4.0	1.0	1.3	.95	1.0	1.0	.25	6.8	.7	2.2
25	1.0	1.2	3.3	1.15	1.0	.7	.7	1.45	.2	2.5	.7	2.0
26	1.05	1.4	2.5	5.0	1.0	1.0	.6	5.5	.2	2.0	.65	1.8
27	1.35	1.2	2.1	2.8	1.3	.7	.5	2.5	.2	1.45	.65	1.7
28	1.3	1.2	1.9	2.0	1.35	.55	1.0	1.7	.2	1.2	.6	1.5
29	1.1	1.1	1.7	1.8	1.35	.55	1.25	1.4	.3	2.3	.6	1.0
30	1.1	.....	1.65	1.55	2.1	.5	1.2	1.2	.5	3.5	.7	1.7
31	.9	.....	1.5	.....	1.9	.....	1.45	1.0	.....	2.45	.....	1.8

Rating table for Nolichucky River near Greeneville, Tenn., for 1906 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.10	550	1.60	2,580	3.10	5,720	5.00	9,900
.20	640	1.70	2,760	3.20	5,940	5.20	10,340
.30	735	1.80	2,950	3.30	6,160	5.40	10,780
.40	835	1.90	3,140	3.40	6,380	5.60	11,220
.50	940	2.00	3,340	3.50	6,600	5.80	11,660
.60	1,060	2.10	3,540	3.60	6,820	6.00	12,100
.70	1,180	2.20	3,750	3.70	7,040	6.20	12,540
.80	1,310	2.30	3,960	3.80	7,260	6.40	12,980
.90	1,450	2.40	4,180	3.90	7,480	6.60	13,420
1.00	1,590	2.50	4,400	4.00	7,700	6.80	13,860
1.10	1,740	2.60	4,620	4.20	8,140	7.00	14,300
1.20	1,900	2.70	4,840	4.40	8,580	8.00	16,500
1.30	2,060	2.80	5,060	4.60	9,020	9.00	18,700
1.40	2,230	2.90	5,280	4.80	9,460	10.00	20,900
1.50	2,400	3.00	5,500				

NOTE.—The above table is applicable only for open-channel conditions. It is based upon three discharge measurements made during 1906 and the general form of previous curves. 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 1907 and 1908.

[Drainage area, 1,100 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	5,060	1,120	1,860	1.69	1.95	B.
February	2,140	1,000	1,380	1.25	1.30	B.
March	5,060	1,240	2,210	2.01	2.32	B.
April	3,750	1,180	2,000	1.82	2.03	B.
May	3,140	1,000	1,680	1.53	1.76	B.
June	6,820	1,310	2,920	2.65	2.96	B.
July	3,640	1,000	1,600	1.45	1.67	B.
August	1,590	735	1,060	.964	1.11	B.
September	6,490	735	1,440	1.31	1.46	B.
October	1,900	735	935	.850	.98	C.
November	2,760	735	1,130	1.03	1.15	B.
December	5,720	835	1,630	1.48	1.71	B.
The year	6,820	735	1,650	1.50	20.40	
1908.						
January	18,900	1,450	3,160	2.87	3.31	B.
February	9,680	1,310	3,040	2.76	2.98	B.
March	7,700	2,400	3,590	3.26	3.76	B.
April	9,900	1,520	2,660	2.42	2.70	B.
May	3,540	1,590	2,210	2.01	2.32	B.
June	3,750	940	1,580	1.44	1.61	B.
July	8,360	940	1,850	1.68	1.94	B.
August	11,000	888	1,860	1.69	1.95	B.
September	1,450	640	923	.839	.94	C.
October	13,900	595	1,950	1.77	2.04	B.
November	3,340	1,060	1,570	1.43	1.60	B.
December	5,710	1,380	2,620	2.38	2.74	B.
The year	18,900	595	2,250	2.05	27.89	

NORTH TOE RIVER AT SPRUCE PINE, N. C.

North Toe River rises on the western slopes of the Blue Ridge, in the northwestern part of Mitchell County, N. C. Its course is circuitous, first to the southwest, then to the west, and then to the northwest, and it unites with the South Toe on the line between Mitchell and Yancey counties. The headwater region is very rough, with steep mountain slopes and narrow valleys sparsely populated. The tributaries as far down as Spruce Pine flow directly from the mountains in narrow gorges. They are for the most part short streams with great fall but with little water. Powers of considerable magnitude, however, can be developed on these streams, for although the amount of water carried by each is small, the fall obtainable in a short distance is large.

The gaging station, which is located at a suspension footbridge about 600 feet west of the railroad station at Spruce Pine, was established June 19, 1907, as one of the stations maintained in cooperation with the Forest Service for the purpose of getting run-off and water-power data in the southern Appalachian Mountains. The station is one-half mile below Beaver Creek, which is a small stream.

Discharge measurements are made from the footbridge, where the current is partly sluggish and the bed is sandy and probably shifting, making rather poor conditions for measurements.

The station was discontinued July 1, 1908.[a]

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Discharge measurements of North Toe River at Spruce Pine, N. C., 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 19	Warren E. Hall	85	211	0.98	248
June 20	do	85	220	.98	248
August 6	do	82	186	.79	154
Do	B. M. Hall, jr.	82	186	.79	151
September 4	do	82	181	.81	168

Daily gage height, in feet, of North Toe River at Spruce Pine, N. C., for 1907 and 1908.

[Observer, P. A. Rose.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							1.1	1.0	0.8	0.8	0.8	0.8
2							1.1	1.0	.8	.8	.9	.8
3							1.1	1.0	.8	.8	.8	.8
4							1.0	1.0	.8	.8	.8	.8
5							1.0	.9	.8	1.1	.7	.8
6							1.0	.9	.8	.8	.7	.8
7							1.0	.8	.8	.8	.7	.8
8							1.0	.8	.8	.8	.7	.8
9							1.0	.8	.8	.8	.7	1.4
10							1.0	.9	.8	.8	.7	1.2
11							1.0	.9	1.8	.8	.7	1.0
12							1.0	1.0	1.0	.8	.7	1.1
13							1.1	.8	.9	.8	.7	1.1
14							1.2	.8	.9	.8	.7	1.5
15							1.1	.8	.8	.8	.7	1.4
16							1.1	.8	.8	.8	.7	1.2
17							1.1	1.1	.7	.8	.8	.9
18							1.1	.8	.7	.8	.8	.9
19						1.0	1.0	.8	.7	.7	.8	.9
20						1.0	1.0	.8	.7	.7	.8	.9
21						1.1	1.1	.8	.7	.7	1.0	.9
22						1.0	1.1	.8	.7	.7	1.0	1.0
23						1.1	.9	.8	5.8	.7	1.0	1.8
24						1.2	1.0	.8	2.1	.7	1.0	1.4
25						1.0	1.0	.8	1.1	.7	1.0	1.2
26						1.1	.9	.8	1.0	.7	.9	1.0
27						1.1	.9	.8	1.0	.8	.8	1.0
28						1.3	1.0	.8	1.0	.8	.8	1.0
29						1.2	1.0	.8	1.0	.8	.8	1.0
30						1.1	1.0	.8	1.0	.8	.8	1.5
31							1.0	.8		.8		1.3

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1		1.2	1.3	1.2	1.2	1.0	16	1.4	1.9	1.2	1.6	1.0	1.2
2		1.6	1.4	1.3	1.2	1.0	17	1.2	1.6	1.2	1.3	1.1	1.0
3		1.6	1.4	1.2	1.2	1.0	18	1.0	1.5	1.2	1.3	1.0	1.0
4		1.6	1.4	1.2	1.1	1.1	19	1.2	1.3	1.2	1.3	1.4	1.0
5	1.0	1.6	1.3	1.2	1.1	1.1	20	1.1	1.2	1.2	1.1	1.1	1.0
6	1.0	1.6	1.5	1.1	1.1	1.1	21	1.0	1.2	1.3	1.1	1.2	1.1
7	1.0	1.6	1.5	1.1	1.4	1.1	22	1.0	1.3	1.3	1.05	1.1	1.0
8	1.0	1.6	1.5	1.1	1.2	1.1	23	1.1	1.2	1.4	1.05	1.1	1.3
9	1.0	1.8	1.4	1.1	1.2	1.0	24	1.1	1.2	1.6	1.0	1.1	1.0
10	1.0	2.5	1.3	1.1	1.1	1.1	25	1.2	1.2	1.3	1.7	1.1	1.1
11	1.2	2.8	1.2	1.1	1.1	1.0	26	1.2	1.2	1.3	1.6	1.1	1.0
12	3.0	1.8	1.5	1.1	1.1	1.0	27	1.3	1.1	1.2	1.4	1.1	1.0
13	1.6	1.8	1.3	1.0	1.05	1.0	28	1.2	1.1	1.2	1.4	1.1	1.0
14	1.0	1.8	1.4	1.0	1.0	1.0	29	1.2	1.1	1.2	1.3	1.1	.9
15	1.0		1.3	1.1	1.0	1.5	30	1.1		1.2	1.2	1.3	.9
							31	1.1				1.1	

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Daily discharge, in second-feet, of North Toe River at Spruce Pine, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec
1907.												
1							320	260	160	160	160	160
2							320	260	160	160	205	160
3							320	260	160	160	160	160
4							260	260	160	160	160	160
5							260	205	160	320	120	160
6							260	205	160	160	120	160
7							260	160	160	160	120	160
8							260	160	160	160	120	160
9							260	160	160	160	120	.....
10							260	205	160	160	120	.....
11							260	205	.....	160	120	260
12							260	260	260	160	120	320
13							320	160	205	160	120	320
14							.....	160	205	160	120	.....
15							320	160	160	160	120	.....
16							320	160	160	160	120	.....
17							320	320	120	160	160	205
18							320	160	120	160	160	205
19						260	260	160	120	120	160	205
20						260	260	160	120	120	160	205
21						320	320	160	120	120	260	205
22						260	320	160	120	120	260	260
23						320	205	160	.....	120	260	.....
24						.....	260	160	.....	120	260	.....
25						260	260	160	320	120	260	.....
26						320	205	160	260	120	205	260
27						320	205	160	260	160	160	260
28						.....	260	160	260	160	160	260
29						.....	260	160	260	160	160	260
30						320	260	160	260	160	160	.....
31						.....	260	160	.....	160	.....	.....

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	.....	.....	.....	.....	.....	260	16	.....	.....	.....	.....	260	.....
2	.....	.....	.....	.....	.....	260	17	.....	.....	.....	.....	320	260
3	.....	.....	.....	.....	.....	260	18	260	.....	.....	.....	260	260
4	.....	.....	.....	.....	320	320	19	.....	.....	.....	.....	.....	260
5	260	.....	.....	.....	320	320	20	320	.....	.....	320	320	260
6	260	.....	.....	320	320	320	21	260	.....	.....	320	.....	320
7	260	.....	.....	320	.....	320	22	260	.....	.....	290	320	260
8	260	.....	.....	320	.....	320	23	320	.....	.....	290	320	.....
9	260	.....	.....	320	.....	260	24	320	.....	.....	260	320	260
10	260	.....	.....	320	320	320	25	.....	.....	.....	.....	320	320
11	.....	.....	.....	320	320	260	26	.....	.....	.....	.....	320	260
12	.....	.....	.....	320	320	260	27	.....	320	.....	.....	320	260
13	.....	.....	.....	260	290	260	28	.....	320	.....	.....	320	260
14	260	.....	.....	260	260	260	29	.....	320	.....	.....	320	205
15	260	.....	.....	320	260	.....	30	320	.....	.....	.....	.....	205
							31	320	.....	.....	.....	320	.....

NOTE.—Daily discharges 1907–8 based on a fairly well defined rating curve. On missing days June 19, 1907, to June 30, 1908, the discharge was greater than 350 second-feet except on days when the gage was not read.

HOLSTON RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The areas drained by Holston River comprise the basins of the North, South, and Middle forks of that stream, the Watauga, and the Nolichucky, including parts of southwestern Virginia, eastern Tennessee, and western North Carolina. The river is one of the largest of the streams which help form the great Tennessee River. It rises along the western slopes of the Blue Ridge, in Smyth and

Bland counties, Va., in three forks, known as the North, Middle, and South forks.

The physical conditions of the drainage basin vary greatly, the character of the country ranging from the gently rolling plain of the South and Middle Forks, with its smooth, rounded, and grass-covered hills, to the grandest and mightiest mountain masses to be found east of the Rocky Mountains, such as the Unakas and the Black Mountains, with their numerous peaks rising more than 6,000 feet above sea level, and with steep and rocky slopes still clad in virgin forest. There are wide variations in the soil and in the general geologic conditions and structure, considerable variation in temperature and rainfall, and still wider variations in the character of the streams of the area, which include the brawling mountain torrents fed by perpetual springs, the puny wet-weather streams of the slate country, and the subterranean streams of the limestone regions.

One of the distinguishing characteristics of the whole basin drained by Holston River is the occurrence of small closed basins or sinks, which are found in great numbers on the low divides between the various tributary watersheds. They are so numerous, in fact, that in many localities it seems impossible that any of the rainfall over areas of a square mile or more can find its way into the streams. Certainly there are no channels visible, and in many places water was seen standing in pools from 50 to 100 feet in diameter, indicating that there is no subterranean passage through which the water finds its way to the streams. Other sinks are dry except after heavy rains. In some places the farmers have rendered the bottoms of these natural basins impervious, and the collected water is used for cattle.

Springs are numerous over all the basin, ranging in size from a discharge of several cubic feet per second to less than a gallon per minute. Many of the smaller streams seem to be fed entirely from this source. In this connection may be noted the fact that a number of streams which at some point in their course sink below the surface of the ground, after flowing there for distances varying from a few yards to half a mile or more reappear on the surface. Some streams were noted which, while discharging no water into the main stream, carried a considerable quantity a short distance above their mouths, the water sinking gradually into the earth as the river was approached. It is said that the Middle Fork loses a quantity of its water in this way, and from the character of the country rock, this seems by no means improbable.

Little definite information can be given regarding the annual rainfall in this basin, but it is well known that throughout the region there is no lack of moisture, showers frequently falling on the mountains when there is not a cloud over the valley. The rainfall in the valley to the west is between 40 and 45 inches per annum, and that on the mountains is certainly greater.

SOUTH FORK OF HOLSTON RIVER NEAR CHILHOWIE, VA.

The South Fork of Holston River rises on the western slopes of the Blue Ridge, in Smyth County, Va., between the slopes of the Brushy Mountains on the north and the Iron Mountains on the south. It is formed by the junction, in a broad stretch of valley land, of Slemp and Cressy creeks, and flowing in a general southwesterly direction is joined by the Middle Fork about 6 miles southeast of Abingdon, Va. The stream below this junction and until the junction with the North Fork is still known as the South Fork. Below the latter junction it is known as Holston River.

The headwaters of the South Fork are at an altitude of about 2,900 feet, the elevation at the junction being about 1,800 feet. The altitude at the junction of Slemp and Cressy creeks is about 2,575 feet. The distance between the latter junction and the junction with the Middle Fork is about 29 miles in a straight line, and the average slope of the country about 27 feet to the mile. Following the course of the river, however, this distance is about 36 miles, and the average fall between 21 and 22 feet to the mile.

Although the basin is, broadly speaking, a plateau, it is not to be inferred that it has not some very sharply marked mountain ridges. The axes of these ridges extend in a northeast-southwest direction, approximately parallel to the course of the principal streams, and the buttressing spurs of the Iron and Stone mountains serrate the southern edge with a series of high and jagged ridges. Away from these, however, the country is composed of a series of low, broad swells and wide, flat valleys, all of the slopes being gentle and covered with grass not unlike the famous blue grass of Kentucky.

The gaging station, which is located 4½ miles south of Chilhowie, was established June 10, 1907, to obtain data for use in determining the water resources and power possibilities of the southern Appalachian Mountains, also for supplying run-off data on the upper Holston drainage where no stream gaging work had previously been done.

Discharge measurements are made from a suspension foot bridge where the current is good ordinarily but rather sluggish at low stage.

Discharge measurements of South Fork of Holston River near Chilhowie, Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 10	Warren E. Hall	80	272	1.40	385
August 13	B. M. Hall, jr	79	206	.68	97
September 9	do	80	195	.57	68
1908.					
February 21	Warren E. Hall	85	236	1.07	187
July 7	F. P. Thomas	80	236	1.08	199
Do	do	80	237	1.05	198
Do	Warren E. Hall	80	237	1.08	187

Daily gage height, in feet, of South Fork of Holston River near Chilhowie, Va., for 1907 and 1908.

[Observer, P. Cole.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							0.8	0.9	0.6	0.8	0.6	0.8
2							.7	.8	.6	.7	.5	.9
3							.9	.8	.6	.7	.8	.8
4							.7	.7	.6	.7	.8	.8
5							.7	.7	.6	.9	.7	.7
6							.7	.7	.6	.8	.7	.7
7							.7	.7	.6	.8	.7	.7
8							.6	.7	.6	.7	.6	.6
9							.6	.6	.5	.7	.6	.7
10						1.4	.8	.8	.5	.7	.9	.8
11						4.4	.8	.7	.6	.7	1.3	.9
12						2.6	.7	.7	.6	.6	1.1	.9
13						3.0	1.4	.7	.6	.6	1.0	.9
14						4.1	1.1	.6	.5	.6	.9	1.0
15						2.6	.9	.6	.5	.6	.8	1.3
16						1.9	1.0	.6	.5	.6	.8	1.3
17						1.6	.9	.8	.5	.6	.7	1.2
18						1.4	.8	.8	.7	.6	.8	1.1
19						1.3	1.0	.7	.7	.6	.9	1.0
20						1 2	.9	.7	.7	.5	1.0	.9
21						1.1	.8	.6	.6	.5	1.0	.9
22						1.1	.7	.6	.8	.5	1.0	.8
23						1.0	.8	.6	2.3	.5	1.0	1.0
24						1.0	.7	.8	2.1	.5	1.4	1.5
25						1.0	.7	.7	1.5	.5	1.5	1.3
26						.9	.7	.7	1.2	.5	1.3	1.1
27						.9	.7	.6	1.0	.5	1.1	1.0
28						.8	.6	.6	.9	.6	1.0	1.0
29						.9	.6	.6	.9	.6	1.0	.9
30						.8	1.3	.6	.8	.5	.9	1.2
31							1.0	.9		.5		1.6
1908.												
1	1.4	0.9	1.1	1.3	0.9	.8	1.2	.6	.6	.4	1.1	.9
2	1.2	.9	1.6	2.5	.9	.8	.9	.5	.6	.4	1.0	1.2
3	1.1	.8	1.5	2.6	.9	.8	.8	.5	.6	.4	.9	1.1
4	1.0	.8	1.4	1.9	.8	1.2	.8	.6	.6	.4	.8	1.0
5	1.3	.9	1.3	1.6	.8	1.9	1.2	.5	.5	.4	.8	.9
6	1.3	1.0	2.1	1.4	.8	1.4	1.2	.6	.6	.4	.7	.9
7	1.2	1.0	1.8	1.3	1.1	1.1	1.1	.6	.6	.4	.7	1.4
8	1.1	.9	1.5	1.2	1.5	1.0	1.0	.6	.5	.4	.7	2.1
9	1.0	.9	1.3	1.1	1.3	.9	1.0	.8	.6	.4	.6	1.5
10	1.0	.9	1.2	1.0	1.2	.9	.9	.7	.5	.6	.6	1.3
11	.9	.9	1.1	1.0	1.1	.8	.8	.6	.5	.6	.7	1.1
12	4.0	1.1	1.2	1.0	1.0	.8	.8	.6	.5	.5	.8	1.3
13	2.4	1.8	1.1	.9	1.0	.8	.7	.6	.5	.5	.8	1.3
14	1.8	2.2	1.1	.9	.9	.7	1.0	.6	.5	.4	.8	1.2
15	1.6	2.5	1.1	.9	.9	1.1	.8	.5	.5	.4	.8	1.1
16	1.4	2.1	1.1	.9	.8	.9	.8	.5	.5	.4	.7	1.0
17	1.3	1.7	1.0	.9	.8	.8	.7	.5	.4	.4	.7	1.0
18	1.2	1.4	1.0	.8	.8	.8	.7	.5	.4	.4	.8	.9
19	1.1	1.3	1.0	.8	.8	.7	.8	.6	.4	.4	.9	9
20	1.1	1.2	1.0	.8	.9	.7	.7	.6	.4	.4	.9	.9
21	1.0	1.1	1.1	.8	.8	.7	.6	.5	.5	.4	.9	.9
22	1.0	1.1	1.2	.8	.8	.7	.9	.6	.4	.4	.8	1.0
23	1.1	1.0	1.3	.8	.8	1.2	.7	.8	.4	.4	.8	1.1
24	1.0	1.0	1.4	.7	.8	1.0	.7	.7	.4	.8	.7	1.0
25	1.0	.9	1.4	.9	.9	.9	.6	.6	.4	.7	.7	1.1
26	1.0	1.0	1.3	1.4	.8	.8	.6	.9	.4	.6	.7	1.6
27	1.1	1.0	1.2	1.2	1.0	.7	.7	.9	.4	.6	.7	1.4
28	1.0	.9	1.1	1.1	1.0	.7	.6	.8	.4	.6	.6	1.3
29	1.0	.9	1.0	1.0	.9	.7	.6	.7	.4	.9	.6	1.3
30	.9		1.0	.9	1.1	.7	.7	.7	.4	1.4	.7	1.6
31	.9		.9		.9		.6	.7		1.5		1.8

Daily discharge, in second-feet, of South Fork of Holston River near Chilhowie, Va., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1.	.....	.....	.....	.....	.....	.....	119	145	79	119	79	119
2.	.....	.....	.....	.....	.....	.....	97	119	79	97	65	145
3.	.....	.....	.....	.....	.....	.....	145	119	79	97	119	119
4.	.....	.....	.....	.....	.....	.....	97	97	79	97	119	119
5.	.....	.....	.....	.....	.....	.....	97	97	79	145	97	97
6.	.....	.....	.....	.....	.....	.....	97	97	79	119	97	97
7.	.....	.....	.....	.....	.....	.....	97	97	79	119	97	97
8.	.....	.....	.....	.....	.....	.....	79	97	79	97	79	79
9.	.....	.....	.....	.....	.....	.....	79	79	65	97	79	97
10.	.....	.....	.....	.....	.....	360	119	119	65	97	145	119
11.	.....	.....	.....	.....	.....	.....	119	97	79	97	300	145
12.	.....	.....	.....	.....	.....	.....	97	97	79	79	210	145
13.	.....	.....	.....	.....	.....	.....	360	97	79	79	175	145
14.	.....	.....	.....	.....	.....	.....	210	79	65	79	145	175
15.	.....	.....	.....	.....	.....	.....	145	79	65	79	119	300
16.	.....	.....	.....	.....	.....	760	175	79	65	79	119	300
17.	.....	.....	.....	.....	.....	505	145	119	65	79	97	250
18.	.....	.....	.....	.....	.....	360	119	119	97	79	119	210
19.	.....	.....	.....	.....	.....	300	175	97	97	79	145	175
20.	.....	.....	.....	.....	.....	250	145	97	97	65	175	145
21.	.....	.....	.....	.....	.....	210	119	79	79	65	175	145
22.	.....	.....	.....	.....	.....	210	97	79	119	65	175	119
23.	.....	.....	.....	.....	.....	175	119	79	.....	65	175	175
24.	.....	.....	.....	.....	.....	175	97	119	.....	65	360	430
25.	.....	.....	.....	.....	.....	175	97	97	430	65	430	300
26.	.....	.....	.....	.....	.....	145	97	97	250	65	300	210
27.	.....	.....	.....	.....	.....	145	97	79	175	65	210	175
28.	.....	.....	.....	.....	.....	119	79	79	145	79	175	175
29.	.....	.....	.....	.....	.....	145	79	79	145	79	175	145
30.	.....	.....	.....	.....	.....	119	300	79	119	65	145	250
31.	.....	.....	.....	.....	.....	.....	175	145	.....	65	.....	505
1908.												
1.	360	145	210	300	145	119	250	79	79	55	210	145
2.	250	145	505	.....	145	119	145	65	79	55	175	250
3.	210	119	430	.....	145	119	119	65	79	55	145	210
4.	175	119	360	760	119	250	119	79	79	55	119	175
5.	300	145	300	505	119	760	250	65	65	55	119	145
6.	300	175	.....	360	119	360	250	79	79	55	97	145
7.	250	175	670	300	210	210	210	79	79	55	97	360
8.	210	145	430	250	430	175	175	79	65	55	97	.....
9.	175	145	300	210	300	145	175	119	79	55	79	430
10.	175	145	250	175	250	145	145	97	65	79	79	300
11.	145	145	210	175	210	119	119	79	65	79	97	210
12.	.....	210	250	175	175	119	119	79	65	65	119	300
13.	.....	670	210	145	175	119	97	79	65	65	119	300
14.	670	.....	210	145	145	97	175	79	65	55	119	250
15.	505	.....	210	145	145	210	119	65	65	55	119	210
16.	360	.....	210	145	119	145	119	65	65	55	97	175
17.	300	585	175	145	119	119	97	65	55	55	97	175
18.	250	360	175	119	119	119	97	65	55	55	119	145
19.	210	300	175	119	119	97	119	79	55	55	145	145
20.	210	250	175	119	145	97	97	79	55	55	145	145
21.	175	210	210	119	119	97	79	65	65	55	145	145
22.	175	210	250	119	119	97	145	79	55	55	119	175
23.	210	175	300	119	119	250	97	119	55	55	119	210
24.	175	175	360	97	119	175	97	97	55	119	97	175
25.	175	145	360	145	145	145	79	79	55	97	97	210
26.	175	175	300	360	119	119	79	145	55	79	97	505
27.	210	175	250	250	175	97	97	145	55	79	97	360
28.	175	145	210	210	175	97	79	119	55	79	79	300
29.	175	145	175	175	145	97	79	97	55	145	79	300
30.	145	.....	175	145	210	97	97	97	55	360	97	505
31.	145	.....	145	.....	145	.....	79	97	.....	430	.....	670

NOTE.—Daily discharges for 1907 and 1908 based on a fairly well defined rating between gage heights 0.5 foot and 1.5 feet. On missing days, beginning June 10, 1907, the discharge was greater than 900 second-feet.

SOUTH FORK OF HOLSTON RIVER AT BLUFF CITY, TENN.

This station is located at the highway bridge at Bluff City, Tenn., about 300 feet below the bridge of the Virginia and Southwestern Railroad. It is about 10 miles above the mouth of Watauga River and 1 mile below Indian Creek. It was originally established by the United States Weather Bureau. The United States Geological Survey maintained gage heights from July 17, 1900, to December 31, 1904, but since that time these records have been furnished by the United States Weather Bureau.

The station is maintained for the purpose of obtaining run-off data for the Holston River drainage basin, and its record is the longest and best one available.

The bed is rocky and very rough, and ledges above and below the bridge cause eddies and sudden variations in the velocity, making discharge measurements difficult. The rating curve, however, is fairly good and constant.

The datum of the gage has not been changed.

Discharge measurements of South Fork of Holston River at Bluff City, Tenn., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 12	Warren E. Hall	232	549	1.40	927
1908.					
February 25	Warren E. Hall	241	623	1.80	1,280
July 8	do	241	642	1.83	1,330
Do	F. P. Thomas	241	653	1.83	1,420

Daily gage height, in feet, of South Fork of Holston River at Bluff City, Tenn., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.3	1.3	3.0	2.0	1.6	1.3	1.7	1.7	1.0	1.6	1.0	1.8
2	3.0	1.4	3.4	1.9	1.7	2.3	1.5	1.6	1.0	1.5	1.0	1.7
3	2.8	1.5	4.0	1.7	1.6	5.0	1.5	1.5	1.2	1.4	1.8	1.6
4	2.5	1.5	3.2	1.6	1.8	3.9	1.5	1.3	1.1	1.4	1.6	1.5
5	2.6	2.0	2.6	1.5	1.9	3.0	1.4	1.2	1.0	2.0	1.3	1.5
6	2.3	1.8	2.4	2.1	1.6	2.4	1.3	1.4	1.0	1.4	1.2	1.5
7	2.1	1.6	2.2	1.8	3.9	2.0	1.7	1.5	.9	1.5	1.2	1.3
8	2.0	1.6	2.3	2.7	3.4	2.2	1.3	1.5	1.5	1.5	1.2	1.2
9	2.0	1.6	2.5	3.4	2.9	3.7	1.2	1.4	1.3	1.5	1.1	1.2
10	1.9	1.5	2.6	3.4	2.4	3.2	1.2	2.5	1.0	1.4	2.3	1.8
11	1.7	1.5	3.5	2.9	2.2	3.0	2.7	2.0	1.8	1.3	3.9	3.5
12	1.7	1.5	3.5	2.5	2.1	5.9	2.7	1.5	2.0	1.3	2.9	2.7
13	1.6	1.4	3.0	2.5	1.9	3.9	5.4	1.4	1.4	1.3	2.6	2.3
14	1.6	1.4	2.7	2.4	1.8	11.7	4.0	1.8	1.0	1.3	2.0	2.0
15	1.5	1.4	3.4	2.2	1.8	5.9	3.0	1.4	1.0	1.2	1.8	2.6
16	1.5	1.3	3.2	2.1	1.7	3.9	3.2	1.3	1.0	1.0	1.7	2.9
17	1.5	1.2	2.8	2.2	1.7	3.7	2.8	1.4	.9	1.0	1.5	2.7
18	1.5	1.2	2.6	2.3	1.5	2.9	2.4	2.4	.9	1.0	1.7	2.4
19	2.0	1.0	2.0	2.3	1.4	2.7	2.4	2.0	.9	1.0	1.9	2.4
20	2.8	1.0	2.2	2.4	1.4	2.4	2.2	1.5	1.0	1.0	2.0	2.0

Daily gage height, in feet, of South Fork of Holston River at Bluff City, Tenn., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	2.6	1.1	2.1	2.3	1.3	2.2	3.0	1.4	0.9	1.0	1.9	1.9
22	2.2	1.1	1.8	2.2	1.2	2.1	2.8	1.3	1.5	1.0	2.0	1.9
23	2.0	1.0	1.8	2.2	1.1	2.0	1.7	1.3	4.5	1.0	1.8	1.6
24	1.9	1.0	1.7	2.4	1.1	2.7	1.6	1.4	6.2	1.0	3.6	2.3
25	1.8	2.5	1.7	2.4	1.0	2.0	1.5	1.8	3.5	1.0	3.8	2.2
26	1.7	2.4	1.6	2.3	1.0	1.8	1.5	1.5	2.7	.9	3.1	2.1
27	1.6	2.5	1.5	2.2	1.0	1.7	2.1	1.3	2.2	.9	2.6	1.8
28	1.4	2.7	1.4	1.9	1.0	1.7	1.5	1.2	1.9	1.1	2.2	1.7
29	1.4	.....	1.4	1.9	1.0	1.7	1.4	1.2	2.0	1.3	2.0	1.9
30	1.4	.....	1.4	1.8	1.0	2.1	2.8	1.1	2.0	1.0	2.0	2.7
31	1.3	.....	1.4	.....	1.0	.....	2.0	1.0	.....	1.0	.....	4.8
1908.												
1	3.6	2.0	3.0	2.6	2.0	1.5	1.5	.8	.6	.3	1.9	1.9
2	2.9	1.9	3.4	7.0	1.8	1.4	1.5	.7	.5	.3	1.5	2.9
3	2.5	1.8	3.4	6.8	1.8	1.3	1.4	.5	.4	.2	1.3	2.3
4	2.1	1.9	3.1	4.5	1.8	1.9	1.3	.6	.4	.2	1.1	1.9
5	3.9	1.8	2.8	3.5	1.7	3.3	1.5	.5	.4	.2	1.0	1.7
6	3.4	2.0	5.1	3.1	1.8	2.7	1.9	.6	1.5	.2	.9	1.6
7	2.9	2.7	4.3	2.8	4.1	2.0	2.1	.6	1.4	.2	.8	2.9
8	2.7	2.3	3.4	2.6	4.5	1.7	1.9	.5	.9	.2	.8	5.9
9	2.6	2.0	3.0	2.3	3.4	1.6	1.8	1.3	.6	.2	.7	3.5
10	2.2	1.9	2.8	2.3	2.8	1.5	1.6	1.4	.5	.6	.7	2.6
11	2.1	2.2	2.4	2.1	2.5	1.5	1.4	1.1	.4	.9	.7	2.2
12	8.9	2.3	3.0	2.1	2.4	1.4	1.2	.8	.4	.8	1.5	2.5
13	6.8	2.0	3.0	2.0	2.1	1.2	1.1	.7	.4	.6	1.3	3.0
14	4.4	4.4	2.8	1.8	1.9	1.0	1.1	.5	.4	.4	1.2	2.5
15	3.6	4.7	2.6	1.8	1.8	2.4	1.3	.5	.3	.4	1.2	2.1
16	3.1	4.9	2.6	2.0	1.7	2.2	1.3	.5	.4	.3	1.1	1.9
17	2.9	3.7	2.4	2.0	1.6	1.7	1.0	.5	.4	.3	1.0	1.8
18	2.7	3.0	2.4	1.9	1.7	1.5	.9	.5	.4	.3	1.1	1.7
19	2.6	2.7	2.6	1.8	1.8	1.4	1.0	.6	.3	.2	1.2	1.7
20	2.4	2.5	2.9	1.8	2.2	1.2	1.0	.8	.3	.2	1.1	1.7
21	2.3	2.2	3.5	1.7	2.2	1.2	.9	.5	.2	.2	1.1	1.6
22	2.1	2.1	3.4	1.6	2.0	1.2	.8	.6	.2	.2	1.3	1.9
23	2.3	2.0	3.3	1.6	1.9	2.4	1.1	.7	.3	.2	1.2	3.9
24	2.3	1.9	3.9	1.5	1.8	2.4	.9	1.0	.2	.5	1.1	3.0
25	2.1	1.9	3.7	1.8	1.7	2.4	.9	.7	.2	1.0	1.0	2.7
26	2.1	1.8	3.2	4.0	1.6	1.8	.7	.9	.3	.8	.9	3.4
27	2.2	1.9	2.7	3.1	1.5	1.4	.7	1.2	.2	.7	.8	3.0
28	2.3	1.9	2.6	2.6	1.5	1.2	1.4	1.0	.2	.6	.8	2.8
29	2.1	1.8	2.2	2.2	1.8	1.1	1.2	.8	.3	1.0	.8	2.9
30	2.1	.....	2.0	1.9	2.4	1.1	1.0	.6	.4	2.3	1.0	3.1
31	1.9	.....	2.0	.....	1.9	.....	1.0	.6	.....	2.3	.....	3.4

Rating table for South Fork of Holston River at Bluff City, Tenn., for 1900 to 1908.

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	245	1.70	1,190	3.20	2,900	5.40	6,580
.30	285	1.80	1,280	3.30	3,040	5.60	6,990
.40	325	1.90	1,380	3.40	3,180	5.80	7,410
.50	370	2.00	1,480	3.50	3,320	6.00	7,830
.60	420	2.10	1,580	3.60	3,460	6.20	8,270
.70	475	2.20	1,680	3.70	3,610	6.40	8,720
.80	530	2.30	1,790	3.80	3,760	6.60	9,180
.90	590	2.40	1,900	3.90	3,910	6.80	9,640
1.00	650	2.50	2,010	4.00	4,060	7.00	10,100
1.10	715	2.60	2,130	4.20	4,390	8.00	12,500
1.20	785	2.70	2,250	4.40	4,730	9.00	14,900
1.30	860	2.80	2,370	4.60	5,080	10.00	17,300
1.40	940	2.90	2,500	4.80	5,440	11.00	19,700
1.50	1,020	3.00	2,630	5.00	5,800	12.00	22,100
1.60	1,105	3.10	2,760	5.20	6,180		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on discharge measurements made during 1900 to 1908, and is fairly well defined below gage height 3.5 feet. Above gage height 7.0 feet the rating curve is a tangent, the difference being 240 per tenth.

Monthly discharge of South Fork of Holston River at Bluff City, Tenn., for 1907 and 1908.

[Drainage area, 828 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	3,040	860	1,490	1.80	2.08	B.
February	2,250	650	1,090	1.32	1.38	B.
March	4,060	940	2,000	2.42	2.79	B.
April	3,180	1,020	1,760	2.13	2.38	B.
May	3,910	650	1,250	1.51	1.74	B.
June	21,400	860	3,290	3.97	4.43	B.
July	6,580	785	1,770	2.14	2.47	B.
August	2,010	650	1,050	1.27	1.46	B.
September	8,270	590	1,390	1.68	1.87	B.
October	1,480	590	813	.982	1.13	C.
November	3,910	650	1,600	1.93	2.15	B.
December	5,440	785	1,670	2.02	2.33	B.
The year	21,400	590	1,600	1.93	26.21	
1908.						
January	14,700	1,380	2,870	3.47	4.00	B.
February	5,620	1,280	2,040	2.46	2.65	B.
March	5,990	1,480	2,710	3.27	3.77	B.
April	10,100	1,020	2,420	2.92	3.26	B.
May	4,900	1,020	1,670	2.02	2.33	B.
June	3,040	650	1,230	1.49	1.66	B.
July	1,580	475	838	1.01	1.16	C.
August	940	370	499	.603	.70	C.
September	1,020	245	363	.438	.49	C.
October	1,790	245	440	.531	.61	C.
November	1,380	475	710	.857	.96	C.
December	7,620	1,100	2,220	2.68	3.09	B.
The year	14,700	245	1,500	1.81	24.68	

HOLSTON RIVER NEAR ROGERSVILLE, TENN.

This station is located at the Southern Railway bridge 1 mile north of Austins Mills and 3 miles south of Rogersville, Tenn. It was established by the United States Weather Bureau March 10, 1902, and all gage heights have been furnished by the Weather Bureau. The data from this station are useful in connection with general run-off and navigation problems.

The section of river is good for measurements, but the high-decked railroad bridge is dangerous to work from.

Daily gage height, in feet, of Holston River near Rogersville, Tenn., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.0	2.2	4.0	2.8	2.8	2.2	2.7	2.6	1.9	2.4	1.7	2.8
2	4.7	2.6	5.5	3.0	2.7	2.7	2.5	2.4	1.8	2.4	1.7	2.7
3	4.0	2.7	6.0	2.8	2.7	5.6	2.4	2.0	1.9	2.3	2.6	2.6
4	3.7	2.8	5.1	2.6	3.2	5.9	2.4	2.0	2.0	2.3	2.6	2.5
5	3.5	3.3	4.3	2.6	3.2	4.6	2.3	2.0	2.0	2.4	2.4	2.4
6	3.4	3.6	3.8	3.8	3.2	3.9	2.2	2.0	2.4	2.9	2.3	2.3
7	3.3	3.2	3.5	4.4	4.2	3.3	2.2	2.0	2.0	2.7	2.2	2.3
8	3.2	3.0	3.6	4.7	5.4	4.0	2.3	2.7	2.6	2.4	2.2	2.2
9	3.0	2.9	3.7	4.3	4.4	5.0	2.2	2.6	2.8	2.4	2.1	2.2
10	2.9	2.8	4.0	5.0	3.8	5.2	2.0	3.2	2.4	2.5	3.4	2.4
11	2.8	2.7	4.4	4.4	3.4	4.7	2.4	2.8	2.7	2.2	5.3	3.4
12	2.7	2.7	5.1	3.9	3.4	8.4	2.8	2.4	2.7	2.1	4.8	4.0
13	2.6	2.6	4.6	3.7	3.0	5.6	4.2	1.9	2.8	2.1	3.8	3.3
14	2.5	2.5	4.0	3.6	2.9	10.7	4.4	2.2	2.4	2.0	3.3	3.1
15	2.5	2.5	4.4	3.5	2.8	14.0	4.3	2.2	2.2	1.9	2.8	3.1

Daily gage height, in feet, of Holston River near Rogersville, Tenn., for 1907 and 1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
16	2.4	2.4	4.6	3.2	2.7	6.0	3.4	2.1	2.0	1.9	2.7	3.4
17	2.4	2.4	4.2	3.2	2.6	4.7	3.4	2.0	2.0	1.9	2.6	3.4
18	2.6	2.3	3.9	3.4	2.5	4.0	3.2	2.5	1.9	1.8	2.6	3.2
19	2.8	2.3	3.8	3.4	2.4	3.6	3.0	3.3	1.8	1.8	2.9	3.0
20	4.0	2.3	3.4	3.4	2.4	3.3	3.0	2.8	1.8	1.8	3.0	2.8
21	3.8	2.2	3.1	3.4	2.3	3.2	2.7	2.5	1.8	1.7	3.0	2.7
22	3.4	2.3	3.1	3.3	2.2	3.0	2.5	2.3	2.7	1.7	2.9	2.6
23	3.2	2.2	3.0	3.3	2.2	2.9	2.4	2.1	4.5	1.7	2.9	2.7
24	3.0	2.2	2.9	4.0	2.2	2.9	2.3	2.4	9.0	1.7	4.6	3.4
25	2.8	3.3	2.7	3.8	2.2	3.3	2.3	2.7	5.2	1.7	5.3	3.6
26	2.8	3.6	2.7	3.5	2.2	2.9	2.4	2.8	3.8	1.6	4.6	3.3
27	2.7	3.8	2.6	3.4	2.3	2.9	2.4	2.4	3.2	1.6	3.9	3.1
28	2.6	3.8	2.6	3.3	2.3	2.6	3.0	2.3	2.8	1.8	3.4	2.8
29	2.5	.....	2.5	3.1	2.2	2.6	2.4	2.3	2.8	1.9	3.2	2.8
30	2.4	.....	2.5	2.9	2.1	2.6	2.9	2.2	2.7	2.0	2.9	4.5
31	2.3	.....	2.4	.....	2.1	.....	3.2	2.0	.....	1.8	.....	6.5
1908.												
1	5.3	3.1	3.3	3.6	3.2	3.3	2.3	2.4	2.0	1.5	3.4	3.0
2	4.3	3.4	4.5	6.4	3.1	2.9	2.5	2.3	1.9	1.5	2.9	3.7
3	3.8	3.2	5.0	12.7	2.9	2.7	2.8	2.0	1.9	1.5	2.6	3.6
4	3.4	2.8	4.6	7.1	2.9	2.7	2.5	1.9	1.9	1.5	2.2	3.0
5	4.2	2.8	4.3	5.3	2.8	4.0	3.0	1.8	1.8	1.4	2.2	2.8
6	5.0	3.2	5.7	4.6	2.8	4.8	3.2	1.9	2.1	1.4	2.1	2.6
7	4.3	3.5	6.6	4.3	3.4	3.7	3.4	2.0	2.5	1.4	2.0	3.9
8	4.0	3.7	5.2	3.9	4.9	3.2	3.3	2.0	2.5	1.4	2.0	7.3
9	3.8	3.3	4.5	3.8	4.8	2.9	4.3	2.1	2.1	1.4	1.9	5.6
10	3.3	3.2	4.0	3.6	4.0	2.8	3.3	2.4	2.0	1.6	1.8	4.2
11	3.2	3.5	3.8	3.3	3.7	2.8	2.9	2.4	1.9	2.3	1.8	3.6
12	4.3	3.5	4.3	3.3	3.5	2.7	2.6	2.1	1.9	2.1	2.3	3.7
13	11.5	4.0	4.8	3.2	3.3	2.6	2.4	2.0	1.8	1.8	2.6	4.0
14	6.6	5.7	4.5	3.0	3.1	2.5	2.3	1.9	1.8	1.7	2.3	4.0
15	5.1	6.8	4.3	2.9	3.0	2.7	2.4	1.9	1.8	1.6	2.3	3.6
16	4.3	8.8	4.0	3.2	2.8	3.8	2.4	1.8	1.7	1.5	2.3	3.2
17	4.2	6.0	3.9	3.3	2.7	3.3	2.4	1.8	1.7	1.5	2.2	3.0
18	4.0	4.8	3.7	3.3	2.8	2.9	2.2	1.8	1.7	1.4	2.1	2.8
19	3.8	4.0	4.1	3.2	2.8	2.7	2.4	1.7	1.6	1.4	2.1	2.7
20	3.6	3.9	4.0	3.2	3.6	2.6	2.3	2.0	1.5	1.4	2.1	2.7
21	3.4	3.7	4.8	3.1	3.7	2.4	2.2	2.0	1.5	1.4	2.3	2.6
22	3.3	3.3	4.8	2.9	4.0	2.5	2.1	2.9	1.5	1.4	2.2	3.3
23	3.2	3.3	4.8	2.7	3.5	2.4	2.6	2.1	1.5	1.5	2.1	5.8
24	3.3	3.2	5.2	2.6	3.3	3.8	2.2	2.1	1.5	1.5	2.0	4.7
25	3.2	3.0	5.5	2.8	3.0	3.4	2.1	2.2	1.5	3.6	2.0	4.0
26	3.2	3.0	5.0	6.5	2.9	3.4	2.0	2.3	1.4	2.6	1.9	3.9
27	3.2	3.3	4.3	5.5	2.9	3.0	2.0	3.4	1.4	2.3	1.9	4.6
28	3.5	3.1	4.0	4.3	2.8	2.7	1.9	2.8	1.4	2.0	1.8	4.2
29	3.3	2.9	3.7	3.7	2.8	2.5	2.7	2.4	1.6	2.5	1.8	4.0
30	3.2	.....	3.6	3.4	3.8	2.4	2.4	2.2	1.5	3.2	2.0	4.0
31	3.0	.....	3.5	.....	4.0	.....	3.2	2.1	.....	3.6	.....	4.2

Rating table for Holston River near Rogersville, Tenn., for 1906 to 1908.

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	1,140	2.90	4,410	4.40	9,120	6.60	17,800
1.50	1,320	3.00	4,670	4.50	9,490	6.80	18,600
1.60	1,510	3.10	4,940	4.60	9,860	7.00	19,400
1.70	1,700	3.20	5,220	4.70	10,240	7.20	20,200
1.80	1,900	3.30	5,510	4.80	10,620	7.40	21,000
1.90	2,100	3.40	5,800	4.90	11,010	7.60	21,800
2.00	2,310	3.50	6,100	5.00	11,400	7.80	22,600
2.10	2,520	3.60	6,410	5.20	12,200	8.00	23,400
2.20	2,740	3.70	6,720	5.40	13,000	9.00	27,400
2.30	2,960	3.80	7,040	5.60	13,800	10.00	31,400
2.40	3,190	3.90	7,370	5.80	14,600	11.00	35,400
2.50	3,420	4.00	7,710	6.00	15,400	12.00	39,400
2.60	3,660	4.10	8,050	6.20	16,200	13.00	43,400
2.70	3,900	4.20	8,400	6.40	17,000	14.00	47,400
2.80	4,150	4.30	8,760				

NOTE.—The above table is applicable only for open-channel conditions. It is based upon seven discharge measurements made during 1904 to 1906 and 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 near Rogersville, Tenn., for 1907 and 1908.

[Drainage area 3,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	11,400	2,960	5,040	1.65	1.90	A.
February	7,040	2,740	4,130	1.35	1.41	A.
March	15,400	3,190	7,140	2.33	2.69	A.
April	11,400	3,660	6,290	2.06	2.30	A.
May	13,000	2,520	4,440	1.45	1.67	A.
June	47,400	2,740	10,300	3.37	3.76	B.
July	9,120	2,310	4,200	1.37	1.58	A.
August	5,510	2,100	3,170	1.04	1.20	A.
September	27,400	1,900	4,500	1.47	1.64	A.
October	4,410	1,510	2,430	.794	.92	A.
November	12,600	1,700	5,320	1.74	1.94	A.
December	17,400	2,740	5,060	1.65	1.90	A.
The year	47,400	1,510	5,170	1.69	22.91	
1908.						
January	37,400	4,670	8,440	2.76	3.18	A.
February	26,600	4,150	7,610	2.49	2.68	A.
March	17,800	5,510	9,460	3.09	3.56	A.
April	42,200	3,660	8,750	2.86	3.19	B.
May	11,000	3,900	5,670	1.85	2.13	A.
June	10,600	3,190	4,790	1.57	1.75	A.
July	8,760	2,100	3,720	1.22	1.41	A.
August	5,800	1,700	2,670	.873	1.01	A.
September	3,420	1,140	1,850	.605	.68	A.
October	6,410	1,140	2,080	.680	.78	A.
November	5,800	1,900	2,710	.886	.99	A.
December	20,600	3,660	7,370	2.41	2.78	A.
The year	42,200	1,140	5,430	1.77	24.14	

NOTE.—The above estimates of accuracy are dependent upon permanency of conditions of flow since the last measurements were made in 1906.

MIDDLE FORK OF HOLSTON RIVER AT CHILHOWIE, VA.

The Middle Fork of Holston River rises a little to the south of the village of Old Mount Airy, Va., on the western slope of the Blue Ridge, in the valley between Walker Mountain on the north and the Brushy Mountains on the south, and flows in a direction generally parallel to the course of the South Fork until a few miles above the junction, where it turns to the southwest. Below the junction, the stream continues its general southwesterly course, and after being joined by the Watauga, it unites with the North Fork of Holston River, near the town of Kingsport, Tenn., forming Holston River. The area drained by the Middle Fork lies mostly to the north of the river, the distance from the summit of the ridge dividing its watershed from that of the South Fork to the stream being too small to permit of the formation of streams of considerable size. The country is similar in general character to the area drained by the South Fork below the junction, the topography consisting of small and rounded hills and ridges, grass-covered to the top, with very gentle slopes and with low divides between the small creek watersheds. The soil is seemingly very fertile and is light and porous, though some areas of clay were found. Limestone is the country rock, and the bed of the river is also in that stone.

The gaging station is located in Chilhowie at the new iron highway bridge. It was established June 8, 1907, to obtain data for use in connection with southern Appalachian water resources investigations, and for supplying general flow data in the upper Holston drainage.

Discharge measurments are made from the single-span bridge where the current is good and the channel conditions favor accurate work.

Discharge measurements of Middle Fork of Holston River at Chilhowie, Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 8	Warren E. Hall	135	487	4.47	1,780
August 12	B. M. Hall, jr	130	88	1.44	112
August 13	Warren E. Hall	130	90	1.50	140
Do	B. M. Hall, jr., and Warren E. Hall	130	90	1.50	141
September 9	B. M. Hall, jr	127	78	1.39	101
1908.					
February 20	Warren E. Hall	120	202	1.84	320
July 4	F. P. Thomas	117	146	1.43	130
July 7	do	117	150	1.40	146
Do	Warren E. Hall	117	150	1.40	144

Daily gage height, in feet, of Middle Fork of Holston River at Chilhowie, Va., for 1907 and 1908.

[Observer, W. G. Baylor.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							1.6	1.5	1.5	1.4	1.4	1.8
2							1.6	1.4	1.4	1.3	1.3	1.7
3							1.5	1.5	1.3	1.2	1.2	1.5
4							1.5	1.5	1.6	1.4	1.3	1.4
5							1.5	1.4	1.4	1.5	1.5	1.6
6							1.6	1.5	1.4	1.4	1.4	1.5
7							1.6	1.3	1.6	1.6	1.5	1.6
8							1.5	1.4	1.4	1.7	1.6	1.8
9							1.5	1.5	1.5	1.4	1.7	1.7
10						2.2	3.05	1.6	1.4	1.3	2.4	1.6
11						10.2	1.8	1.6	1.3	1.4	2.6	1.8
12						3.8	3.6	1.7	1.6	1.5	1.9	1.5
13							2.6	1.5	1.4	1.3	1.8	1.6
14						7.5	1.9	1.6	1.6	1.3	1.6	1.4
15						4.3	1.8	1.5	1.4	1.4	1.7	1.5
16						2.9	2.2	1.7	1.6	1.5	1.4	1.6
17						2.5	1.9	1.6	1.5	1.3	1.5	1.8
18						2.1	1.9	1.7	1.5	1.4	1.6	1.7
19						2.0	1.8	1.8	1.3	1.3	1.8	1.6
20						1.9	2.0	1.7	1.3	1.2	1.6	1.5
21						1.9	1.7	1.5	1.5	1.3	1.4	1.4
22						1.9	1.7	1.6	1.6	1.4	1.3	1.3
23						1.9	1.6	1.5	.....	1.3	1.5	1.4
24						1.9	1.6	1.6	2.4	1.3	1.7	1.5
25						1.9	1.5	1.5	1.8	1.4	1.8	1.6
26						1.8	1.7	1.5	1.6	1.3	1.6	1.5
27						1.7	1.9	1.7	1.5	1.4	1.6	1.6
28						1.6	1.6	1.6	1.3	1.5	1.7	1.9
29						2.0	1.5	1.4	1.4	1.6	1.9	1.5
30						1.8	1.7	1.5	1.3	1.5	2.0	1.6
31						.....	1.6	1.4	.....	1.4	.....	1.7

Daily gage height, in feet, of Middle Fork of Holston River at Chilhowie, Va., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	1.4	1.8	2.2	5.1	1.9	1.6	2.7	2.1	2.2	1.3	1.3	1.3
2	1.5	1.9	2.4	5.2	1.9	1.6	2.6	2.4	2.1	1.3	1.3	1.2
3	1.5	2.3	2.2	4.5	1.8	1.6	2.6	2.3	2.1	1.3	1.3	1.2
4	1.6	2.8	2.0	4.0	1.8	3.2	2.6	2.3	2.1	1.3	1.3	1.2
5	2.8	.....	2.2	3.4	1.8	2.6	2.6	2.2	2.1	1.3	1.3	1.2
6	2.5	.....	3.9	3.4	1.7	2.4	2.6	2.2	2.5	1.3	1.4	1.2
7	2.0	2.9	2.7	3.7	1.7	2.0	2.4	2.1	2.4	1.3	1.4	3.3
8	1.8	2.5	2.5	3.3	1.7	1.8	2.4	2.1	2.4	1.3	1.3	3.5
9	1.5	1.9	2.4	3.0	1.8	1.8	2.4	2.3	2.3	1.3	1.3	3.2
10	1.5	1.8	2.2	2.9	1.6	1.7	2.3	2.7	2.3	1.2	1.3	3.1
11	1.5	1.9	2.1	2.9	1.5	1.7	2.3	2.5	2.2	1.2	1.3	3.1
12	.....	1.8	2.15	2.8	1.5	1.7	2.3	2.4	2.2	1.2	1.3	3.0
13	3.2	2.4	2.1	2.8	1.6	1.6	2.2	2.3	2.2	1.2	1.3	2.9
14	2.9	2.8	2.0	2.8	1.6	1.6	2.2	2.3	2.2	1.2	1.3	2.9
15	2.5	2.9	2.0	2.7	1.5	1.6	2.1	2.2	2.2	1.2	1.2	2.7
16	1.9	2.2	2.0	2.7	1.5	1.5	2.1	2.6	2.2	1.2	1.2	2.6
17	1.6	2.0	2.0	2.7	1.4	1.5	2.5	2.4	2.1	1.2	1.2	2.8
18	1.5	2.0	1.9	2.7	1.5	1.4	2.7	2.2	2.1	1.1	1.1	2.7
19	1.5	1.9	1.9	2.3	1.6	1.4	2.6	2.2	2.1	1.2	1.1	2.6
20	1.7	2.0	1.8	2.0	1.7	1.7	2.5	2.2	2.1	1.2	1.1	2.5
21	1.8	1.9	1.8	1.9	1.7	1.8	2.5	2.1	2.1	1.2	1.1	2.5
22	1.5	1.8	1.8	1.8	1.6	1.7	2.4	2.1	2.1	1.2	1.0	2.4
23	1.4	1.8	1.7	1.7	1.6	2.5	2.4	2.1	2.0	1.1	1.0	2.3
24	1.5	1.7	1.7	1.7	1.8	2.1	2.3	2.4	1.9	1.2	1.0	2.3
25	1.5	1.7	1.8	1.7	2.1	1.9	2.3	2.6	1.9	1.2	1.0	2.2
26	1.5	1.8	1.8	2.7	1.9	1.8	2.3	2.7	1.8	1.2	1.0	2.4
27	1.6	1.8	1.8	2.3	1.8	1.7	2.2	2.6	1.7	1.2	1.0	2.4
28	1.7	1.8	1.8	2.2	1.7	1.7	2.2	2.5	1.7	1.4	1.0	3.6
29	1.9	1.7	1.8	2.0	1.7	1.6	2.1	2.5	1.6	1.5	1.0	3.7
30	1.8	.....	2.2	2.0	1.8	1.6	2.1	2.4	1.6	1.4	1.3	3.5
31	1.8	.....	4.85	.....	1.8	.....	2.1	2.2	.....	1.3	.....	3.3

WATAUGA RIVER NEAR ELIZABETHTON, TENN.

Watauga River rises on the northern and eastern slopes of Grandfather Mountain, on the southern boundary of Watauga County, N. C., and after flowing about 6 miles in a northeasterly direction is joined by Boone Fork, a stream which rises on the eastern slope of Grandfather Mountain and flows first due east about 4 miles and then to the north about 4 miles, or to its junction with the Watauga. At the junction the river changes its course to the northwest, and with many bends, rapids, and falls, flows through Watauga County, N. C., and Johnson and Carter counties, Tenn., uniting its waters with those of the South Fork of Holston River about 9 miles northwest of Johnson City. In its course it is joined by many tributaries. It drains an extensive area, a large part of which lies in the high mountains.

Like all other drainage basins throughout this region, the basin of the Watauga is subject to a very heavy annual rainfall, being greater near the headwaters, where there is an almost constant precipitation. This rainfall at times comes in the form of violent rainstorms, but these are infrequent, the precipitation being equally well distributed throughout the entire year, though the summer rainfall is the great-

est in amount. At times the heavy rains are long continued, lasting a week or more, and the streams rise to great heights and do a vast amount of damage. Droughts are infrequent, and as a rule are neither severe or long continued, the drought of 1904 being probably the most severe within the memory of the inhabitants of the basin.

A marked feature of the region is the great number of springs, the discharge of which ranges from less than a gallon a minute up, several being of very large size. One of the larger springs is in the village of Allentown, Tenn. The spring basin is nearly 100 feet in diameter and has a discharge estimated at from 8 to 10 cubic feet per second. Another large spring is directly on the bank of the river, at the town of Fishspring. Here there are a number of small springs flowing from crevices in the rock, the aggregate volume being 7 or 8 cubic feet per second.

The fall of the Watauga is very great throughout its entire length, and the selection of shoals for utilization would be largely a matter of convenience, the average fall of the stream in Tennessee being about 15 feet to the mile, and between Shulls Mill and the Tennessee line about 47 feet to the mile, with many small stretches where the fall is much greater.

The gaging station is located on the Virginia and Southwestern Railway bridge at Siam, about 4 miles from Elizabethton, Tenn. It was established May 11, 1903, for the purpose of supplying run-off data useful in estimating water power, which is very abundant in parts of this river. It is 1½ miles above the mouth of Stony Creek and 5 miles above Doe River.

Excepting the rather sluggish current of low stages, the conditions are good for measurements of discharge.

No change in the location or datum of the gage has occurred.

This station was discontinued December 31, 1908.[a]

Discharge measurements of Watauga River near Elizabethton, Tenn., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. feet.*	*Feet.*	*Sec.-ft.*
June 18	Warren E. Hall	212	874	2.48	1,180
August 10	do	209	717	1.77	570
1908.					
February 26	Warren E. Hall	208	722	2.18	914

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Watauga River near Elizabethton, Tenn., for 1907 and 1908.

[Observer, J. B. Nave.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.4	1.6	2.6	1.65	1.9	1.8	.....	1.7	1.5	1.9	1.45	.....
2	3.0	1.55	2.9	1.6	1.9	5.5	1.8	1.65	1.7	1.8	.....	1.85
3	2.65	1.55	2.7	1.6	1.9	4.9	1.75	1.6	1.75	1.6	1.4	1.7
4	2.4	1.55	2.65	1.7	2.0	3.7	.....	1.6	1.7	1.7	1.4	1.6
5	2.25	1.6	2.6	1.75	2.1	3.1	1.65	1.6	.....	2.5	1.4	1.55
6	2.2	1.6	2.55	1.8	2.1	2.7	1.6	1.6	1.6	2.3	1.35	1.55
7	2.2	1.55	2.5	1.9	2.0	2.6	1.6	1.65	1.55	.....	1.3	1.5
8	2.15	1.55	2.4	1.95	1.95	3.5	1.55	1.7	1.65	1.7	1.3	.....
9	2.1	1.55	2.6	2.0	1.9	3.4	1.5	1.75	1.7	1.65	1.35	1.5
10	2.0	1.5	2.8	2.3	1.8	3.3	1.5	1.75	1.7	1.65	1.8	1.5
11	1.95	.....	3.1	2.2	1.75	3.1	1.6	1.7	1.65	1.6	2.3	1.45
12	1.85	1.5	2.9	2.2	1.75	2.9	1.8	1.6	2.4	1.55	2.0	1.5
13	1.8	1.5	2.6	2.15	1.7	2.7	2.3	1.5	1.95	1.5	1.9	1.6
14	1.7	1.5	2.5	2.1	1.65	5.0	3.2	1.45	1.7	1.5	1.8	2.3
15	1.7	.....	2.45	2.1	1.6	3.3	2.3	1.4	.....	1.5	1.7	2.6
16	1.65	.....	2.4	2.1	1.55	.....	2.3	1.3	1.6	1.45	1.65	2.6
17	1.6	1.5	2.3	2.2	1.5	2.5	2.3	1.8	1.55	1.45	1.65	2.5
18	1.7	1.5	2.25	2.2	1.45	2.5	2.2	1.9	1.5	1.45	1.65	2.35
19	1.8	1.5	2.2	2.3	1.5	2.45	2.1	1.85	1.5	1.4	1.6	2.1
20	1.75	1.5	2.0	2.25	1.6	2.4	2.1	1.75	.....	1.4	1.6	2.0
21	1.75	1.5	1.95	2.2	1.55	2.4	.....	1.65	1.7	1.4	1.6	1.8
22	1.7	1.6	1.9	2.3	1.55	2.35	2.05	1.6	1.8	1.35	.....	1.9
23	1.7	1.75	1.85	3.0	1.6	.....	2.00	1.75	5.2	1.35	2.0	4.5
24	1.65	2.2	1.8	2.9	1.65	2.2	1.9	1.8	4.8	1.3	2.4	4.4
25	1.6	2.3	1.8	2.5	1.6	1.9	1.85	1.75	3.8	1.3	2.5	4.2
26	1.6	2.85	1.75	2.3	1.6	2.6	1.8	1.7	3.5	1.3	2.5	4.0
27	1.6	2.4	1.75	2.2	1.5	2.9	1.75	1.65	3.2	1.3	2.35	3.6
28	1.6	2.6	1.7	2.15	1.5	2.3	1.7	1.6	2.9	1.3	2.25	3.0
29	1.55	.....	1.7	2.1	1.4	2.1	2.0	1.6	2.8	.....	2.1	2.7
30	1.5	.....	1.65	2.0	1.4	.....	1.9	1.55	2.4	1.5	2.0	3.6
31	1.5	.....	1.7	.....	1.5	.....	1.9	1.55	.....	1 5	.....	3.5
1908.												
1	3.1	2.1	.....	2.4	2.3	2.0	2.4	2.05	1.7	1.2	.....	1.8
2	2.5	2.05	3.9	5.6	2.2	1.9	2.05	.....	1.7	1.05	2.5	2.1
3	.....	2.0	3.6	4.3	.....	1.8	2.05	1.7	1.6	1.05	2.2	2.0
4	2.2	2.1	3.1	3.3	2.05	2.4	3.0	1.6	1.6	.....	2.05	1.8
5	3.3	.....	.....	.....	2.0	2.6	.....	1.8	1.6	1.05	2.0	1.8
6	3.0	2.15	.....	2.8	2.0	2.3	2.6	1.8	.....	1.05	1.8	.....
7	.....	2.1	.....	2.5	2.3	.....	2.7	1.7	1.7	1.05	1.8	5.4
8	2.35	2.05	.....	2.3	2.6	2.0	4.7	1.7	1.7	1.05	.....	3.7
9	2.3	.....	.....	2.3	2.5	1.9	3.1	.....	1.5	1.2	1.7	3.0
10	2.2	2.0	.....	2.2	.....	1.8	2.8	1.7	1.5	2.8	1.6	2.5
11	2.15	2.0	.....	2.05	2.3	1.8	2.4	1.6	1.5	.....	1.7	2.3
12	8.1	2.6	.....	.....	2.05	1.7	.....	1.5	1.4	1.5	1.8	2.6
13	6.1	4.0	.....	2.0	2.0	1.7	2.0	1.5	.....	1.4	1.7	.....
14	3.6	4.5	.....	1.9	2.0	.....	1.9	1.4	1.4	1.4	1.8	2.5
15	3.4	6.5	.....	1.9	1.9	3.0	1.9	1.4	1.4	1.3	.....	.....
16	3.2	.....	2.5	2.7	1.9	2.4	1.9	.....	1.4	1.3	1.8	.....
17	2.7	3.5	2.3	2.6	.....	2.05	1.7	1.4	1.4	1.3	1.8	2.1
18	2.6	3.0	2.4	2.8	2.1	1.8	1.6	1.4	1.3	.....	1.8	.....
19	2.55	2.8	2.1	.....	2.8	1.7	.....	1.4	1.3	1.2	1.9	2.1
20	2.4	2.5	2.5	2.3	2.7	1.7	1.6	2.05	.....	1.2	1.8	.....
21	2.3	2.05	2.6	2.2	2.8	.....	1.5	1.7	1.3	1.2	1.8	1.9
22	2.25	2.4	.....	.....	2.5	1.7	2.4	1.8	1.3	1.2	.....	1.5
23	.....	.....	3.0	2.0	2.2	2.9	1.9	.....	1.3	3.4	1.7	2.9
24	2.2	2.05	3.8	1.9	.....	2.05	1.8	1.3	1.2	4.5	1.7	2.7
25	2.1	2.05	3.3	2.5	2.1	2.5	1.5	2.5	1.1	.....	1.6	.....
26	2.1	2.1	2.9	.....	2.0	2.05	.....	3.8	1.1	2.3	1.6	3.0
27	3.0	2.0	2.6	3.3	2.1	1.9	1.5	2.9	.....	2.0	1.6	.....
28	2.8	1.8	2.5	2.9	2.1	.....	2.1	2.5	1.2	2.0	1.0	2.6
29	2.3	2.05	.....	2.5	2.1	1.7	3.6	2.1	1.5	3.3	.....	2.7
30	2.2	.....	2.4	2.4	2.8	1.7	3.6	.....	1.4	3.8	1.6	2.8
31	2.15	.....	2.1	.....	.....	.....	2.5	1.8	.....	3.1	.....	3.1

Rating table for Watauga River near Elizabethton, Tenn., for 1907 and 1908.

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	155	2.50	1,180	4.00	2,850	6.00	5,840
1.10	195	2.60	1,275	4.10	2,980	6.20	6,180
1.20	240	2.70	1,370	4.20	3,110	6.40	6,520
1.30	290	2.80	1,470	4.30	3,250	6.60	6,860
1.40	345	2.90	1,570	4.40	3,390	6.80	7,200
1.50	400	3.00	1,675	4.50	3,530	7.00	7,540
1.60	460	3.10	1,780	4.60	3,670	7.20	7,900
1.70	525	3.20	1,890	4.70	3,820	7.40	8,260
1.80	595	3.30	2,000	4.80	3,970	7.60	8,620
1.90	670	3.40	2,115	4.90	4,120	7.80	8,980
2.00	750	3.50	2,230	5.00	4,270	8.00	9,340
2.10	830	3.60	2,350	5.20	4,570	8.20	9,720
2.20	915	3.70	2,470	5.40	4,880		
2.30	1,000	3.80	2,595	5.60	5,200		
2.40	1,090	3.90	2,720	5.80	5,520		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on three discharge measurements made during 1907 and 1908, earlier high water measurements, and the form of previous low-water curves, and is fairly well defined between gage heights 1.7 feet and 4.0 feet. Above gage height 3.9 feet the table is the same as the 1906 table.

Monthly discharge of Watauga River near Elizabethton, Tenn., for 1907 and 1908.

[Drainage area, 408 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	2,120	400	717	1.76	2.03	B.
February	1,520	400	557	1.37	1.43	B.
March	1,780	492	1,000	2.45	2.82	A.
April	1,680	460	864	2.12	2.36	B.
May	830	345	530	1.30	1.50	B.
June	5,040	595	1,680	4.12	4.60	A.
July	1,890	400	708	1.74	2.01	B.
August	670	290	494	1.21	1.40	B.
September	4,570	400	1,030	2.52	2.81	A.
October	1,180	290	457	1.12	1.29	B.
November	1,180	290	612	1.50	1.67	B.
December	3,530	372	1,210	2.97	3.42	A.
The year	5,040	290	822	2.02	27.34	
1908.						
January	9,530	830	1,680	4.12	4.75	A.
February	6,690	595	1,430	3.50	3.78	A.
April	5,200	670	1,350	3.31	3.69	A.
May	1,470	670	959	2.35	2.71	A.
June	1,680	525	797	1.95	2.18	B.
July	3,820	400	1,060	2.60	3.00	A.
August	2,600	290	657	1.61	1.86	B.
September	525	195	360	.882	.98	B.
October	3,530	175	777	1.90	2.19	B.
November	1,480	155	608	1.49	1.66	B.
December	4,880	400	1,320	3.24	3.74	A.

DOE RIVER AT ELIZABETHTON, TENN.

The most important tributary received by Watauga River is Doe River, which rises in the high and mountainous area to the west and north of Roan High Knob, and flows in a general northerly and northwesterly direction, joining the Watauga at Elizabethton, Tenn. Near the mouth of the stream, probably one-fourth or more of the valley is cleared land, the cleared areas being the level bottom or terrace land immediately along the river; but about 2 miles above

Elizabethton the gorge of the Doe begins, and from that point to Allentown the river flows in a very narrow channel carved out by its waters from the solid rock, which rises on either side in precipitous walls several hundred feet high. Near Allentown, where Doe River is joined by the Laurel Fork and Little Doe River, there is a considerable area of open and level land rimmed about by high and steep mountains. Above that place the gorge of the Doe becomes more pronounced, the sides rising higher and more steeply above the water, and the scenery, though confined, is very much grander than that of the lower gorge.

The gaging station was established at the wagon bridge in Elizabethton on June 15, 1907, as part of the southern Appalachian water-resources investigation.

Discharge measurements are made from the covered wooden bridge, where the current is sluggish owing to a low dam below. The gage was located 1,500 feet above the bridge in an attempt to get above the backwater from this dam. The general conditions are poor and the station was discontinued on June 30, 1908.[a]

Discharge measurements of Doe River at Elizabethton, Tenn., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 17	Warren E. Hall	129	285	1.50	403
August 9	do	127	283	1.60	504
September 5	B. M. Hall, jr.	125	243	1.48	357
Do	do	125	242	1.43	334

Daily gage height, in feet, of Doe River at Elizabethton, Tenn., for 1907 and 1908.

[Observer, Mary Perry.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							0.9	0.9	0.85	1.0	0.65	0.85
2							1.15	.9	.8	1.0	.7	.75
3							1.0	.8	.8	.9	.75	.75
4							.9	.8	1.75	.9	.75	.8
5							.9	.8	1.65	.8	.7	.9
6							.9	.9	1.1	.8	.6	1.0
7							.9	.9	1.0	.8	.52	1.2
8							.8	1.0	2.0	.9	.6	1.25
9							.8	1.45	1.4	.85	.75	.95
10							.8	1.0	1.05	.8	1.35	2.0
11							.8	1.0	1.0	.8	1.25	1.75
12							1.8	1.0	1.0	.8	.95	.85
13							1.6	.9	.95	.8	.82	.95
14							1.3	.8	.9	.8	.75	1.45
15						2.0	1.1	.7	.9	.75	.65	.8
16						1.7	1.0	.75	.8	.7	.6	.95
17						1.55	1.75	1.05	.8	.7	.65	1.15
18						1.45	1.15	.9	.75	.8	.68	1.3
19						1.4	1.1	.9	.7	.8	.6	1.0
20						1.3	.95	.7	.7	.8	.7	.85

[a] Records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Doe River at Elizabethton, Tenn., for 1907 and 1908—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21						1.6	0.9	0.75	1.0	0.9	0.65	1.0
22						1.05	.8	2.3	1.3	.8	.5	1.35
23						1.05	.8	2.35	3.6	.8	.5	1.45
24						1.1	.8	1.95	1.9	.8	1.3	1.7
25						1.35	.9	1.15	1.5	.8	1.4	1.85
26						1.1	.8	1.0	1.15	.8	1.25	1.45
27						1.0	.9	1.0	1.1	.8	1.15	1.2
28						1.35	.8	1.0	1.0	.85	.9	1.55
29						1.05	1.65	1.0	1.0	.75	.75	1.75
30							1.2	.95	.9	.7	.65	1.15
31							.95	.9		.65		1.6

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	1.7	1.45	1.95	2.0	1.3	1.1	16	1.5	2.0	1.4	1.6	1.0	1.55
2	1.65	1.2	1.65	2.55	2.0	1.1	17	1.4	1.55	1.2	1.5	1.0	1.3
3	1.3	1.15	1.55	1.7	1.2	1.05	18	1.35	1.2	1.25	1.35	1.25	1.1
4	1.1	1.1	1.5	1.5	1.1	1.5	19	1.25	1.2	1.2	1.2	1.8	1.0
5	1.95	1.1	1.8	1.3	1.1	1.25	20	1.0	1.05	1.25	1.2	2.0	1.0
6	2.0	1.3	1.95	1.3	1.1	1.2	21	1.0	1.0	1.5	1.15	1.6	1.3
7	1.8	1.1	1.7	1.2	1.7	1.1	22	1.0	1.0	1.5	1.1	1.25	1.6
8	1.45	1.1	1.5	1.2	1.45	1.1	23	1.2	1.0	1.7	1.1	1.2	1.45
9	1.25	1.1	1.45	1.2	1.35	1.0	24	1.1	1.1	2.05	1.1	1.1	1.4
10	1.1	1.1	1.2	1.1	1.3	1.0	25	1.0	1.1	1.75	2.65	1.1	1.5
11	1.3	1.2	1.2	1.1	1.2	.85	26	1.0	1.1	1.6	2.0	1.1	1.45
12	3.8	1.35	1.85	1.1	1.1	.8	27	1.1	1.1	1.35	1.65	1.1	1.4
13	2.85	1.65	1.55	1.1	1.1	.8	28	1.1	1.1	1.3	1.45	1.2	1.2
14	2.5	1.7	1.55	1.1	1.0	1.25	29	1.1	1.2	1.3	1.4	1.2	1.1
15	1.6	3.0	1.45	1.0	1.0	1.85	30	1.0	.....	1.2	1.35	1.2	1.0
							31	1.0	.....	1.2	.....	1.15	.....

NORTH FORK OF HOLSTON RIVER AT SALTVILLE, VA.

This station is located at the highway bridge about one-half mile from Saltville. It was established June 11, 1907, for cooperation with the Forest Service, for the purpose of investigating the water resources of the southern Appalachian Mountains. The station is just above Little Tumbling Creek and about 2 miles above Sturgeon Creek.

Discharge measurements are made from the single-span bridge, where the current is rough and broken and in places becomes sluggish at low stages, making it rather bad for measurements.

The gage chain was lost on November 12, 1908, and the station was abandoned.

Discharge measurements of North Fork of Holston River at Saltville, Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 12	Warren E. Hall	145	550	5.86	1,940
August 10	B. M. Hall, jr.	72	132	2.10	133
August 14	do	70	107	1.97	84
Do	Warren E. Hall	70	111	1.97	94
September 10	B. M. Hall, jr.	44	83	1.61	46
Do	do	44	83	1.61	48
1908.					
February 22	Warren E. Hall	110	260	3.35	406
July 3	F. P. Thomas	85	159	2.29	174
Do	Warren E. Hall	85	162	2.29	177

Daily gage height, in feet, of North Fork of Holston River at Saltville, Va., for 1907 and 1908.

[Observer, T. A. Hockett.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1									2.55	2.3	2.0	2.9
2									2.1	2.2	2.4	2.8
3									2.05	2.1	2.9	2.75
4									2.0	2.25	2.8	2.55
5									1.9	2.4	2.55	2.5
6									1.85	2.5	2.5	2.35
7									1.8	2.35	2.3	2.3
8									1.8	2.4	2.3	2.3
9									1.75	2.25	2.2	2.25
10									1.7	2.15	5.2	4.6
11						8.5			2.3	2.1	4.7	5.9
12						5.8			2.5	2.05	4.0	4.3
13						9.5			2.35	2.0	3.4	3.7
14						9.8		2.0	2.05	1.95	3.05	3.8
15						6.0		1.9	2.0	1.9	2.8	3.9
16						4.9		1.9	1.9	1.8	2.45	3.8
17						4.2		1.95	1.85	1.8	2.4	3.75
18						3.85		2.45	1.6	1.8	3.6	3.65
19						3.6		2.45	2.75	1.8	3.8	3.35
20						3.6		2.4	2.35	1.8	3.6	3.15
21						3.5		2.1	2.05	1.8	3.55	3.05
22						3.4		2.1	2.55	1.8	3.4	3.0
23						3.3		2.0	5.4	1.8	3.35	2.9
24						3.8		2.25	4.4	1.8	4.6	2.9
25						3.2		2.3	3.35	1.8	4.8	2.75
26						3.05		2.25	3.0	1.8	4.2	2.7
27						2.9		2.2	2.65	1.8	3.8	2.6
28						2.8		2.2	2.5	1.9	3.4	2.6
29								2.1	2.5	1.9	3.1	3.45
30								2.0	2.4	1.9	3.0	4.4
31								2.0		1.9		5.2
1908.												
1	4.0	3.05	3.7	7.9	3.2	3.0	2.6	1.75	1.85	1.6	2.7	
2	3.65	3.15	5.0	9.7	3.15	2.85	2.4	1.7	1.75	1.6	2.5	
3	3.2	3.05	4.5	5.9	3.0	2.7	2.35	1.75	1.7	1.6	2.2	
4	3.2	3.15	4.2	4.9	3.0	4.3	2.3	1.7	1.7	1.55	2.15	
5	3.5	3.15	4.4	4.2	3.0	5.7	2.45	1.7	2.8	1.5	2.05	
6	3.15	3.45	6.4	6.0	2.95	4.2	2.55	1.7	3.85	1.55	2.0	
7	3.05	3.65	5.2	3.65	5.7	3.7	2.45	1.7	2.75	1.55	2.05	
8	3.65	3.45	4.4	3.5	5.4	3.3	2.3	1.8	2.25	1.6	2.0	
9	3.35	3.25	4.0	3.4	4.5	3.15	2.15	2.15	2.15	1.65	1.9	
10	3.0	3.05	3.6	3.3	4.1	2.95	2.1	2.3	2.05	1.65	1.85	
11	2.7	3.35	3.4	3.35	3.8	2.8	2.0	2.05	2.0	1.9	2.1	
12	8.6	4.8	3.9	3.55	3.55	2.7	2.0	2.0	1.9	2.45	2.5	
13	5.4	5.8	3.75	3.4	3.35	2.6	1.9	1.85	1.8	2.15		
14	4.6	6.4	3.8	3.25	3.15	2.6	1.9	1.75	1.75	1.8		
15	4.0	7.6	3.7	3.1	3.0	3.4	2.15	1.7	1.7	1.9		
16	3.85	6.6	3.6	3.1	3.0	3.1	2.25	1.7	1.65	1.7		
17	3.65	4.6	3.5	3.05	2.9	2.85	2.1	1.7	1.6	1.75		
18	3.25	4.2	3.5	3.0	2.8	2.55	2.05	1.75	1.65	1.7		
19	3.15	3.85	3.8	3.0	3.8	2.5	2.0	1.75	1.65	1.75		
20	3.0	3.65	4.6	2.95	4.8	2.45	1.9	1.85	1.65	1.6		
21	3.15	3.25	4.2	2.9	5.0	2.4	1.95	1.7	1.65	1.6		
22	3.25	3.2	4.2	2.85	4.2	3.7	1.95	1.75	1.6	1.55		
23	3.4	3.2	4.2	2.75	3.85	6.6	1.9	1.85	1.6	1.55		
24	3.3	3.0	4.4	2.7	3.5	4.2	1.8	1.9	1.55	1.6		
25	3.15	3.0	4.5	2.9	3.2	3.35	1.8	1.95	1.55	1.55		
26	2.95	3.2	4.0	5.2	2.95	3.1	1.85	2.15	1.55	2.0		
27	3.85	3.1	3.8	4.0	3.4	2.85	1.9	2.4	1.6	1.9		
28	3.65	2.95	3.5	3.4	3.25	2.55	1.8	2.1	1.65	1.8		
29	3.65	2.9	3.4	3.35	3.25	2.5	1.85	2.0	1.65	2.25		
30	3.25		3.4	3.2	3.6	2.7	1.8	1.9	1.65	3.7		
31	3.05		3.4		3.25		1.8	1.9		3.25		

Rating table for North Fork of Holston River at Saltville, Va., for 1907 and 1908.

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	33	2.90	290	4.30	825	6.40	2,360
1.60	46	3.00	315	4.40	880	6.60	2,520
1.70	60	3.10	340	4.50	940	6.80	2,680
1.80	75	3.20	370	4.60	1,000	7.00	2,840
1.90	90	3.30	400	4.70	1,065	7.20	3,000
2.00	106	3.40	430	4.80	1,130	7.40	3,160
2.10	123	3.50	465	4.90	1,200	7.60	3,320
2.20	141	3.60	500	5.00	1,270	7.80	3,480
2.30	160	3.70	540	5.20	1,415	8.00	3,640
2.40	180	3.80	580	5.40	1,565	9.00	4,440
2.50	200	3.90	625	5.60	1,720	10.00	5,240
2.60	221	4.00	670	5.80	1,880		
2.70	243	4.10	720	6.00	2,040		
2.80	266	4.20	770	6.20	2,200		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on nine discharge measurements made during 1907 and 1908 and is well defined below gage height 2.3 feet. Above gage height 5.5 feet the rating curve is a tangent, the difference being 80 per tenth.

Monthly discharge of North Fork of Holston River at Saltville, Va., for 1907 and 1908.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
1907.				
June 11–28	5,080	266	1,370	B.
August 14–31	190	90	132	B.
September	1,560	46	223	B.
October	200	75	109	B.
November	1,420	106	458	B.
December	1,960	150	475	B.
1908.				
January	4,120	243	605	B.
February	3,320	290	739	B.
March	2,360	430	745	B.
April	5,000	243	776	B.
May	1,800	266	567	B.
June	2,520	180	471	B.
July	221	75	121	B.
August	180	60	86.8	B.
September	602	40	97.2	B.
October	540	33	92.9	B.
November 1–12	243	82	138	B.

LITTLE TENNESSEE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Little Tennessee River, with its tributaries, drains a large area, extending from the Blue Ridge on the south to the Great Smoky Mountains on the north, including all the territory between the basins of Pigeon and Hiwassee rivers. Its larger tributaries are the Tuckasegee from the east, and the Oconalufty from the northeast, the Cheoah from the southwest, and the Nantahala from the south, while the upper portion of the Tennessee heads on top of the Blue Ridge. These waters pass through the Tennessee into Ohio River.

The upper or southern part of the basin lying on the northwest slope of the Blue Ridge, is an elevated plateau region having an altitude of more than 3,000 feet, with low, rounded granite knobs and few high summits, and broad alluvial flats, the deposit of the slow streams. The Balsam, Great Smoky, and Unaka Mountains, with

many crests over 6,000 feet high, form the watershed on the north and west, and from these descend into the northern portion of the basin many swift streams which have carved deep narrow valleys, leaving high intervening ridges with deep and rugged slopes. The watersheds between several of these streams are high and rough, especially in the Cheoah, Nantahala, and Cowee ranges. The lower part of the basin includes some of the most rugged land in the southern Appalachians with only a very small part suited for tillage and few alluvial bottoms, but in the upper part much of the mountain land is not steep and there are several large and fertile valleys.

The soils in the upper part of the basin are sandy, derived from granite. On Little Tennessee River around and above Franklin, where most of the good farms are located, they are of deep and fertile red loams, derived from schists. In the narrow valleys around the high mountains, where sandstones, quartzite, and conglomerates prevail, the soils are generally thin and sandy, and poor agriculturally, but on north slopes and in hollows are well suited to forests. The alluvial bottoms of many of the streams are also light and sandy, though those of the Little Tennessee are silts of the finest texture.

LITTLE TENNESSEE RIVER NEAR FRANKLIN, N. C.

This station is located at the iron wagon bridge about 1 mile northeast of Franklin, N. C. It was established June 12, 1907, in cooperation with the Forest Service to supply data regarding the water resources and power possibilities in the southern Appalachian Mountains. The station is 1 mile below the mouth of Cullasaja River, which is an important tributary.

Discharge measurements are made from the bridge where the river is about 125 feet wide with high banks, permanent, rocky bottom, and swift current.

The gage is attached to a tree on the left bank 700 feet above the bridge.[a]

Discharge measurements of Little Tennessee River near Franklin, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 12	F. A. Murray	126	267	1.84	687
July 17	do	125	245	1.56	550
Do	B. M. Hall, jr	125	245	1.56	547
August 28	F. P. Thomas	123	215	1.21	414
Do	do	123	217	1.20	428
Do	F. A. Murray	112	185	1.13	351
November 8	do	112	182	1.19	348
November 9	do	112	182	1.17	342
1908.					
May 22	M. R. Hall	125	278	2.18	843
Do	do	125	287	2.16	849
December 19	W. A. Lamb	120	269	1.95	660

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Little Tennessee River near Franklin, N. C., for 1907 and 1908.

[Observer, T. W. Angel.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							1.8	1.25	1.05	1.7	1.1	2.0
2							1.8	1.25	1.0	1.5	1.1	2.1
3							1.75	1.25	1.0	1.45	1.1	2.3
4							2.0	1.25	1.05	1.4	1.1	2.3
5							1.9	1.2	1.1	1.35	1.1	2.4
6							1.7	1.2	1.1	1.3	1.1	2.45
7							1.7	1.15	1.1	1.3	1.6	2.4
8							1.65	1.15	1.1	1.25	2.0	2.6
9							1.6	1.1	1.1	1.2	1.8	2.65
10							1.6	1.1	1.05	1.15	1.8	2.65
11							1.6	1.1	1.1	1.1	1.8	2.6
12						1.85	1.8	1.4	1.05	1.1	1.7	2.6
13						1.8	1.85	1.4	1.0	1.05	1.65	2.6
14						2.0	1.75	1.35	1.0	1.0	1.65	2.5
15						1.85	1.7	1.6	1.0	1.0	1.65	2.85
16						1.8	1.7	1.55	1.0	1.0	1.7	3.0
17						1.7	1.65	1.7	1.0	1.05	2.0	3.0
18						1.65	1.6	2.0	1.0	1.0	1.9	3.2
19						1.8	1.55	1.8	.95	1.0	1.9	3.3
20						1.8	1.5	1.7	.9	1.0	1.9	3.4
21						1.7	1.5	1.6	.9	1.0	1.85	3.4
22						1.65	1.45	1.55	.9	1.0	1.8	3.3
23						1.8	1.4	1.5	6.7	1.0	1.8	3.2
24						2.3	1.4	1.4	2.6	1.0	1.8	3.0
25						1.9	1.4	1.35	2.0	1.0	1.8	3.0
26						1.8	1.35	1.25	1.6	1.0	2.0	2.95
27						1.75	1.4	1.2	1.5	1.1	2.0	2.9
28						1.8	1.35	1.15	2.7	1.1	2.0	2.85
29						2.1	1.35	1.1	2.5	1.1	2.0	2.8
30						2.0	1.3	1.05	2.0	1.1	2.0	2.75
31							1.3	1.05		1.1		2.7
1908.												
1	2.7	2.7	2.7	2.5	3.0	2.3	1.8	1.7	2.05	1.15	1.9	1.8
2	2.7	2.6	2.7	2.45	2.9	2.2	1.8	1.6	2.0	1.2	1.7	2.2
3	2.7	2.55	2.65	2.45	2.8	2.5	1.85	1.55	1.95	1.15	1.4	1.85
4	2.7	2.5	2.6	2.4	2.7	2.3	2.9	1.55	1.95	1.2	2.0	1.85
5	4.0	3.0	2.55	2.5	2.65	2.25	2.4	1.5	2.3	1.2	1.8	1.75
6	3.6	2.5	2.5	2.4	2.6	2.2	2.1	1.9	2.1	1.2	1.6	1.65
7	3.5	2.45	2.45	2.35	3.9	2.2	2.6	1.85	2.0	1.15	1.4	5.9
8	3.35	2.4	2.45	2.3	3.0	2.2	2.2	1.85	1.9	1.15	1.5	4.4
9	3.2	2.4	2.4	2.25	2.7	2.2	2.8	1.8	1.8	1.5	1.5	3.0
10	2.7	2.35	2.4	2.2	2.65	2.15	3.0	1.7	1.8	2.4	1.5	2.6
11	3.0	3.2	3.0	2.15	2.6	2.1	2.9	1.65	1.75	1.5	1.5	2.4
12	7.1	2.7	2.7	2.1	2.55	2.1	2.1	1.55	1.7	1.3	1.7	2.9
13	5.2	2.85	2.6	2.05	2.45	2.0	2.0	1.5	1.6	1.2	1.6	2.6
14	4.6	2.75	2.55	2.0	2.35	2.0	2.0	1.5	1.55	1.2	1.8	2.3
15	3.3	9.7	2.5	4.1	2.3	1.95	1.95	1.45	1.5	1.15	1.6	2.1
16	3.2	6.1	2.45	3.5	2.3	2.8	2.1	1.45	1.45	1.2	1.4	2.0
17	2.7	5.2	2.4	2.95	2.3	2.4	2.0	1.45	1.45	1.2	1.5	1.9
18	2.5	4.0	2.35	2.6	2.25	2.25	1.9	1.55	1.35	1.2	1.6	1.9
19	2.5	4.1	2.3	2.55	2.2	2.1	1.85	1.5	1.3	1.2	1.5	1.95
20	2.5	3.7	2.5	2.5	2.9	2.0	1.8	1.5	1.3	1.2	1.5	1.9
21	2.45	3.2	3.35	2.45	2.4	1.85	1.85	1.45	1.3	1.2	1.6	1.85
22	2.4	2.9	2.9	2.4	2.25	2.1	1.85	2.7	1.25	1.2	1.4	3.2
23	2.35	2.85	3.4	2.35	2.2	2.0	1.75	2.5	1.25	2.7	1.6	3.1
24	2.3	2.8	6.0	2.2	2.3	2.0	1.7	2.8	1.2	2.6	1.6	3.0
25	2.3	3.0	4.9	7.0	2.5	1.95	1.65	2.6	1.2	1.7	1.6	2.9
26	2.3	3.1	3.0	4.7	2.2	1.9	1.55	2.5	1.2	1.3	1.6	2.4
27	2.3	3.0	2.7	4.2	2.55	1.9	1.55	2.45	1.15	1.2	1.55	2.2
28	2.3	3.0	2.6	3.7	2.3	1.85	2.0	2.3	1.3	1.5	1.5	2.2
29	2.25	2.7	2.6	3.35	2.3	1.85	1.9	2.2	1.25	2.7	1.5	2.1
30	2.2		2.55	3.1	2.2	1.85	1.85	2.1	1.25	2.2	1.4	2.1
31	3.0		2.5				1.75	2.1		1.7		2.5

Daily discharge, in second-feet, of Little Tennessee River near Franklin, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							645	398	328	595	345	750
2							645	398	310	500	345	805
3							620	398	310	478	345	920
4							750	398	328	455	345	920
5							695	380	345	435	345	980
6							595	380	345	415	345	1,010
7							595	362	345	415	545	980
8							570	362	345	398	750	1,100
9							545	345	345	380	645	1,130
10							545	345	328	362	645	1,130
11							545	345	345	345	645	1,100
12						670	645	455	328	345	595	1,100
13						645	670	455	310	328	570	1,100
14						750	620	435	310	310	570	1,040
15						670	595	545	310	310	570	.....
16						645	595	522	310	310	595	.....
17						595	570	595	310	328	750	.....
18						570	545	750	310	310	695	.....
19						645	522	645	292	310	695	.....
20						645	500	595	275	310	695	.....
21						595	500	545	275	310	670	.....
22						570	478	522	275	310	645	.....
23						645	455	500	.....	310	645	.....
24						920	455	455	1,100	310	645	.....
25						695	455	435	750	310	645	.....
26						645	435	398	545	310	750	.....
27						620	455	380	500	345	750	.....
28						645	435	362	.....	345	750	.....
29						805	435	345	1,040	345	750	.....
30						750	415	328	750	345	750	.....
31						.....	415	328	.....	345	.....	.....
1908.												
1				1,040		920	645	595	778	362	695	645
2		1,100		1,010		860	645	545	750	380	595	860
3		1,070	1,130	1,010		1,040	670	522	722	362	455	670
4		1,040	1,100	980		920	.....	522	722	380	750	670
5		.....	1,070	1,040	1,130	890	980	500	920	380	645	620
6		1,040	1,040	980	1,100	860	805	695	805	380	545	570
7		1,010	1,010	950	.....	860	1,100	670	750	362	455	.....
8		980	1,010	920	.....	860	860	670	695	362	500	.....
9		980	980	890	.....	860	.....	645	645	500	500	.....
10		950	980	860	1,130	832	.....	595	645	980	500	1,100
11				832	1,100	805	.....	570	620	500	500	980
12				805	1,070	805	805	522	595	415	595	.....
13			1,100	778	1,010	750	750	500	545	380	545	1,100
14			1,070	750	950	750	750	500	522	380	645	920
15			1,040	.....	920	722	722	478	500	362	545	805
16			1,010	.....	920	.....	805	478	478	380	455	750
17			980	.....	920	980	750	478	478	380	500	695
18	1,040	.....	950	1,100	890	890	695	522	435	380	545	695
19	1,040	.....	920	1,070	860	805	670	500	415	380	500	722
20	1,040	.....	1,040	1,040	.....	750	645	500	415	380	500	695
21	1,010	.....	.....	1,010	980	670	670	478	415	380	545	670
22	980	.....	.....	980	890	805	670	.....	398	380	455	.....
23	950	.....	.....	950	860	750	620	1,040	398	.....	545	.....
24	920	.....	.....	860	920	750	595	.....	380	1,100	545	.....
25	920	.....	.....	.....	1,040	722	570	1,100	380	595	545	.....
26	920	.....	.....	.....	860	695	522	1,040	380	415	545	980
27	920	.....	.....	.....	1,070	695	522	1,010	362	380	522	860
28	920	.....	1,100	.....	920	670	750	920	415	500	500	860
29	890	.....	1,100	.....	920	670	695	860	398	.....	500	805
30	860	.....	1,070	.....	860	670	670	805	398	860	455	805
31	.....	.....	1,040	.....	890	.....	620	805	.....	595	.....	1,040

NOTE.—Daily discharges for 1907 and 1908 based on a well-defined rating curve. On missing days beginning June 12, 1907, the discharge was greater than 1,150 second-feet.

LITTLE TENNESSEE RIVER AT JUDSON, N. C.

This station is located at the Southern Railway bridge, about one-fourth mile from Judson, N. C., and a short distance below the mouth of Sawyer Branch. It was established in June, 1896, for the purpose of supplying general run-off and water power data. The station is 2½ miles below the mouth of Nantahala River and about 4 miles above the mouth of Tuckaseegee River.

During 1903 the original wire gage was replaced by a standard chain gage having the same location and datum, which was used until June 30, 1905. Since July 1, 1905, a vertical gage, bolted to a solid rock on the right bank, about 100 feet above the bridge, has been used. This gage was set to read with the chain gage at a gage height of 3 feet, but owing to the large amount of slope in the river the actual elevation of its zero is 0.50 foot above the datum of the chain gage.

The river bed is rocky and uneven and the current is swift and rough, making measurements difficult at any but low stages.[a]

Discharge measurements of Little Tennessee River at Judson, N. C., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 22	M. R. Hall and F. A. Murray	150	356	3.48	1,510
Oct. 18	O. P. Hall	139	297	2.64	818

Daily gage height, in feet, of Little Tennessee River at Judson, N. C., for 1907 and 1908.

[Observer, E. G. Enloe.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.3	4.2	4.5	3.55	3.8	4.9	3.4	3.0	2.5	3.3	3.0	3.4
2	4.9	4.9	6.0	3.5	3.75	4.7	3.3	2.9	2.5	3.2	3.0	3.3
3	4.7	4.3	5.0	3.4	3.7	4.2	3.3	2.8	2.7	3.1	3.0	3.2
4	4.5	4.2	4.5	3.3	4.2	3.9	3.4	2.8	2.8	3.0	3.0	3.1
5	4.4	5.0	4.3	3.2	3.7	3.7	3.45	2.9	3.0	3.3	2.9	3.1
6	4.4	4.9	4.2	4.0	4.4	3.6	3.3	2.8	2.7	3.0	2.85	3.1
7	4.4	4.6	4.1	3.7	3.2	3.5	3.3	2.8	2.6	2.9	2.8	3.05
8	4.4	4.3	4.4	3.8	4.0	3.9	3.2	2.7	2.8	3.0	2.8	3.05
9	4.4	4.2	4.1	3.8	3.9	4.85	3.2	2.8	2.7	3.0	2.8	4.8
10	4.4	4.1	4.7	3.7	5.0	3.9	3.25	2.8	2.6	2.9	3.4	4.3
11	4.4	3.95	4.7	3.5	4.4	3.85	3.3	2.8	2.5	2.8	3.3	4.0
12	4.0	3.9	4.5	3.5	4.1	3.6	3.3	2.8	2.8	2.8	3.25	3.8
13	4.0	3.8	4.4	3.4	4.1	3.6	3.9	3.0	2.7	2.75	3.2	3.6
14	3.9	3.7	4.0	3.4	3.9	3.7	3.4	3.1	2.6	2.7	3.1	5.5
15	3.9	3.7	3.95	3.5	4.1	3.6	3.3	3.5	2.5	2.7	3.0	4.5
16	3.8	3.6	3.9	3.6	4.0	3.6	3.3	3.4	2.5	2.7	3.0	4.3
17	3.8	3.55	3.85	3.6	3.9	3.6	3.3	3.0	2.5	2.65	2.9	4.0
18	3.8	3.5	3.8	3.9	3.8	3.6	3.3	3.0	2.5	2.65	3.25	3.6
19	3.7	3.5	3.7	3.8	3.7	3.5	3.2	3.0	2.45	2.65	3.5	3.6
20	4.0	3.5	3.75	3.6	3.7	3.5	3.2	3.0	2.45	2.6	3.2	3.6

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Little Tennessee River at Judson, N. C., for 1907 and 1908— Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	4.0	3.5	3.7	3.5	3.6	3.65	3.2	3.0	2.4	2.6	3.8	3.55
22	3.9	3.5	3.6	3.5	3.5	3.65	3.1	2.9	2.7	2.6	4.0	3.5
23	3.7	3.5	3.5	5.0	3.45	3.6	2.9	3.05	7.0	2.6	4.4	6.3
24	3.7	3.5	3.5	5.5	3.45	3.6	2.9	3.0	4.0	2.6	5.8	5.1
25	3.7	3.7	3.5	5.1	3.5	4.5	3.0	2.9	3.5	2.55	4.6	4.5
26	3.8	3.8	3.6	4.9	4.0	3.9	3.0	2.7	3.3	2.5	4.2	4.3
27	3.5	3.8	3.55	4.0	4.0	3.6	3.1	2.6	3.0	2.8	3.9	4.2
28	3.0	3.8	3.5	3.95	3.6	3.7	3.0	2.6	3.1	2.75	3.7	4.1
29	3.0	.....	3.4	3.9	3.5	3.9	2.9	2.5	4.4	2.7	3.6	3.9
30	3.2	.....	3.4	3.9	3.45	3.5	3.1	2.5	3.7	2.65	3.5	6.5
31	3.5	.....	3.6	.....	3.9	.....	3.1	2.5	.....	2.6	.....	5.5
1908.												
1	4.8	4.1	4.5	4.3	4.8	3.5	2.9	2.9	3.05	2.6	3.1	3.8
2	4.5	4.4	4.4	4.2	4.7	3.5	2.9	2.9	3.0	2.5	3.0	3.3
3	4.3	4.3	4.5	4.1	4.5	3.5	3.0	2.9	2.95	2.5	2.9	3.1
4	4.2	4.25	4.4	4.0	4.1	3.4	4.0	2.9	2.9	2.5	3.0	3.0
5	6.0	4.2	4.4	4.1	4.1	3.45	4.0	3.0	3.0	2.5	2.95	3.0
6	5.0	4.5	4.3	4.2	4.0	3.4	4.1	4.0	4.0	2.45	2.9	3.0
7	4.7	4.2	4.2	4.1	4.1	3.45	4.1	3.5	3.3	2.45	2.85	5.0
8	4.4	4.1	4.1	4.0	4.2	3.4	4.7	3.4	3.1	2.4	2.8	8.4
9	4.3	4.0	4.0	3.95	4.2	3.3	4.0	3.4	3.0	2.4	2.8	7.6
10	4.2	4.2	4.0	3.9	4.2	3.3	4.2	3.3	2.95	3.2	2.8	5.6
11	4.1	4.5	4.0	3.8	4.1	3.6	3.6	3.0	2.9	3.0	3.8	4.4
12	8.5	4.9	5.0	3.7	4.0	3.4	3.5	3.0	2.85	2.8	3.2	4.1
13	6.5	5.2	4.5	3.6	3.9	3.4	3.5	2.9	2.8	2.7	3.1	3.9
14	5.1	5.3	4.45	3.55	3.9	4.0	3.5	2.85	2.8	2.6	3.5	3.8
15	5.0	10.9	4.4	4.7	3.9	4.7	3.4	2.8	2.8	2.55	3.4	3.7
16	4.7	7.9	4.4	5.0	3.9	3.6	3.4	2.85	2.7	2.5	3.2	4.4
17	4.8	6.5	4.3	4.5	3.9	3.4	3.3	2.8	2.7	2.5	3.0	4.2
18	4.55	5.5	4.0	4.2	3.9	3.35	3.2	2.8	2.7	2.5	2.95	4.0
19	4.4	5.3	3.9	4.3	4.4	3.3	3.5	2.85	2.7	2.5	2.9	3.8
20	4.3	5.1	5.1	4.2	3.1	3.3	3.1	2.8	2.7	2.5	2.85	3.5
21	4.2	4.9	5.1	4.0	3.2	3.4	3.0	2.95	2.7	2.5	2.8	3.4
22	4.15	4.7	4.6	3.9	3.2	3.3	3.0	4.0	2.65	2.45	2.8	5.1
23	4.1	4.4	6.0	3.9	3.1	3.1	3.0	4.0	2.65	4.0	2.8	5.0
24	4.0	4.4	7.5	3.7	3.6	3.1	3.0	4.05	2.6	5.0	2.8	4.3
25	3.9	4.5	6.2	7.0	4.0	3.1	3.0	5.4	2.6	5.2	2.8	4.1
26	3.9	4.4	5.5	7.0	4.1	3.0	3.0	4.45	2.5	3.0	2.8	4.0
27	3.9	4.4	5.2	6.5	4.0	3.0	3.5	3.8	2.5	2.9	2.8	3.8
28	4.0	4.2	5.0	5.0	4.2	3.0	3.4	3.5	2.5	3.0	2.8	3.8
29	4.0	4.2	4.7	4.7	4.0	2.9	3.0	3.3	2.7	4.0	2.8	3.9
30	3.95	.....	4.5	4.7	4.0	2.9	3.0	3.2	2.6	3.6	2.7	4.0
31	3.9	.....	4.4	.....	3.6	.....	2.9	3.1	.....	3.2	.....	4.1

Rating table for Little Tennessee River at Judson, N. C., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.40	600	3.80	1,970	5.20	4,480	7.20	9,670
2.50	670	3.90	2,110	5.30	4,700	7.40	10,290
2.60	740	4.00	2,260	5.40	4,920	7.60	10,930
2.70	810	4.10	2,420	5.50	5,150	7.80	11,600
2.80	890	4.20	2,580	5.60	5,380	8.00	12,300
2.90	970	4.30	2,750	5.70	5,620	8.20	13,030
3.00	1,060	4.40	2,920	5.80	5,860	8.40	13,800
3.10	1,150	4.50	3,100	5.90	6,110	8.60	14,600
3.20	1,250	4.60	3,280	6.00	6,360	8.80	15,400
3.30	1,350	4.70	3,470	6.20	6,870	9.00	16,200
3.40	1,460	4.80	3,660	6.40	7,390	10.00	20,700
3.50	1,580	4.90	3,860	6.60	7,930	11.00	25,500
3.60	1,700	5.00	4,060	6.80	8,490		
3.70	1,830	5.10	4,270	7.00	9,070		

NOTE.—The above table is applicable only for open-channel conditions. It is based upon 10 discharge measurements made during 1905 to 1907 and form of previous curves and is well defined between gage heights 2.6 feet and 11.0 feet.

Monthly discharge of Little Tennessee River at Judson, N. C., for 1907 and 1908.

[Drainage area, 675 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	4,700	1,060	2,340	3.47	4.00	B.
February	4,060	1,580	2,240	3.32	3.46	B.
March	6,360	1,460	2,410	3.57	4.12	B.
April	5,150	1,250	2,100	3.11	3.47	B.
May	4,060	1,250	2,080	3.08	3.55	B.
June	3,860	1,580	2,060	3.05	3.40	B.
July	2,110	970	1,280	1.90	2.19	B.
August	1,580	670	964	1.43	1.65	B.
September	9,070	600	1,260	1.87	2.09	B.
October	1,350	670	897	1.33	1.53	B.
November	5,860	890	1,620	2.40	2.68	B.
December	7,660	1,100	2,610	3.87	4.46	B.
The year	9,070	600	1,820	2.70	36.60	
1908.						
January	14,200	2,110	3,480	5.16	5.95	A.
February	25,000	2,260	4,430	6.56	7.08	A.
March	10,600	2,110	3,600	5.33	6.14	A.
April	9,070	1,640	3,160	4.68	5.22	A.
May	3,660	1,150	2,260	3.35	3.86	B.
June	3,470	970	1,460	2.16	2.41	B.
July	3,470	970	1,540	2.28	2.63	B.
August	4,920	890	1,470	2.18	2.51	B.
September	2,260	670	936	1.39	1.55	B.
October	4,480	600	1,130	1.67	1.92	B.
November	1,970	810	1,040	1.54	1.72	B.
December	13,800	1,060	2,980	4.41	5.08	A.
The year	25,000	600	2,290	3.39	46.07	

LITTLE TENNESSEE RIVER AT McGHEE, TENN.

This station is located at the Louisville and Nashville Railroad bridge about one-third mile south of McGhee Station, Tenn., and one-half mile below the mouth of Tellico River. It was established by the United States Weather Bureau late in 1904, the gage readings beginning November 29 of that year. Since that time discharge measurements have been made by the United States Geological Survey and the daily gage readings have been furnished by the Weather Bureau.

Although the river is navigable up to the station, there are very great water power possibilities a short distance above.

The section is about 530 feet wide at ordinary stages. The current is very swift even at low water and is somewhat broken at places, but is fairly good for measuring purposes.

The gage is a boxed chain gage located on the railroad bridge. Owing to a new location of the railroad, a new crossing of the river was made 1,000 feet above the old one. The gage was moved to the new bridge December 1, 1905, and was set to read the same as before by raising its datum the exact amount of the slope of river between the points (0.30 foot at gage height 4 feet).[a]

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Discharge measurements of Little Tennessee River at McGhee, Tenn., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 27	M. R. Hall	485	2,020	5.05	8,500
August 15	F. A. Murray	462	1,200	3.29	3,660
1908.					
December 18	M. R. Hall	372	1,310	3.60	4,530

Daily gage height, in feet, of Little Tennessee River at McGhee, Tenn., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	7.5	4.4	4.6	4.6	4.3	4.8	4.4	3.0	2.6	3.8	2.6	3.7
2	6.3	9.1	5.5	4.2	4.2	5.6	4.1	3.1	2.6	3.5	2.7	3.6
3	5.7	6.2	6.9	3.9	4.1	4.7	3.4	3.0	2.6	3.3	4.4	3.5
4	5.5	5.3	5.6	3.8	5.1	4.6	4.1	2.9	2.8	3.2	3.5	3.5
5	5.3	6.0	5.0	3.7	5.0	4.4	3.9	2.9	2.8	3.5	3.1	3.4
6	5.0	6.2	4.8	3.9	4.5	4.2	3.7	3.3	2.8	3.9	3.0	3.2
7	4.8	5.5	4.5	4.2	5.8	4.0	3.6	3.3	2.6	3.4	3.0	3.3
8	4.7	5.1	5.4	4.3	6.1	4.0	3.5	3.0	2.7	3.3	2.9	3.3
9	4.6	4.9	5.3	4.2	5.6	6.1	3.4	3.0	3.4	3.4	2.8	3.2
10	4.6	4.6	5.2	4.2	5.1	5.3	3.3	2.9	3.0	3.2	3.9	3.7
11	4.5	4.5	6.6	4.0	5.1	4.8	3.4	2.9	3.0	3.1	5.0	5.4
12	4.4	4.4	5.5	3.9	5.9	4.5	3.4	2.9	3.5	3.0	4.0	4.2
13	4.3	4.3	4.4	3.9	5.2	4.2	5.5	3.2	2.9	2.9	3.6	4.0
14	4.3	4.2	4.7	3.8	4.9	4.5	4.5	3.0	2.7	2.9	3.4	4.3
15	4.1	4.1	5.6	3.7	4.7	4.5	4.0	3.1	2.6	2.8	3.3	5.8
16	4.1	4.0	5.4	3.9	4.9	4.0	3.7	3.3	2.5	2.8	3.2	4.9
17	4.1	4.0	4.9	4.3	4.5	3.6	3.6	3.5	2.5	2.8	3.1	4.5
18	4.3	3.9	4.7	4.1	4.3	3.6	3.5	3.3	2.6	2.8	3.2	4.2
19	4.1	3.9	4.5	5.1	4.2	3.6	3.5	3.3	2.6	2.7	3.9	4.1
20	4.1	3.9	4.4	5.7	4.1	3.9	3.6	3.2	2.5	2.7	3.7	4.0
21	4.7	3.8	4.3	4.7	4.0	3.9	3.5	3.0	2.4	2.7	3.5	3.8
22	4.2	3.8	4.2	4.4	3.9	3.7	3.3	3.2	3.0	2.7	4.8	3.8
23	4.1	3.8	4.1	5.2	3.8	3.9	3.2	3.2	6.3	2.7	4.9	4.0
24	4.0	3.7	4.0	6.0	3.8	4.3	3.2	3.2	6.6	2.7	9.8	6.5
25	4.0	4.4	4.0	5.2	3.8	5.3	3.1	3.1	4.3	2.7	6.7	5.2
26	4.0	4.1	3.9	4.8	4.0	4.5	3.3	3.0	3.5	2.6	5.3	4.6
27	4.0	5.0	4.1	5.2	4.5	4.4	3.3	2.9	3.2	2.7	4.7	4.5
28	3.9	4.8	3.9	5.0	4.1	4.0	3.1	2.8	3.2	3.2	4.3	4.3
29	3.8	.....	3.8	4.6	3.8	7.7	3.0	3.0	5.2	3.1	4.1	4.2
30	3.7	.....	3.7	4.4	3.7	5.0	3.7	2.8	4.5	2.8	3.9	5.3
31	3.8	.....	3.7	.....	3.8	.....	3.6	2.7	.....	2.7	.....	8.8
1908.												
1	6.2	5.0	5.2	4.9	5.0	4.0	3.0	2.8	3.2	2.5	3.0	2.6
2	5.4	5.3	5.3	4.7	4.5	3.8	3.0	2.7	3.1	2.4	2.9	4.1
3	5.0	4.2	5.8	4.6	4.5	3.7	3.0	2.7	3.0	2.4	2.8	3.6
4	4.4	4.3	5.6	4.4	4.4	3.8	3.6	2.7	3.0	2.4	2.8	3.1
5	9.5	4.4	5.2	4.3	4.3	4.1	4.7	3.1	2.9	2.4	2.8	3.1
6	7.0	4.5	5.2	4.7	4.5	4.0	4.5	3.8	4.2	2.3	2.7	3.0
7	5.9	4.7	5.1	4.5	4.6	3.9	4.3	4.8	3.9	2.3	2.7	8.0
8	5.6	4.3	5.0	4.3	5.7	3.7	6.2	3.8	3.3	2.2	2.6	9.2
9	5.1	4.2	4.8	4.2	4.8	3.6	4.5	4.6	3.1	2.3	2.6	5.6
10	4.8	4.3	4.7	4.2	4.6	3.5	4.4	4.3	3.0	3.3	2.6	4.7
11	4.6	4.5	4.5	4.1	4.5	3.7	4.1	3.6	2.9	3.6	2.7	4.2
12	10.8	4.7	6.5	4.0	4.3	3.8	4.0	3.2	2.9	2.8	3.3	4.7
13	8.9	5.2	6.5	3.9	4.2	3.5	3.7	3.1	2.8	2.6	3.1	4.9
14	6.9	6.6	5.6	3.9	4.1	3.5	3.5	3.0	2.8	2.5	2.9	4.4
15	5.6	10.0	5.2	3.9	4.0	4.4	3.7	2.9	2.8	2.4	3.0	4.1
16	5.6	11.0	5.0	5.8	4.0	4.3	3.5	2.9	2.7	2.4	3.1	3.9
17	6.1	7.9	4.7	5.0	3.8	3.7	3.5	2.9	2.7	2.4	2.9	3.8
18	5.5	6.6	4.6	4.6	4.2	3.5	3.3	3.0	2.7	2.3	2.8	3.7
19	5.1	6.1	4.5	4.8	4.7	3.4	3.7	3.0	2.6	2.3	2.8	3.6
20	4.9	5.8	4.6	4.6	5.5	3.3	3.7	3.7	2.5	2.3	2.8	3.5
21	4.7	5.3	7.9	4.4	4.6	3.4	3.2	3.3	2.6	2.3	2.7	3.3
22	4.7	5.2	6.1	4.2	4.3	3.4	3.1	5.2	2.6	2.3	2.7	4.8
23	4.7	5.0	5.5	4.1	4.1	3.4	3.0	6.6	2.5	2.4	2.7	8.5
24	4.5	4.9	10.6	4.1	4.4	3.3	3.1	4.3	2.5	4.0	2.7	5.7
25	4.3	4.7	8.6	4.7	4.1	3.4	3.1	4.5	2.5	3.5	2.7	4.9
26	4.2	4.9	6.9	8.3	4.3	3.7	3.0	5.1	2.5	3.0	2.7	4.7
27	4.4	4.5	6.1	6.1	4.2	3.2	3.0	4.3	2.4	2.7	2.7	4.4
28	4.4	4.7	5.7	5.5	4.2	3.1	3.0	3.8	2.4	2.6	2.6	4.1
29	4.2	4.3	5.4	5.0	4.1	3.1	2.9	3.6	2.6	3.2	2.6	4.5
30	4.1	.....	5.2	4.8	4.5	3.0	3.2	3.4	2.7	4.0	2.6	4.5
31	4.0	.....	5.0	.....	4.1	.....	3.0	3.3	.....	3.5	.....	4.8

Rating table for Little Tennessee River at McGhee, Tenn., for 1906 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.20	1,650	3.60	4,380	5.00	8,220	6.80	13,700
2.30	1,790	3.70	4,630	5.10	8,520	7.00	14,320
2.40	1,940	3.80	4,890	5.20	8,820	7.20	14,960
2.50	2,090	3.90	5,150	5.30	9,120	7.40	15,600
2.60	2,250	4.00	5,410	5.40	9,420	7.60	16,240
2.70	2,420	4.10	5,680	5.50	9,720	7.80	16,880
2.80	2,600	4.20	5,950	5.60	10,020	8.00	17,520
2.90	2,790	4.30	6,220	5.70	10,320	8.20	18,180
3.00	2,990	4.40	6,500	5.80	10,620	8.40	18,840
3.10	3,200	4.50	6,780	5.90	10,920	8.60	19,500
3.20	3,420	4.60	7,060	6.00	11,220	8.80	20,160
3.30	3,650	4.70	7,350	6.20	11,840	9.00	20,820
3.40	3,890	4.80	7,640	6.40	12,460	10.00	24,220
3.50	4,130	4.90	7,930	6.60	13,080	11.00	27,720

NOTE.—The above table is applicable only for open-channel conditions. It is based upon 13 discharge measurements made during 1903 to 1908 and one in 1901, and is well defined between gage heights 2.2 feet and 5.0 feet.

Monthly discharge of Little Tennessee River at McGhee, Tenn., for 1907 and 1908.

[Drainage area, 2,470 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	15,900	4,630	6,940	2.81	3.24	A.
February	21,200	4,630	7,490	3.03	3.16	A.
March	14,000	4,630	7,560	3.06	3.53	A.
April	11,200	4,630	6,630	2.69	3.00	A.
May	11,500	4,630	6,950	2.81	3.24	A.
June	16,600	4,380	6,910	2.80	3.12	A.
July	9,720	2,990	4,490	1.82	2.10	A.
August	4,130	2,420	3,140	1.27	1.46	A.
September	13,100	1,940	3,820	1.55	1.73	A.
October	5,150	2,250	3,090	1.25	1.44	A.
November	23,500	2,250	5,680	2.30	2.57	A.
December	20,200	3,420	6,500	2.63	3.03	A.
The year	23,500	1,940	5.770	2.34	31.62	
1908.						
January	27,000	5,410	9,910	4.01	4.62	A.
February	27,700	5,950	9,610	3.89	4.20	A.
March	26,300	6,780	10,400	4.21	4.85	A.
April	18,500	5,150	7,370	2.98	3.32	A.
May	10,300	4,890	6,580	2.66	3.07	A.
June	6,500	2,990	4,420	1.79	2.00	A.
July	11,800	2,790	4,470	1.81	2.09	A.
August	13,100	2,420	4,740	1.92	2.21	A.
September	5,950	1,940	2,760	1.12	1.25	A.
October	5,410	1,650	2,540	1.03	1.19	A.
November	3,650	2,250	2,590	1.05	1.17	A.
December	21,500	2,250	7,230	2.93	3.38	A.
The year	27,700	1,650	6,050	2.45	33.35	

CULLASAJA RIVER AT CULLASAJA, N. C.

This station is located at a wagon bridge at Cullasaja, N. C., 5 miles southeast of Franklin, N. C., and about 1 mile below the mouth of Ellijay Creek. It was established June 13, 1907, in cooperation with the Forest Service to supply data relative to the water resources in the Southern Appalachian Mountains.

Discharge measurements are made from the wagon bridge where the section is excellent for making measurements.[a]

Discharge measurements of Cullasaja River at Cullasaja, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 13	F. A. Murray	37	90	1.60	187
July 18	do	36	79	1.32	131
Do	B. M. Hall, jr	36	80	1.32	126
August 29	F. A. Murray	33	67	.95	78
Do	do	33	71	.95	84
November 9	do	34	64	.92	80
Do	do	34	64	.94	82
1908.					
May 23	M. R. Hall	39	96	1.78	208
Do	do	39	97	1.78	209
Do	do	39	97	1.78	190
December 21	W. A. Lamb	38	91	1.59	172

Daily gage height, in feet, of Cullasaja River at Cullasaja, N. C., for 1907 and 1908.

[Observer, J. M. Moore.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							1.65	1.05	0.9	1.25	0.9	1.5
2							1.55	1.05	1.1	1.15	2.1	1.45
3							1.55	1.0	1.45	1.1	1.8	1.45
4							1.7	1.0	1.0	1.05	1.05	1.35
5							1.65	1.0	1.0	1.3	1.0	1.35
6							1.45	1.2	.95	1.0	1.0	1.35
7							1.4	1.0	1.0	1.0	1.0	1.35
8							1.4	1.0	.95	1.2	1.0	1.3
9							1.3	.95	.9	1.0	.95	2.3
10							1.3	.95	.9	1.0	1.05	3.0
11							1.35	1.1	1.2	.95	1.3	1.8
12							1.7	1.25	.85	.95	1.25	2.0
13						1.6	1.6	1.1	.85	.9	1.1	1.95
14						1.8	1.4	1.25	.9	.9	1.1	3.65
15						1.65	1.65	1.2	.9	.9	1.05	2.85
16						1.65	1.35	1.0	.9	.9	1.05	2.0
17						1.45	1.3	1.05	.85	.9	1.0	2.25
18						1.45	1.3	1.5	.85	.9	2.3	2.2
19						1.5	1.3	1.25	.85	.9	1.5	2.0
20						1.6	1.25	1.55	.8	.9	1.45	1.9
21						1.5	1.15	1.5	.8	.85	2.95	1.8
22						1.45	1.15	1.05	.95	.85	2.25	1.8
23						2.9	1.1	1.0	3.0	.85	2.85	4.0
24						1.75	1.3	1.1	1.65	.8	3.8	3.0
25						2.05	1.1	1.0	1.6	.8	2.4	2.65
26						1.8	1.1	.95	1.0	.8	2.1	2.5
27						1.75	1.1	.9	1.0	1.1	1.8	2.35
28						2.2	1.1	1.0	2.35	1.05	1.75	2.35
29						1.75	1.15	.95	1.8	1.0	1.65	2.15
30						1.4	1.4	.95	1.45	.95	1.6	3.9
31							1.2	.95		.9		2.8
1908.												
1	2.65	2.5	2.35	2.1	2.5	1.8	1.4	1.15	1.0	1.0	1.5	2.35
2	2.4	2.3	2.45	2.5	2.4	1.65	1.4	1.0	1.0	.9	1.3	1.8
3	2.15	2.15	2.3	2.0	2.35	1.6	1.5	1.05	1.1	.9	1.45	1.7
4	2.7	2.0	2.2	2.0	2.35	1.65	2.0	1.0	1.1	.9	1.4	1.5
5	2.8	1.95	2.2	2.05	2.2	1.8	1.7	1.15	2.4	.85	1.4	1.5
6	2.45	2.1	2.2	2.0	2.1	1.75	1.85	1.7	1.85	.85	1.35	1.5
7	2.35	1.95	2.2	1.9	3.0	1.55	1.8	1.3	1.45	.85	1.35	4.6
8	2.2	1.9	2.0	1.9	2.4	1.5	1.75	1.4	1.4	.85	1.25	2.8
9	2.1	1.9	2.05	1.85	2.3	1.5	2.5	1.5	1.3	1.85	1.25	2.5
10	2.0	2.05	2.05	1.85	2.25	1.5	1.95	1.3	1.2	1.9	1.2	2.4

[a] All records of discharge at this station have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Cullasaja River at Cullasaja, N. C., for 1907 and 1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
11	4.1	2.3	2.25	1.8	2.2	1.5	1.85	1.25	1.0	1.1	1.7	2.0
12	4.5	2.9	2.35	1.75	2.1	1.65	1.85	1.15	1.0	1.0	1.4	2.2
13	3.4	3.1	2.05	1.7	2.0	1.5	1.85	1.1	1.0	1.0	1.2	2.0
14	3.05	3.2	2.1	1.7	2.0	.....	1.7	1.05	1.0	1.0	1.75	1.8
15	2.85	6.0	2.0	2.5	2.0	2.25	1.6	1.0	1.1	1.0	1.6	1.75
16	2.8	4.5	2.0	2.35	2.0	1.8	1.5	1.05	1.1	.95	1.4	1.75
17	2.6	4.3	1.95	2.35	2.0	1.75	1.5	1.2	1.1	.9	1.35	1.75
18	2.45	3.1	1.9	2.3	2.0	1.65	1.5	1.15	1.05	.9	1.3	1.75
19	2.35	3.0	1.85	2.2	2.05	1.55	1.5	1.15	1.0	.9	1.3	1.7
20	2.25	2.8	2.6	2.05	2.0	1.55	1.45	1.1	1.0	.9	1.35	1.7
21	2.25	2.7	2.45	2.05	1.95	1.65	1.35	1.1	1.0	.9	1.35	1.7
22	2.2	2.6	2.15	1.95	1.85	1.55	1.3	2.1	1.0	1.15	1.25	3.4
23	2.15	2.5	4.5	1.9	1.8	1.5	1.3	2.0	1.0	3.2	1.25	2.4
24	2.0	2.45	3.5	4.7	1.9	2.15	1.3	3.5	1.0	1.85	1.2	2.3
25	2.0	2.35	3.0	3.4	1.85	1.5	1.3	3.0	.95	1.4	1.2	2.2
26	2.0	2.45	2.8	3.4	2.3	1.45	1.35	2.2	1.0	1.4	1.15	2.0
27	2.0	2.4	2.6	3.0	2.0	1.4	1.2	1.8	1.0	1.2	1.15	1.9
28	1.95	2.35	2.5	2.7	1.9	1.4	1.4	1.75	1.3	2.5	1.15	1.9
29	1.9	2.2	2.4	2.6	1.9	1.4	1.3	1.7	1.0	2.4	1.1	1.9
30	1.9	.....	2.4	2.6	1.85	1.4	1.3	1.5	1.0	2.4	1.1	1.9
31	1.9	.....	2.3	.....	1.8	.....	1.2	1.4	.....	2.4	.....	2.0

Daily discharge, in second-feet, of Cullasaja River at Cullasaja, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	184	94	76	122	76	159
2	.....	.....	.....	.....	.....	.....	167	94	101	108	.....	152
3	.....	.....	.....	.....	.....	.....	167	88	152	101	210	152
4	.....	.....	.....	.....	.....	.....	192	88	88	94	94	136
5	.....	.....	.....	.....	.....	.....	184	88	88	129	88	136
6	.....	.....	.....	.....	.....	.....	152	115	82	88	88	136
7	.....	.....	.....	.....	.....	.....	144	88	88	88	88	136
8	.....	.....	.....	.....	.....	.....	144	88	82	115	88	129
9	.....	.....	.....	.....	.....	.....	129	82	76	88	82	.....
10	.....	.....	.....	.....	.....	.....	129	82	76	88	94	.....
11	.....	.....	.....	.....	.....	.....	136	101	115	82	129	210
12	.....	.....	.....	.....	.....	.....	192	122	70	82	122	248
13	.....	.....	.....	.....	.....	175	175	101	70	76	101	238
14	.....	.....	.....	.....	.....	210	144	122	76	76	101	.....
15	.....	.....	.....	.....	.....	184	184	115	76	76	94	.....
16	.....	.....	.....	.....	.....	184	136	88	76	76	94	248
17	.....	.....	.....	.....	.....	152	129	94	70	76	88	.....
18	.....	.....	.....	.....	.....	152	129	159	70	76	.....	.....
19	.....	.....	.....	.....	.....	159	129	122	70	76	159	248
20	.....	.....	.....	.....	.....	175	122	167	65	76	152	228
21	.....	.....	.....	.....	.....	159	108	159	65	70	.....	210
22	.....	.....	.....	.....	.....	152	108	94	82	70	.....	210
23	.....	.....	.....	.....	.....	.....	101	88	.....	70	.....	.....
24	.....	.....	.....	.....	.....	201	129	101	184	65	.....	.....
25	.....	.....	.....	.....	.....	.....	101	88	175	65	.....	.....
26	.....	.....	.....	.....	.....	210	101	82	88	65	.....	.....
27	.....	.....	.....	.....	.....	201	101	76	88	101	210	.....
28	.....	.....	.....	.....	.....	.....	101	88	.....	94	201	.....
29	.....	.....	.....	.....	.....	201	108	82	210	88	184	.....
30	.....	.....	.....	.....	.....	144	144	82	152	82	175	.....
31	.....	.....	.....	.....	.....	.....	115	82	.....	76	.....	.....
1908.												
1	.....	.....	.....	.....	.....	210	144	108	88	88	159	.....
2	.....	.....	.....	.....	.....	184	144	88	88	76	129	210
3	.....	.....	.....	248	.....	175	159	94	101	76	152	192
4	.....	248	.....	248	.....	184	248	88	101	76	144	159
5	.....	238	.....	.....	.....	210	192	108	.....	70	144	159
6	.....	.....	.....	248	.....	201	219	192	219	70	136	159
7	.....	238	.....	228	.....	167	210	129	152	70	136	.....
8	.....	228	248	228	.....	159	201	144	144	70	122	.....
9	.....	228	.....	219	.....	159	.....	159	129	219	122	.....
10	248	.....	.....	219	.....	159	238	129	115	228	115	.....

(See note at foot of table, next page.)

Daily discharge, in second-feet, of Cullasaja River at Cullasaja, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
11				210		159	219	122	88	101	192	248
12				201		184	219	108	88	88	144	
13				192	248	159	219	101	88	88	115	248
14				192	248		192	94	88	88	201	210
15			248		248		175	88	101	88	175	201
16			248		248	210	159	94	101	82	144	201
17			238		248	201	159	115	101	76	136	201
18			228		248	184	159	108	94	76	129	201
19			219			167	159	108	88	76	129	192
20					248	167	152	101	88	76	136	192
21					238	184	136	101	88	76	136	192
22				238	219	167	129		88	108	122	
23				228	210	159	129	248	88		122	
24	248				228		129		88	219	115	
25	248				219	159	129		82	144	115	
26	248					152	136		88	115	108	248
27	248				248	144	115	210	88		108	238
28	238				228	144	144	201	129		108	238
29	228				228	144	129	192	88		101	238
30	228				219	144	129	159	88		101	238
31	228				210		115	144				248

NOTE.—Daily discharges for 1907 and 1908 based on a well-defined rating curve. On missing days, beginning June 13, 1907, the discharge was greater than 250 second-feet.

NANTAHALA RIVER NEAR NANTAHALA, N. C.

This station was established May 22, 1907, in cooperation with the Forest Service, though discharge measurements referred to a bench mark had been made before. It is at Mathew Cole's footbridge, about 1 mile up the river from Nantahala and just above Nelsons Creek.

A flume for transporting lumber, taking its water from a tributary creek several miles above, passes the station. The water flowing in the flume is measured when the station is visited and is usually about 10 to 12 second-feet. This flow is not included with the regular measurements.

The gage has the same datum as the bench marks formerly used.[a]

Discharge measurements of Nantahala River near Nantahala, N. C., in 1904 to 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1904.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
October 8	O. P. Hall	50	120	0.82	115
1907.					
May 22	F. A. Murray	64	208	1.76	388
August 23	F. P. Thomas	66	190	1.50	326
Do	do	66	190	1.50	323
October 17	O. P. Hall	60	171	1.25	231
1908.					
August 16	F. P. Thomas	65	180	1.29	217

[a] Records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Nantahala River near Nantahala, N. C., for 1907 and 1908.

[Observer, Mathew Cole.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						3.0	1.7	1.4	1.2	1.7	1.2	1.6
2						2.35	1.7	1.4	1.2	1.55	2.05	1.6
3						2.15	1.75	1.4	1.2	1.5	1.65	1.6
4						2.0	1.7	1.4	1.2	1.5	1.5	1.5
5						1.9	1.7	1.4	1.2	1.7	1.4	1.5
6						1.9	1.7	1.4	1.2	1.45	1.4	1.5
7						1.85	1.7	1.4	1.2	1.4	1.3	1.5
8						2.55	1.7	1.3	1.25	1.6	1.3	1.5
9						2.15	1.65	1.3	1.25	1.4	1.3	1.7
10						2.0	1.5	1.3	1.1	1.35	2.3	2.5
11						2.0	1.5	1.3	1.55	1.3	1.75	1.95
12						1.9	2.15	1.3	1.3	1.3	1.6	1.9
13						1.8	2.0	1.55	1.2	1.3	1.6	1.9
14						1.8	1.75	1.5	1.15	1.25	1.5	2.45
15						1.8	1.6	2.0	1.1	1.2	1.5	2.1
16						1.7	1.6	1.65	1.1	1.2	1.5	2.0
17						1.7	1.6	1.45	1.1	1.2	1.4	1.9
18						1.7	1.6	1.5	1.05	1.2	1.4	1.9
19						1.7	1.7	1.5	1.0	1.2	1.4	1.8
20						1.7	1.7	1.4	1.0	1.2	1.4	1.8
21						1.7	1.6	1.5	1.0	1.2	1.8	1.7
22					1.7	1.7	1.5	1.5	1.1	1.2	1.8	1.7
23					1.7	2.05	1.45	1.5	4.0	1.2	2.4	2.75
24					1.7	1.9	1.4	1.5	3.0	1.2	2.65	2.15
25					1.75	1.75	1.4	1.5	1.6	1.1	2.3	2.0
26					2.25	1.7	1.4	1.45	1.4	1.1	2.05	2.0
27					2.05	1.75	1.4	1.3	1.4	1.55	1.9	1.95
28					1.85	1.9	1.4	1.3	2.0	1.4	1.85	1.9
29					1.8	2.35	1.7	1.3	2.1	1.2	1.8	2.0
30					1.8	1.75	1.75	1.3	1.75	1.2	1.7	3.6
31					2.55	.....	1.5	1.25	.....	1.2	.....	2.75
1908.												
1	2.45	2.5	2.2	2.2	2.3	1.75	1.3	1.3	1.4	1.1	1.3	2.1
2	2.3	2.0	2.25	2.15	2.15	1.7	1.3	1.3	1.4	1.1	1.3	1.65
3	2.2	2.0	2.2	2.1	2.1	1.7	1.5	1.3	1.4	1.1	1.3	1.4
4	2.3	2.0	2.2	2.1	2.1	1.7	1.65	1.3	1.3	1.1	1.3	1.35
5	2.8	2.0	2.2	2.1	2.1	1.7	1.95	1.2	2.2	1.1	1.2	1.3
6	2.45	2.2	2.2	2.0	2.0	1.7	1.85	2.0	1.75	1.1	1.2	1.55
7	2.35	2.1	2.2	2.0	2.55	1.7	1.6	1.5	1.45	1.1	1.2	4.0
8	2.3	2.0	2.1	2.0	2.15	1.7	1.9	1.6	1.4	1.1	1.2	2.7
9	2.2	2.0	2.1	2.0	2.1	1.7	2.0	1.8	1.3	1.3	1.2	2.3
10	2.1	2.05	2.0	1.95	2.1	1.7	1.85	1.55	1.3	1.5	1.2	2.0
11	3.4	2.0	2.2	1.9	2.1	1.7	1.7	1.4	1.3	1.2	1.3	2.0
12	3.6	2.2	2.65	1.9	2.05	1.6	1.65	1.4	1.3	1.1	1.25	2.3
13	3.0	2.65	2.35	1.85	2.0	1.6	1.6	1.35	1.3	1.1	1.2	2.0
14	2.75	2.8	2.3	1.8	1.95	1.8	1.6	1.3	1.2	1.1	1.3	1.9
15	2.5	4.2	2.2	2.55	1.9	1.7	1.55	1.3	1.2	1.05	1.3	1.9
16	2.45	3.35	2.15	2.3	1.9	1.7	1.5	1.3	1.2	1.0	1.3	1.8
17	2.4	3.0	2.1	2.15	1.9	1.55	1.5	1.3	1.2	1.0	1.25	1.8
18	2.3	2.9	2.1	2.1	1.9	1.5	1.45	1.25	1.2	1.0	1.2	1.75
19	2.3	2.9	2.0	2.1	1.9	1.5	1.6	1.55	1.2	1.0	1.2	1.7
20	2.3	2.4	2.55	2.05	1.9	1.5	1.5	1.5	1.2	1.0	1.2	1.7
21	2.1	2.3	2.35	2.0	1.9	1.5	1.4	1.5	1.2	1.0	1.2	1.7
22	2.1	2.3	2.3	2.0	1.8	1.5	1.35	2.05	1.1	1.0	1.2	2.65
23	2.0	2.25	3.6	1.95	1.8	1.5	1.3	1.75	1.1	2.2	1.2	2.15
24	2.0	2.2	3.65	1.9	1.9	1.45	1.3	1.7	1.1	1.5	1.2	2.05
25	2.0	2.2	3.0	3.6	1.9	1.4	1.3	2.4	1.1	1.3	1.2	1.95
26	2.2	2.2	2.75	2.65	1.95	1.4	1.3	1.9	1.1	1.3	1.2	1.9
27	2.2	2.2	2.7	2.4	1.85	1.4	1.3	1.65	1.1	1.25	1.2	1.8
28	2.0	2.2	2.55	2.3	1.8	1.4	1.3	1.6	1.3	1.2	1.15	1.8
29	2.0	2.2	2.45	2.3	1.8	1.4	1.6	1.6	1.25	1.85	1.1	1.8
30	2.0	.....	2.4	2.3	1.8	1 3	1.45	1.5	1.1	1.5	1.1	1.8
31	2.0	.....	2.3	.....	1.8	.....	1.3	1.4	.....	1.4	.....	1.95

Daily discharge, in second-feet, of Nantahala River near Nantahala, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							374	282	222	374	222	342
2							374	282	222	327		342
3							390	282	222	312	358	342
4						470	374	282	222	312	312	312
5						438	374	282	222	374	282	312
6						438	374	282	222	297	282	312
7						422	374	282	222	282	252	312
8							374	252	237	342	252	312
9							358	252	237	282	252	374
10						470	312	252	193	267		
11						470	312	252	327	252	390	454
12						438		252	252	252	342	438
13						406	470	312	222	252	342	438
14						406	390	312	208	237	312	
15						406	342	470	193	222	312	
16						374	342	358	193	222	312	
17						374	342	297	193	222	282	438
18						374	342	312	179	222	282	438
19						374	374	312	165	222	282	406
20						374	374	282	165	222	282	406
21						374	342	312	165	222	406	374
22					374	374	312	312	193	222	406	374
23					374		297	312		222		
24					374	438	282	312		222		
25					390	390	282	312	342	193		470
26						374	282	297	282	193		470
27						390	282	252	282	327	438	454
28					422	438	282	252	470	282	422	438
29					406		374	252		222	406	470
30					406	390	390	252	390	222	374	
31							312	237		222		
1908.												
1						390	252	252	282	193	252	
2		470				374	252	252	282	193	252	358
3		470				374	312	252	282	193	252	282
4		470				374	358	252	252	193	252	267
5		470				374	454	222		193	222	252
6				470	470	374	422	470	390	193	222	327
7				470		374	342	312	297	193	222	
8		470		470		374	438	342	282	193	222	
9		470		470		374	470	406	252	252	222	
10			470	454		374	422	327	252	312	222	470
11		470		438		374	374	282	252	222	252	470
12				438		342	358	282	252	193	237	
13				422	470	342	342	267	252	193	222	470
14				406	454	406	342	252	222	193	252	438
15					438	374	327	252		179	252	438
16					438	374	312	252		165	252	406
17					438	327	312	252		165	237	406
18					438	312	297	237		165	222	390
19			470		438	312	342	327		165	222	374
20					438	312	312	312		165	222	374
21				470	438	312	282	312	222	165	222	374
22				470	406	312	267		193	165	222	
23				454	406	312	252	390	193		222	
24				438	438	297	252	374	193	312	222	
25					438	282	252		193	252	222	454
26					454	282	252	438	193	252	222	438
27					422	282	252	358	193	237	222	406
28	470				406	282	252	342	252	222	208	406
29	470				406	282	342	342	237	422	193	406
30	470				406	252	297	312	193	312	193	406
31	470				406		252	282		282		454

NOTE.—Daily discharge for 1907 and 1908 based on a fairly well-defined rating curve. On missing days beginning May 22, 1907, the discharge was greater than 480 second-feet.

21144—IRR 243—10——12

TUCKASEEGEE RIVER NEAR EAST LAPORT, N. C.

This station is located at the steel wagon bridge about 2½ miles downstream from East Laport, N. C. It was established May 27, 1907, in cooperation with the Forest Service. The station is about 2 miles below the mouth of Caney Fork.

Discharge measurements are made from the bridge. The current is good, and the bed is partly rock and should be fairly constant.[a]

Discharge measurements of Tuckaseegee River near East Laport, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 27	F. A. Murray	113	228	2.00	459
August 26	F. P. Thomas	107	172	1.20	220
Do	do	107	172	1.20	244
October 21	O. P. Hall	98	153	1.15	197
1908.					
April 17	Warren E. Hall	118	296	2.48	735
August 18	F. P. Thomas	110	198	1.58	324

Daily gage height, in feet, of Tuckaseegee River near East Laport, N. C., for 1907 and 1908.

[Observer, William Rogers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						3.2	1.8	1.4	1.4	1.5	1.2	1.6
2						2.4	1.7	1.3	1.3	1.5	2.1	1.5
3						2.2	2.0	1.3	1.3	1.5	1.5	1.4
4						2.1	1.8	1.3	1.2	1.5	1.2	1.3
5						2.0	1.7	1.3	1.2	1.5	1.2	1.2
6						1.9	1.7	1.3	1.1	1.4	1.2	1.2
7						1.9	1.6	1.3	1.1	1.4	1.2	1.2
8						2.8	1.5	1.4	1.3	1.3	1.1	1.2
9						2.1	1.5	1.4	1.2	1.3	1.1	1.4
10						2.0	1.5	1.4	1.1	1.3	1.5	3.9
11						1.8	1.6	1.4	1.1	1.3	1.4	2.5
12						1.8	2.0	1.4	1.1	1.3	1.4	2.0
13						1.8	1.8	1.4	1.1	1.2	1.3	2.0
14						1.9	1.6	1.4	1.1	1.2	1.3	4.0
15						1.8	1.6	1.4	1.1	1.2	1.3	3.0
16						1.7	1.7	1.5	1.1	1.2	1.3	2.5
17						1.6	1.7	1.5	1.1	1.2	1.3	2.4
18						1.6	1.6	1.6	1.1	1.2	1.6	2.3
19						1.9	1.5	1.5	1.1	1.2	1.5	2.0
20						1.7	1.5	1.4	1.0	1.2	1.5	2.0
21						1.7	1.6	1.3	1.1	1.2	3.5	1.8
22						1.8	1.6	1.3	1.1	1.2	2.2	1.7
23						1.9	1.5	1.3	5.0	1.2	3.4	5.0
24						2.0	1.4	1.3	3.0	1.2	3.5	4.0
25						2.1	1.5	1.2	2.0	1.2	2.2	3.0
26						1.9	1.5	1.2	1.4	1.2	2.0	2.5
27					2.0	1.8	1.4	1.2	1.4	1.2	2.0	2.4
28					1.9	2.0	1.4	1.2	1.3	1.2	1.9	2.2
29					1.8	2.0	1.4	1.2	1.3	1.2	1.9	2.0
30					1.8	1.8	1.7	1.2	1.3	1.2	1.7	4.0
31					2.0		1.4	1.2		1.2		3.0

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Tuckaseegee River near East Laport, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	2.6	3.0	2.0	2.4	2.5	2.0	1.5	1.6	1.6	1.2	1.7	1.5
2	2.5	2.7	2.0	2.3	2.5	2.0	1.5	1.5	1.6	1.2	1.7	1.6
3	2.2	2.6	2.0	2.3	2.4	2.0	1.7	1.5	1.5	1.2	1.6	1.5
4	2.1	2.3	2.1	2.2	2.3	2.0	1.7	1.5	1.5	1.2	1.6	1.5
5	2.9	2.2	2.2	2.2	2.3	1.9	2.6	1.6	1.5	1.2	1.5	1.5
6	2.7	2.4	2.4	2.2	2.3	1.9	2.2	1.9	1.9	1.1	1.5	1.5
7	2.6	2.3	2.3	2.2	4.5	1.8	2.5	1.8	1.8	1.1	1.5	5.0
8	2.4	2.2	2.3	2.2	3.0	1.8	2.6	1.7	1.8	1.1	1.4	3.0
9	2.2	2.2	2.3	2.2	2.9	1.8	2.6	1.6	1.7	1.2	1.4	2.7
10	2.1	2.2	2.2	2.1	2.6	2.4	2.5	1.5	1.6	2.5	1.4	2.4
11	7.0	2.3	2.2	2.1	2.4	2.1	2.4	1.9	1.5	2.0	1.4	2.0
12	5.5	3.0	3.0	2.1	2.3	2.0	2.1	1.4	1.5	1.3	1.4	2.5
13	4.0	3.4	2.5	2.0	2.2	2.0	1.9	1.4	1.5	1.3	1.4	2.0
14	3.4	3.6	2.5	2.0	2.2	2.1	1.8	1.4	1.4	1.3	1.6	1.9
15	3.0	9.6	2.4	4.0	2.1	2.3	1.7	1.5	1.4	1.3	1.5	1.8
16	2.9	4.0	2.4	3.0	2.1	1.9	2.0	1.5	1.4	1.2	1.5	1.7
17	2.8	3.2	2.3	2.8	2.2	1.8	1.9	1.5	1.4	1.2	1.5	1.7
18	2.6	3.0	2.3	2.5	2.2	1.8	1.8	1.4	1.3	1.2	1.5	1.6
19	2.6	3.0	2.2	2.4	2.1	1.7	1.7	1.4	1.3	1.1	1.5	1.6
20	2.5	2.8	2.2	2.3	2.1	1.9	1.6	1.9	1.3	1.1	1.5	1.6
21	2.4	2.7	3.0	2.2	2.1	1.8	1.6	2.0	1.3	1.1	1.5	1.5
22	2.3	2.6	2.9	2.1	2.0	1.7	1.5	3.4	1.3	1.1	1.4	2.0
23	2.3	2.6	2.7	2.1	2.0	1.7	1.5	2.7	1.3	2.6	1.4	3.5
24	2.2	2.5	4.2	2.0	2.1	1.7	1.5	2.3	1.2	2.0	1.4	2.5
25	2.1	2.4	3.5	6.4	2.0	1.7	1.4	3.7	1.2	1.5	1.4	2.3
26	2.2	2.2	3.0	2.0	2.0	1.7	1.3	2.6	1.2	1.4	1.4	2.2
27	2.2	2.0	3.0	3.0	2.4	1.6	1.5	2.5	1.3	1.4	1.4	2.0
28	2.2	2.5	2.9	2.7	2.5	1.6	1.6	2.4	1.3	2.2	1.4	2.0
29	2.1	2.0	2.6	2.6	2.6	1.6	1.7	2.1	1.2	2.9	1.4	2.0
30	2.1	.....	2.5	2.5	2.4	1.5	1.7	1.9	1.2	2.0	1.5	2.1
31	2.1	.....	2.5	.....	2.1	.....	1.6	1.6	.....	1.8	.....	2.3

Daily discharge, in second-feet, of Tuckaseegee River near East Laport, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	390	265	265	295	205	325
2	.....	.....	.....	.....	.....	.....	355	235	235	295	510	295
3	.....	.....	.....	.....	.....	560	470	235	235	295	295	265
4	.....	.....	.....	.....	.....	510	390	235	205	295	205	235
5	.....	.....	.....	.....	.....	470	355	235	205	295	205	235
6	.....	.....	.....	.....	.....	430	355	235	180	265	205	235
7	.....	.....	.....	.....	.....	430	325	235	180	265	205	235
8	.....	.....	.....	.....	.....	.....	295	265	235	235	180	235
9	.....	.....	.....	.....	.....	510	295	265	205	235	180	265
10	.....	.....	.....	.....	.....	470	295	265	180	235	295	.....
11	.....	.....	.....	.....	.....	390	325	265	180	235	265	.....
12	.....	.....	.....	.....	.....	390	470	265	180	235	265	470
13	.....	.....	.....	.....	.....	390	390	265	180	205	235	470
14	.....	.....	.....	.....	.....	430	325	265	180	205	235	.....
15	.....	.....	.....	.....	.....	390	325	265	180	205	235	.....
16	.....	.....	.....	.....	.....	355	355	295	180	205	235	.....
17	.....	.....	.....	.....	.....	325	355	295	180	205	235	.....
18	.....	.....	.....	.....	.....	325	325	325	180	205	325	610
19	.....	.....	.....	.....	.....	430	295	295	180	205	295	470
20	.....	.....	.....	.....	.....	355	295	265	160	205	295	470
21	.....	.....	.....	.....	.....	855	325	235	180	205	.....	390
22	.....	.....	.....	.....	.....	390	325	235	180	205	560	355
23	.....	.....	.....	.....	.....	430	295	235	.....	205	.....	.....
24	.....	.....	.....	.....	.....	470	265	235	.....	205	.....	.....
25	.....	.....	.....	.....	.....	510	295	205	470	205	560	.....
26	.....	.....	.....	.....	.....	430	295	205	265	205	470	.....
27	.....	.....	.....	.....	470	390	265	205	265	205	470	.....
28	.....	.....	.....	.....	430	470	265	205	235	205	430	560
29	.....	.....	.....	.....	390	470	265	205	235	205	430	470
30	.....	.....	.....	.....	390	390	355	205	235	205	355	.....
31	.....	.....	.....	.....	470	.....	265	205	.....	205	.....	.....

(See note at foot of table on next page.)

Daily discharge, in second-feet, of Tuckaseegee River near East Laport, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	.....	.....	470	.....	.....	470	295	325	325	205	355	295
2	.....	.....	470	610	.....	470	295	295	325	205	355	325
3	560	.....	470	610	.....	470	355	295	295	205	325	295
4	510	610	510	560	610	470	355	295	295	205	325	295
5	.....	560	560	560	610	430	.....	325	295	205	295	295
6	.....	.....	.....	560	610	430	560	430	430	180	295	295
7	.....	610	610	560	.....	390	.....	390	390	180	295	.....
8	.....	560	610	560	.....	390	.....	355	390	180	265	.....
9	560	560	610	560	.....	390	.....	325	355	205	265	.....
10	510	560	560	510	.....	.....	.....	295	325	.....	265	.....
11	.....	610	560	510	.....	510	.....	430	295	470	265	470
12	.....	.....	.....	510	610	470	510	265	295	235	265	.....
13	.....	.....	.....	470	560	470	430	265	295	235	265	470
14	.....	.....	.....	470	560	510	390	265	265	235	325	430
15	.....	.....	.....	.....	510	610	355	295	265	235	295	390
16	.....	.....	.....	.....	510	430	470	295	265	205	295	355
17	.....	.....	610	.....	560	390	430	295	265	205	295	355
18	.....	.....	610	.....	560	390	390	265	235	205	295	325
19	.....	.....	560	.....	510	355	355	265	235	180	295	325
20	.....	.....	560	610	510	430	325	430	235	180	295	325
21	.....	.....	.....	560	510	390	325	470	235	180	295	295
22	610	.....	.....	510	470	355	295	.....	235	180	265	470
23	610	.....	.....	510	470	355	295	.....	235	.....	265	.....
24	560	.....	.....	470	510	355	295	610	205	470	265	.....
25	510	.....	.....	.....	470	355	265	.....	205	295	265	610
26	560	560	.....	470	470	355	235	.....	205	265	265	560
27	560	470	.....	.....	.....	325	295	.....	235	265	265	470
28	560	.....	.....	.....	.....	325	325	.....	235	560	265	470
29	510	470	.....	.....	.....	325	355	510	205	.....	265	470
30	510	.....	.....	.....	.....	295	355	430	205	470	295	510
31	510	.....	.....	.....	510	.....	325	325	.....	390	.....	610

NOTE.—Daily discharge for 1907 and 1908 based on a well-defined rating curve. On missing days beginning May 27, 1907, the discharge was greater than 650 second-feet.

TUCKASEEGEE RIVER AT BRYSON, N. C.

This station is located at the highway bridge in the town of Bryson, N. C., one-half mile below the mouth of Deep Creek. The original station was established in June, 1896, at the Southern Railway bridge 3 miles above Bryson, but was abandoned early in 1897 on account of poor section for measurements. The present station was established November 7, 1897, and has been maintained continuously since that time. This station furnishes data especially useful for a number of purposes, including estimates of water power, which is very abundant both above and below the station.

Bryson is about 15 miles above the mouth of Tuckaseegee River where it joins Little Tennessee River. Oconolufty River is an important tributary coming in about 8 miles above Bryson.

Discharge measurements are made at the bridge where the current and other conditions are good. The gage datum has not been changed.[a]

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Discharge measurements of Tuckaseegee River at Bryson, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 24	F. A. Murray	190	950	1.80	1,440
August 23	F. P. Thomas	190	827	1.37	1,010
October 19	O. P. Hall	190	834	1.22	686
1908.					
August 19	F. P. Thomas	190	787	1.29	884

Daily gage height, in feet, of Tuckaseegee River at Bryson, N. C., for 1907 and 1908.

[Observer, J. M. Welch.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.8	2.6	2.9	1.7	1.8	2.9	1.7	1.35	1.2	1.6	1.2	1.65
2	2.6	2.2	3.2	1.6	1.75	2.3	1.85	1.3	1.15	1.5	2.3	1.6
3	2.4	2.1	2.4	1.6	2.4	2.1	1.9	1.3	1.25	1.5	1.7	1.5
4	2.3	2.25	2.1	1.6	2.5	1.9	1.7	1.3	1.3	1.45	1.4	1.5
5	2.25	2.9	2.0	2.1	2.1	1.8	1.6	1.3	1.3	1.85	1.35	1.4
6	2.2	2.4	2.0	2.0	2.3	1.75	1.6	1.35	1.2	1.5	1.35	1.5
7	2.1	2.2	2.5	1.9	2.8	1.7	1.5	1.3	1.2	1.4	1.3	1.5
8	2.1	2.1	2.3	1.8	2.4	3.0	1.5	1.45	1.6	1.5	1.3	1.45
9	2.0	2.0	2.1	1.8	2.3	2.1	1.45	1.3	1.35	1.4	1.25	2.65
10	2.0	2.0	3.0	1.7	2.2	2.0	1.4	1.8	1.25	1.35	2.3	2.8
11	1.95	1.9	2.4	1.65	2.6	1.9	1.45	1.4	1.65	1.3	1.85	2.1
12	1.95	1.85	2.2	1.7	2.3	1.8	2.45	1.45	1.4	1.3	1.6	1.8
13	1.9	1.85	2.1	1.6	2.1	1.8	1.9	1.45	1.25	1.3	1.5	1.75
14	1.9	1.8	2.2	1.6	2.1	1.9	1.6	1.35	1.2	1.3	1.5	2.65
15	1.85	1.7	2.2	1.6	2.2	1.8	1.8	1.5	1.2	1.25	1.4	2.25
16	1.8	1.7	2.0	1.8	2.0	1.7	1.7	1.65	1.2	1.25	1.4	2.05
17	1.9	1.7	2.0	1.75	1.9	1.65	2.45	1.5	1.2	1.25	1.4	1.9
18	1.8	1.7	1.95	1.7	1.9	1.6	1.9	1.55	1.2	1.2	1.7	1.9
19	1.8	1.7	1.9	2.45	1.8	1.7	1.65	1.4	1.2	1.2	1.75	1.8
20	2.1	1.7	1.85	1.9	1.8	1.6	1.6	1.3	1.1	1.2	1.6	1.7
21	1.8	1.7	1.8	1.8	1.75	1.55	1.55	1.5	1.1	1.2	2.45	1.7
22	1.8	1.65	1.75	2.0	1.7	1.7	1.50	1.5	1.5	1.2	2.0	1.65
23	1.75	1.65	1.7	2.65	1.9	2.0	1.4	1.4	4.2	1.2	3.25	3.85
24	1.7	1.8	1.7	2.1	1.9	1.8	1.4	1.5	2.05	1.2	3.45	3.55
25	1.7	1.85	1.7	2.0	1.8	1.9	1.45	1.4	1.7	1.2	2.55	2.35
26	1.8	2.1	1.8	1.9	2.1	1.8	1.4	1.4	1.5	1.2	2.2	2.1
27	1.7	2.0	1.7	2.2	1.9	1.65	1.4	1.3	1.45	1.45	2.0	2.0
28	1.7	2.9	1.65	2.0	1.8	3.2	1.5	1.3	1.4	1.35	1.9	1.9
29	1.7	.....	1.65	1.9	1.7	2.2	1.6	1.25	2.4	1.2	1.8	1.9
30	1.65	.....	1.6	1.9	1.7	1.8	1.5	1.2	1.8	1.2	1.7	4.3
31	1.7	.....	1.8	.....	2.2	.....	1.4	1.2	.....	1.2	.....	2.9
1908.												
1	2.55	2.3	2.4	2.2	2.45	1.9	1.4	1.3	1.45	1.15	1.55	1.85
2	2.3	1.95	2.45	2.2	2.3	1.8	1.4	1.3	1.4	1.1	1.5	1.7
3	2.2	1.85	2.5	2.2	2.2	1.8	1.75	1.3	1.4	1.1	1.4	1.5
4	2.25	1.9	2.45	2.15	2.1	2.1	1.85	1.3	1.4	1.1	1.4	1.4
5	3.0	1.9	2.45	2.1	2.05	1.9	2.25	1.45	1.95	1.1	1.3	1.35
6	2.45	2.1	2.45	2.1	2.1	1.8	2.2	2.5	2.0	1.1	1.3	1.5
7	2.3	1.9	2.5	2.0	3.15	1.8	2.0	1.8	1.6	1.1	1.25	5.0
8	2.2	1.9	2.5	2.0	2.45	1.7	2.15	1.65	1.5	1.1	1.25	2.75
9	2.1	1.85	2.4	1.95	2.3	1.7	2.2	1.7	1.4	1.4	1.2	2.15
10	2.0	1.9	2.3	1.9	2.2	1.7	2.2	1.6	1.4	1.9	1.2	1.9
11	2.5	2.0	2.2	1.9	2.1	2.0	1.95	1.5	1.35	1.35	1.4	1.8
12	4.6	2.45	3.1	1.8	2.05	1.75	1.8	1.4	1.3	1.2	1.45	2.5
13	3.25	2.8	2.5	1.8	2.0	1.7	1.7	1.3	1.3	1.2	1.3	1.95
14	2.95	3.15	2.4	1.8	2.0	1.8	1.7	1.3	1.3	1.15	1.3	1.8
15	2.55	6.6	2.3	2.5	2.0	1.95	1.6	1.4	1.3	1.15	1.5	1.7
16	2.5	3.85	2.2	2.5	1.95	1.8	1.65	1.4	1.25	1.1	1.4	1.7
17	2.4	3.2	2.1	2.3	2.1	1.7	1.6	1.45	1.25	1.1	1.3	1.6
18	2.3	2.85	2.1	2.2	2.2	1.6	1.5	1.5	1.25	1.1	1.3	1.6
19	2.2	2.85	2.0	2.25	2.95	1.6	1.85	1.4	1.2	1.1	1.3	1.6
20	2.1	2.6	2.65	2.1	2.35	1.6	1.5	1.4	1.2	1.1	1.3	1.5

Daily gage height, in feet, of Tuckaseegee River at Bryson, N. C., for 1907 and 1908– Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
21	2.1	2.55	3.2	2.0	2.2	1.6	1.4	1.3	1.2	1.1	1.3	1.5
22	2.1	2.35	2.75	1.9	2.1	1.6	1.45	2.55	1.2	1.1	1.3	2.9
23	2.0	2.35	3.7	1.9	2.0	1.6	1.45	1.85	1.2	1.85	1.25	2.5
24	1.9	2.2	4.6	1.9	2.2	1.6	1.5	2.0	1.2	1.6	1.25	2.15
25	1.9	2.25	3.4	4.9	2.05	1.85	1.4	2.95	1.15	1.4	1.2	2.2
26	1.9	2.35	2.95	3.4	2.15	1.6	1.4	2.2	1.15	1.25	1.2	2.05
27	2.1	2.2	2.75	2.9	2.1	1.5	1.4	1.85	1.1	1.1	1.2	1.9
28	1.9	2.0	2.6	2.65	2.05	1.5	1.5	1.7	1.25	1.4	1.2	1.95
29	1.9	2.1	2.45	2.45	2.45	1.4	1.5	1.6	1.2	2.3	1.2	2.0
30	1.8	.....	2.3	2.5	2.25	1.4	1.4	1.55	1.15	1.9	1.2	1.95
31	1.8	.....	2.3	.....	1.95	.....	1.4	1.5	.....	1.6	.....	2.5

Rating table for Tuckaseegee River at Bryson, N. C., for 1904 to 1908.

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	550	2.40	2,300	3.70	5,040	5.00	8,800
1.20	650	2.50	2,480	3.80	5,290	5.20	9,475
1.30	750	2.60	2,660	3.90	5,540	5.40	10,250
1.40	860	2.70	2,850	4.00	5,800	5.60	11,125
1.50	980	2.80	3,050	4.10	6,070	5.80	12,100
1.60	1,100	2.90	3,250	4.20	6,350	6.00	13,200
1.70	1,230	3.00	3,460	4.30	6,630	6.20	14,360
1.80	1,370	3.10	3,670	4.40	6,920	6.40	15,520
1.90	1,510	3.20	3,890	4.50	7,220	6.60	16,680
2.00	1,660	3.30	4,110	4.60	7,530	6.80	17,840
2.10	1,810	3.40	4,330	4.70	7,840		
2.20	1,970	3.50	4,560	4.80	8,160		
2.30	2,130	3.60	4,800	4.90	8,480		

NOTE.—The above table is applicable only for open-channel conditions. It is based upon discharge measurements made during 1904 to 1907 and is well defined below gage height 3.0 feet. Above gage height 6.0 feet the rating curve is a tangent, the difference being 580 per tenth. Above gage height 3.0 feet the table is the same as for 1903, and above 5.0 feet the same as for 1901–2.

Monthly discharge of Tuckaseegee River at Bryson, N. C., for 1907 and 1908.

[Drainage area, 662 square miles.]

Month.	Discharge in second-feet.			Per square mile.	Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.			
1907.						
January	3,050	1,160	1,620	2.45	2.82	B.
February	3,250	1,160	1,690	2.55	2.66	B.
March	3,890	1,100	1,810	2.73	3.15	B.
April	2,760	1,100	1,480	2.24	2.50	B.
May	3,050	1,230	1,760	2.66	3.07	B.
June	3,890	1,040	1,640	2.48	2.77	B.
July	2,390	860	1,170	1.77	2.04	B.
August	1,370	650	861	1.30	1.50	B.
September	6,350	550	1,060	1.60	1.78	B.
October	1,440	650	791	1.19	1.37	B.
November	4,440	650	1,480	2.24	2.50	B.
December	6,630	860	1,980	2.99	3.45	B.
The year	6,630	550	1,450	2.18	29.61	
1908.						
January	7,530	1,370	2,260	3.41	3.93	B.
February	16,700	1,440	2,780	4.20	4.53	B.
March	7,530	1,660	2,760	4.17	4.81	B.
April	8,480	1,370	2,210	3.34	3.73	B.
May	3,780	1,580	2,010	3.04	3.50	B.
June	1,810	860	1,260	1.90	2.12	B.
July	2,050	860	1,230	1.86	2.14	B.
August	3,360	750	1,210	1.83	2.11	B.
September	1,660	550	802	1.21	1.35	B.
October	2,130	550	783	1.18	1.36	B.
November	1,040	650	762	1.15	1.28	B.
December	8,800	805	1,810	2.73	3.15	B.
The year	16,700	550	1,660	2.50	34.01	

SCOTTS CREEK NEAR DILLSBORO, N. C.

This station was established August 26, 1907, in cooperation with the Forest Service. It is at a footbridge about 1 mile from Dillsboro, and about the same distance above the mouth of the creek which is a large tributary of Tuckaseegee River.

The discharge measurements are made from the footbridge, where the current is mostly swift and the bed is fairly constant.

The station was discontinued on June 30, 1908.[a]

Discharge measurements of Scotts Creek near Dillsboro, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 26	F. A. Murray	39	66	1.63	85
October 21	O. P. Hall	40	63	1.61	79
1908.					
April 16	Warren E. Hall	40	86	2.10	171

Daily gage height, in feet, of Scotts Creek near Dillsboro, N. C., for 1907 and 1908.

[Observer, E. B. Monleith.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1	.....	1.6	1.8	1.6	1.8	16	.....	1.65	1.6	1.7	1.9
2	.....	1.6	1.8	2.05	1.8	17	.....	1.65	1.6	1.7	1.85
3	.....	2.1	1.7	1.75	1.8	18	.....	1.6	1.6	2.05	1.8
4	.....	1.75	1.8	1.65	1.8	19	.....	1.6	1.6	1.8	1.8
5	.....	1.65	1.9	1.65	1.7	20	.....	1.6	1.6	1.75	1.75
6	.....	1.6	1.8	1.6	1.8	21	.....	1.6	1.6	2.0	1.8
7	.....	1.6	1.75	1.6	1.75	22	.....	2.6	1.6	1.95	1.8
8	.....	2.25	1.8	1.6	1.7	23	.....	2.85	1.6	2.7	2.2
9	.....	1.7	1.7	1.6	1.9	24	.....	1.8	1.6	2.3	2.0
10	.....	1.7	1.7	2.35	2.35	25	.....	1.7	1.6	2.1	1.9
11	.....	1.75	1.7	1.85	2.0	26	1.6	1.7	1.6	2.0	1.9
12	.....	1.7	1.7	1.8	1.9	27	1.6	1.7	1.85	2.0	1.9
13	.....	1.65	1.65	1.8	1.95	28	1.65	2.1	1.7	1.9	1.9
14	.....	1.6	1.6	1.7	2.0	29	1.6	2.0	1.6	1.9	1.9
15	.....	1.6	1.6	1.7	1.9	30	1.6	1.85	1.6	1.8	2.8
						31	1.6	.....	1.6	.....	2.2

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	2.0	3.8	2.15	2.2	2.1	1.9	16	2.2	2.45	2.0	2.1	2.05	1.9
2	2.0	1.9	2.15	2.1	2.1	1.9	17	2.1	2.35	2.0	2.0	2.1	1.9
3	2.0	1.9	2.1	2.1	2.1	1.95	18	2.1	2.3	2.0	2.1	2.1	1.85
4	2.45	2.0	2.1	2.1	2.0	1.95	19	2.0	2.3	2.05	2.05	2.4	1.8
5	2.2	2.0	2.1	2.2	2.0	1.9	20	2.0	2.2	2.6	2.0	2.1	1.85
6	2.1	2.05	2.1	2.1	2.0	1.9	21	2.0	2.2	2.45	2.0	2.05	1.9
7	2.1	2.0	2.1	2.1	2.45	1.9	22	2.0	2.1	2.3	1.95	2.0	1.8
8	2.0	1.95	2.1	2.1	2.15	1.85	23	2.0	2.1	3.4	1.95	2.25	1.8
9	2.0	1.9	2.0	2.05	2.1	1.85	24	1.95	2.0	2.9	1.9	2.1	1.9
10	2.0	2.0	2.0	2.0	2.1	1.85	25	1.95	2.05	2.6	3.0	2.15	1.8
11	2.55	2.1	2.15	2.0	2.0	1.8	26	2.0	2.1	2.45	2.35	2.1	1.8
12	2.45	2.15	2.4	2.0	2.0	1.8	27	2.0	2.0	2.4	2.25	2.0	1.8
13	2.25	2.2	2.1	1.95	2.0	1.95	28	1.9	2.0	2.3	2.15	2.15	1.7
14	2.2	2.65	2.1	1.95	2.0	2.05	29	1.9	2.1	2.25	2.1	2.1	1.7
15	2.2	3.0	2.05	2.3	2.0	2.15	30	1.9	.....	2.2	2.2	2.0	1.7
							31	1.9	.....	2.2	.....	2.0	.....

[a] All records of discharge at this station have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily discharge, in second-feet, of Scotts Creek near Dillsboro, N. C., for 1907 and 1908.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1	.....	78	110	78	110	16	.....	85	78	92	130
2	.....	78	110	160	110	17	.....	85	78	92	120
3	.....	170	92	101	110	18	.....	78	78	160	110
4	.....	101	110	85	110	19	.....	78	78	110	110
5	.....	85	130	85	92	20	.....	78	78	101	101
6	.....	78	110	78	110	21	.....	78	78	150	110
7	.....	78	101	78	101	22	.....	.....	78	140	110
8	.....	200	110	78	92	23	.....	.....	78	.....	190
9	.....	92	92	78	130	24	.....	110	78	210	150
10	.....	92	92	.....	.....	25	.....	92	78	170	130
11	.....	101	92	120	150	26	78	92	78	150	130
12	.....	92	92	110	130	27	78	92	120	150	130
13	.....	85	85	110	140	28	85	170	92	130	130
14	.....	78	78	92	150	29	78	150	78	130	130
15	.....	78	78	92	130	30	78	120	78	110	.....
						31	78	.....	78	.....	190

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	150	.....	180	190	170	130	16	190	.....	150	170	160	130
2	150	130	180	170	170	130	17	170	.....	150	150	170	130
3	150	130	170	170	170	140	18	170	210	150	170	170	120
4	.....	150	170	170	150	140	19	150	210	160	160	.....	110
5	190	150	170	190	150	130	20	150	190	.....	150	170	120
6	170	160	170	170	150	130	21	150	190	.....	150	160	130
7	170	150	170	170	.....	130	22	150	170	210	140	150	110
8	150	140	170	170	180	120	23	150	170	.....	140	200	110
9	150	130	150	160	170	120	24	140	150	.....	130	170	130
10	150	150	150	150	170	120	25	140	160	.....	.....	180	110
11	.....	170	180	150	150	110	26	150	170	.....	.....	170	110
12	.....	180	.....	150	150	110	27	150	150	.....	200	150	110
13	200	190	170	140	150	140	28	130	150	210	180	180	92
14	190	.....	170	140	150	160	29	130	170	200	170	170	92
15	190	.....	160	210	150	180	30	130	.....	190	190	150	92
							31	130	.....	190	.....	150	.....

NOTE.—Daily discharges for 1907 and 1908 based on an approximate rating curve. On missing days, August 26, 1907, to June 30, 1908, the discharge was greater than 220 second-feet.

OCONOLUFTY RIVER NEAR CHEROKEE, N. C.

This station was established August 27, 1907, in cooperation with the Forest Service. It is located about 500 feet below the mouth of Soco Creek, a large tributary of Oconolufty River, and 1½ miles from Cherokee post-office. A flume for transporting lumber and wood, taking its water from tributary streams, generally uses 10 or 12 second-feet of water which is not included in the station records.

Discharge measurements are made from a boat at ordinary times but can also be made in two parts by measuring Soco Creek and the river above the junction, both measurements being made from bridges.

The station was discontinued on June 30, 1908.[a]

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Discharge measurements of Oconolufty River near Cherokee, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 27	F. A. Murray	100	250	1.81	237
October 19	O. P. Hall	98	230	1.67	232
1908.					
April 20	Warren E. Hall			2.43	546

Daily gage height, in feet, of Oconolufty River near Cherokee, N. C., for 1907 and 1908.

[Observer, W. R. Maney.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1		1.7	2.7	2.8	2.1	16		1.8	1.7	2.65	2.3
2		1.7	2.6	2.5	2.1	17		1.75	1.7	2.6	2.2
3		1.7	2.5	2.45	2.0	18		1.8	1.65	2.9	2.2
4		1.7	1.9	2.45	2.0	19		1.75	1.65	2.6	2.0
5		1.65	2.0	2.4	1.95	20		1.60	1.65	2.1	1.95
6		1.6	2.0	2.35	1.9	21		1.6	1.6	2.75	3.2
7		1.6	2.1	2.3	1.9	22		2.4	1.6	2.5	3.0
8		1.95	2.0	2.25	1.9	23		3.6	1.6	5.3	3.3
9		1.85	1.9	2.2	1.85	24		3.0	1.6	4.0	2.1
10		1.75	1.85	3.2	3.0	25		2.8	1.55	3.4	2.1
11		2.4	1.8	2.2	2.75	26		2.75	1.55	3.1	2.1
12		1.85	1.8	2.15	2.35	27	1.8	2.0	1.7	2.85	2.1
13		1.8	1.8	2.1	2.5	28	1.95	3.0	1.7	2.7	2.1
14		1.8	1.75	2.8	2.4	29	1.8	2.8	1.65	2.5	2.8
15		1.8	1.7	2.75	2.4	30	1.75	2.75	1.65	2.1	5.0
						31	1.7		1.6		3.1

Day.	Jan.	Feb.	Mar.	Apr.	May	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	3.0	2.2	2.4	2.1	2.3	2.3	16	2.15	4.2	2.1	3.1	2.15	2.15
2	3.4	2.3	3.0	2.15	2.2	2.2	17	2.2	3.1	2.1	2.1	3.0	2.1
3	2.8	2.3	2.4	2.1	2.1	2.1	18	2.2	3.0	2.15	2.1	2.1	2.15
4	2.8	2.3	2.3	2.1	2.1	2.3	19	2.1	2.3	2.1	2.15	4.0	2.1
5	3.0	2.2	2.1	2.15	2.15	2.1	20	2.1	2.2	4.2	2.1	3.0	2.3
6	2.8	2.1	3.0	2.1	2.1	2.2	21	2.15	2.15	3.1	2.15	2.1	2.2
7	2.1	2.2	3.0	2.2	3.5	2.3	22	2.2	2.1	3.15	2.2	2.15	3.1
8	2.15	2.1	2.4	2.15	2.1	2.1	23	2.2	2.1	4.2	2.3	2.1	2.15
9	2.15	2.1	2.1	2.1	2.15	2.1	24	2.2	2.15	3.0	2.1	2.15	2.1
10	2.15	2.2	2.1	2.2	2.1	2.15	25	2.15	2.1	3.1	7.0	2.2	3.5
11	3.1	2.2	2.15	2.2	2.1	2.1	26	2.15	2.15	3.15	3.1	2.1	2.1
12	3.1	2.1	2.4	2.1	2.15	2.1	27	2.2	2.15	2.1	3.2	2.15	2.15
13	3.1	3.0	3.0	2.15	2.1	2.15	28	2.3	2.1	2.1	2.1	2.2	2.1
14	3.3	3.1	2.4	2.1	2.2	2.3	29	2.1	2.15	2.15	2.1	3.0	2.0
15	2.15	7.0	2.1	3.1	2.1	2.1	30	2.15		2.1	2.1	2.15	2.1
							31	2.1		2.15		2.2	

Daily discharge, in second-feet, of Oconolufty River near Cherokee, N. C., for 1907 and 1908.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1	.....	220	.....	.....	390	16	.....	260	220	.....	485
2	.....	220	.....	585	390	17	.....	240	220	.....	435
3	.....	220	585	560	345	18	.....	260	202	.....	435
4	.....	220	300	560	345	19	.....	240	202	.....	345
5	.....	202	345	535	322	20	.....	185	202	390	322
6	.....	185	345	510	300	21	.....	185	185	.....	.....
7	.....	185	390	485	300	22	.....	535	185	585	.....
8	.....	322	345	460	300	23	.....	.....	185	.....	.....
9	.....	280	300	435	280	24	.....	.....	185	.....	390
10	.....	240	280	.....	.....	25	.....	.....	170	.....	390
11	.....	535	260	435	.....	26	.....	.....	170	.....	390
12	.....	280	260	412	510	27	260	345	220	.....	390
13	.....	260	260	390	585	28	322	.....	220	.....	390
14	.....	260	240	.....	535	29	260	.....	202	585	.....
15	.....	260	220	.....	535	30	240	.....	202	390	.....
						31	220	.....	185	.....	.....

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	.....	435	535	390	485	485	16	412	.....	390	.....	412	412
2	.....	485	.....	412	435	435	17	435	.....	390	390	.....	390
3	.....	485	535	390	390	390	18	435	.....	412	390	390	412
4	.....	485	485	390	390	485	19	390	485	390	412	.....	390
5	.....	435	390	412	412	390	20	390	435	.....	390	.....	485
6	.....	390	.....	390	390	435	21	412	412	.....	412	390	435
7	390	435	.....	435	.....	485	22	435	390	.....	435	412	.....
8	412	390	535	412	390	390	23	435	390	.....	485	390	412
9	412	390	390	390	412	390	24	435	412	.....	390	412	390
10	412	435	390	435	390	412	25	412	390	.....	.....	435	.....
11	.....	435	412	435	390	390	26	412	412	.....	.....	390	390
12	.....	390	535	390	412	390	27	435	412	390	.....	412	412
13	.....	.....	.....	412	390	412	28	485	390	390	390	435	390
14	.....	.....	535	390	435	485	29	390	412	412	390	.....	345
15	412	.....	390	.....	390	390	30	412	.....	390	390	412	390
							31	390	.....	412	.....	435	.....

NOTE.—Daily discharge for 1907 and 1908, based on an approximate rating curve. On missing days August 27, 1907, to June 30, 1908, the discharge was greater than 600 second-feet.

CHEOAH RIVER AT MILLSAPS, N. C.

This station was established on August 24, 1907, in cooperation with the Forest Service. It is located about 500 feet above the mouth of Snowbird Creek, which is a large tributary.

Discharge measurements are made from a boat or by wading.

Measurements are also made of Snowbird Creek which, together with these at the gage, give the flow of the river below the junction. The records published for the station are for the Cheoah River above Snowbird Creek.

The station was discontinued on June 30, 1908.[a]

Discharge measurements of Cheoah River at Millsaps, N. C., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
August 24	F. A. Murray	64	101	1.50	99
October 16	O. P. Hall	61	88	1.30	68

[a] All records of discharge at this station have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled, "Water powers of North Carolina."

Daily gage height, in feet, of Cheoah River at Millsaps, N. C., for 1907 and 1908.

[Observer, Miss Birdie Nickols.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1		1.4	1.35	1.3	1.5	16		1.15	1.3	1.5	1.7
2		1.35	1.5	2.0	1.75	17		1.1	1.25	1.5	2.0
3		1.3	1.4	1.5	1.8	18		1.1	1.3	1.75	1.9
4		1.25	1.35	1.25	1.6	19		1.1	1.25	1.5	1.8
5		1.2	1.4	1.3	1.75	20		1.1	1.3	1.6	1.75
6		1.2	1.45	1.3	1.5	21		1.9	1.25	1.5	1.55
7		1.4	1.4	1.35	1.75	22		1.5	1.2	1.55	1.75
8		1.25	1.5	1.3	1.6	23		4.1	1.25	3.0	1.85
9		1.3	1.45	1.5	2.0	24	1.5	1.4	1.3	2.0	1.9
10		1.2	1.4	2.3	1.5	25	1.5	1.3	1.25	1.5	1.8
11		1.6	1.4	1.75	1.75	26	1.4	1.35	1.2	2.0	2.0
12		1.3	1.45	1.5	1.85	27	1.3	1.75	1.5	1.7	2.1
13		1.25	1.4	1.6	2.0	28	1.3	1.25	1.4	1.8	1.9
14		1.15	1.45	1.5	1.75	29	1.3	1.30	1.3	1.5	1.9
15		1.2	1.3	1.75	1.85	30	1.3	1.4	1.25	1.6	5.5
						31	1.2		1.3		3.8

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	2.5	2.0	2.0	2.0	2.0	1.5	16	2.25	3.0	2.0	1.45	2.0	1.45
2	2.25	2.0	2.0	2.0	2.0	1.5	17	2.75	3.0	2.0	1.5	2.0	1.4
3	2.0	2.5	2.1	2.0	2.0	2.0	18	2.5	2.5	1.9	1.5	2.0	1.4
4	2.0	2.0	2.2	1.95	2.0	1.5	19	2.75	2.75	2.0	1.5	3.0	1.4
5	3.5	2.0	2.1	1.9	2.5	1.5	20	2.6	2.6	2.0	1.5	2.5	1.4
6	2.75	1.9	2.0	1.9	2.0	1.5	21	2.65	2.2	2.5	2.0	2.0	1.4
7	2.25	2.0	1.9	1.95	2.0	1.5	22	2.2	2.1	2.0	2.0	2.0	1.4
8	2.5	2.1	2.0	1.95	2.0	1.5	23	2.15	1.9	2.0	2.0	2.0	1.4
9	2.9	2.15	2.0	1.95	2.0	1.5	24	2.1	2.1	3.0	1.9	2.5	1.35
10	2.7	2.0	2.0	1.9	2.0	2.5	25	2.0	2.0	2.5	3.0	2.0	1.3
11	2.9	2.0	1.9	1.9	2.0	2.0	26	2.0	2.0	2.3	2.5	2.0	1.3
12	2.8	2.5	2.0	1.5	2.5	1.5	27	2.0	2.0	2.0	2.4	1.5	1.3
13	2.85	2.75	2.0	1.5	2.4	1.5	28	2.9	2.1	2.0	2.0	1.5	1.3
14	2.7	2.9	2.0	1.4	2.45	1.5	29	2.8	2.2	2.1	2.0	1.5	1.3
15	2.6	6.0	1.9	1.45	2.0	1.45	30	2.7		2.5	2.0	1.5	1.3
							31	2.5		2.0		1.5	

Daily discharge, in second-feet, of Cheoah River at Millsaps, N. C., for 1907 and 1908.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1		83	76	68	99	16		47	68	99	132
2		76	99			17		40	61	99	
3		68	83	99		18		40	68		
4		61	76	61	115	19		40	61	99	
5		54	83	68		20		40	68	115	
6		54	91	68	99	21			61	99	107
7		83	83	76		22		99	54	107	
8		61	99	68	115	23			61		
9		68	91	99		24	99	83	68		
10		54	83		99	25	99	68	61	99	
11		115	83			26	83	76	54		
12		68	91	99		27	68		99	132	
13		61	83	115		28	68	61	83		
14		47	91	99		29	68	68	68	99	
15		54	68			30	68	83	61	115	
						31	54		68		

(See note at foot of table on next page.)

Daily discharge, in second-feet, of Cheoah River at Millsaps, N. C., for 1907 and 1908—Continued.

Day.	Apr.	May.	June.	Day.	Apr.	May.	June.
1908.				1908.			
1			99	16	91		91
2			99	17	99		83
3				18	99		83
4			99	19	99		83
5			99	20	99		83
6			99	21			83
7			99	22			83
8			99	23			83
9			99	24			76
10				25			68
11				26			68
12	99		99	27		99	68
13	99		99	28		99	68
14	83		99	29		99	68
15	91		91	30		99	68
				31		99	

NOTE.—Daily discharge for 1907 and 1908 based on an approximate rating curve. On missing days, from August 24, 1907, to June 30, 1908, the discharge was greater than 140 second-feet.

CLINCH RIVER AT CLINCHPORT, VA.

Clinch River rises in the Cumberland Mountains, in southern Virginia, and flows in a southwesterly direction, generally parallel to Holston River. It discharges into Tennessee River at Kingston, Tenn., 104 miles above Chattanooga, and 79 miles below Knoxville. The country drained by this river includes about 4,390 square miles, is mountainous, and has meager transportation facilities.

The gaging station is located in Clinchport at the railroad bridge about 400 feet east of the Virginia and Southwestern Railroad station. It was established June 7, 1907, in cooperation with the Forest Service, to obtain data for use in connection with studies of the water resources of the southern Appalachian Mountains. The station is a short distance below the mouth of Stock Creek and about 1½ miles above Copper Creek.

Discharge measurements are made from the railroad bridge, where the current is rather sluggish during low water, and the bed is probably slightly shifting.

Discharge measurements of Clinch River at Clinchport, Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage. height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 15	Warren E. Hall	202	918	1.30	757
Do	B. M. Hall, jr	202	910	1.30	734
September 7	do	207	810	.81	430
1908.					
February 24	Warren E. Hall	227	1,150	2.10	1,530
July 2	F. P. Thomas	229	971	1.14	664
Do	Warren E. Hall	229	971	1.14	655

Daily gage height, in feet, of Clinch River at Clinchport, Va., for 1907 and 1908.

[Observer, C. R. Lane.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							1.9	1.6	0.8	1.0	0.7	1.9
2							1.5	2.6	.9	.9	.9	1.7
3							1.3	1.6	1.2	.8	2.5	1.6
4							1.2	1.4	1.4	.8	1.9	1.5
5							1.1	1.1	1.0	.9	1.5	1.4
6							1.0	1.4	.9	1.0	1.3	1.3
7						2.0	1.2	1.9	.8	1.0	1.2	1.2
8						2.3	1.1	1.7	1.0	1.1	1.2	1.1
9						7.2	1.0	1.7	.9	1.1	1.1	1.1
10						4.6	1.0	2.0	.8	1.0	4.2	1.3
11						4.8	1.1	1.5	1.6	.9	10.0	1.8
12						8.5	1.2	1.3	1.4	.8	4.9	3.1
13						5.6	1.6	1.2	1.3	.8	3.4	2.5
14						18.8	2.2	1.8	1.2	.8	2.7	2.2
15						10.0	2.0	1.4	1.0	.7	2.3	2.1
16						5.6	1.6	1.2	.9	.7	1.9	2.3
17						4.2	1.5	1.3	.8	.7	1.7	2.1
18						3.3	1.3	2.7	.8	.6	1.8	2.0
19						2.9	1.2	3.0	.7	.6	2.6	1.9
20						2.6	1.1	2.2	.7	.6	2.9	1.7
21						2.3	1.0	2.1	.7	.6	2.6	1.6
22						2.2	.9	1.7	1.3	.6	2.3	1.5
23						1.9	.8	1.6	2.1	.6	2.1	2.2
24						1.9	.8	1.5	2.3	.6	8.0	3.7
25						2.0	1.7	1.5	2.1	.6	6.5	3.4
26						1.7	1.6	1.4	1.6	.5	4.5	2.8
27						1.6	1.4	1.4	1.3	.6	3.5	2.4
28						1.4	1.7	1.2	1.1	.7	2.9	2.2
29						1.2	1.3	1.1	1.1	.6	2.5	2.0
30						2.9	2.2	1.0	1.0	.6	2.1	4.5
31							1.9	.9		.6		7.3
1908.												
1	4.7	2.2	3.0	2.8	2.0	1.9	1.2	.8	.6	.5	1.4	1.4
2	3.7	2.9	4.3	11.3	1.9	1.5	1.2	.7	.6	.5	1.1	1.8
3	3.1	2.4	4.5	8.2	1.9	1.4	1.1	.6	.5	.5	1.0	1.8
4	2.6	2.2	3.8	5.6	1.9	1.3	1.0	.6	.5	.5	.8	1.4
5	3.3	2.3	3.4	4.2	1.8	1.6	1.0	.6	.6	.4	.8	1.4
6	4.0	3.5	6.6	3.5	1.9	2.5	1.0	.6	3.0	.4	.7	1.3
7	3.5	4.9	5.9	3.1	2.3	1.9	1.2	.8	3.7	.4	.7	2.5
8	3.1	4.2	4.4	2.7	3.1	1.6	1.6	.8	2.3	.4	.6	4.3
9	2.7	3.4	3.5	2.5	2.8	1.4	1.2	1.0	1.7	.4	.6	3.9
10	2.3	2.9	3.2	2.3	2.5	1.3	1.1	1.1	1.3	.7	.6	2.7
11	2.1	3.2	2.8	2.2	2.2	1.3	1.0	1.6	1.1	1.1	.7	2.2
12	3.9	3.7	3.4	2.3	2.0	1.2	.9	1.1	1.0	.8	1.5	3.3
13	7.4	5.2	3.9	2.5	1.8	1.1	.8	.9	.9	.7	1.7	3.4
14	4.9	5.5	3.7	2.3	1.7	1.0	.8	.8	.8	.6	1.4	2.9
15	3.7	6.9	3.4	2.2	1.5	1.1	1.6	.7	.8	.6	1.3	2.6
16	3.3	8.0	3.1	2.1	1.5	3.6	1.0	.8	.7	.6	1.2	2.2
17	2.9	5.4	2.9	2.0	1.4	2.5	1.2	.8	.7	.5	1.2	1.9
18	2.7	4.1	4.7	1.9	1.4	1.8	1.0	1.2	.7	.4	1.2	1.7
19	2.5	3.4	3.7	1.9	1.4	1.4	1.0	1.5	.6	.4	1.3	1.6
20	2.3	3.0	5.0	1.9	1.9	1.2	.9	1.2	.6	.4	1.3	1.6
21	2.2	2.7	4.9	1.8	3.2	1.6	.8	1.1	.6	.4	1.3	1.6
22	2.1	2.4	4.3	1.7	2.7	1.7	.7	1.9	.6	.4	1.2	1.7
23	2.1	2.2	4.2	1.6	2.4	7.7	.7	2.2	.6	.5	1.1	5.0
24	2.0	2.1	4.6	1.5	2.2	3.7	.6	1.7	.5	.7	1.0	4.2
25	1.9	2.0	4.9	1.7	2.1	2.8	.7	1.3	.5	1.0	1.0	3.4
26	1.8	2.2	4.1	4.2	2.0	2.1	.7	1.0	.5	.8	.9	3.7
27	2.3	2.8	3.4	3.6	1.9	1.7	.7	.9	.5	.7	.9	5.0
28	3.7	2.6	3.0	2.9	1.9	1.5	.7	.8	.5	.7	.8	3.6
29	3.1	2.4	2.7	2.4	2.0	1.3	.7	.8	.5	.9	.8	3.0
30	2.6		2.6	2.1	2.9	1.3	1.1	.8	.5	1.1	.9	2.8
31	2.2		2.4		2.4		1.0	.7		1.3		3.0

HIWASSEE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The Hiawassee, or, as it is more commonly written, Hiwassee River, rises in the mountains of the Blue Ridge, in western North Carolina and northern Georgia, whence, flowing in a northwesterly direction, it breaks through the Unaka Range, and enters Tennessee River 36 miles above Chattanooga and 148 miles below Knoxville. The Hiwassee receives the tributary waters of the Ocoee about 12 miles above Charleston and 6 miles below Savannah Ford or Farm, which is held to be the head of navigation.

Its drainage area, comprising about 2,700 square miles, is equivalent to the western slope of the mountainous divide between Little Tennessee and Hiwassee rivers, which divide is a cross range between the Blue Ridge and the Smoky Mountains. The altitude of this tract ranges between 1,500 and 5,000 feet. Spurs from 5 to 20 miles long reach from the divide toward the river, while deep valleys extend from the river far into the mountains.

The mountain sides are steep and in many places rocky, while the creek valleys, of which there are six prominent ones, have considerable areas of alluvial flats and rolling foothills.

Even the alluvial flats along the river and creeks have a large proportion of clay, and the foothills are almost entirely clay. The mountain sides are loamy, the coves are very fertile, the ridges light and often stony.

HIWASSEE RIVER NEAR HAYESVILLE, N. C.

This station is located at the iron wagon bridge known as Barnard Bridge, 2½ miles east of Hayesville. It was established May 20, 1907, in cooperation with the Forest Service and has been continued to supply general run-off and water-power data. The station is about 1 mile below the mouth of Shooting Creek and 4 miles above Tusquitee Creek, both of which are important tributaries.

The gage is a vertical rod attached to a maple tree on left bank, about 200 feet above the bridge.

Discharge measurements are made from the single span bridge where the current is swift and the bed is composed largely of rock and is permanent.[a]

Discharge measurements of Hiwassee River near Hayesville, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 20	F. A. Murray	89	136	1.41	437
August 22	F. P. Thomas	90	134	1.32	390
Do	F. A. Murray	88	132	1.32	382
October 14	O. P. Hall	89	131	1.00	242
1908.					
August 14	F. P. Thomas	78	98	0.88	198
November 20	M. R. Hall	84	120	1.01	237
Do	do	84	119	1.01	235

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Hiwassee River near Hayesville, N. C., for 1907 and 1908.

[Observer, Mrs. V. A. Barnard.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						3.4	1.3	1.25	1.0	1.3	0.9	1.25
2						1.9	1.3	1.2	.9	1.2	1.4	1.2
3						1.8	1.3	1.15	1.0	1.2	1 05	1.2
4						1.7	1.7	1.1	1.1	1 2	1.05	1.2
5						1.55	1.4	1.1	1.1	1.25	1.0	1.15
6						1.45	1.3	1.1	1.0	1.15	1.1	1.15
7						1.45	1.3	1.1	.95	1.1	1.0	1.15
8						2.3	1.3	1.2	1.0	1.45	1.0	1.1
9						1.9	1.3	1.1	1.0	1.15	.95	1.35
10						1.8	1.25	1.1	1 3	1.1	1.5	2.5
11						1.8	1.5	1.05	1.6	1.0	1.3	1.8
12						1.55	1.6	1.3	1.15	1.0	1.2	1.55
13						1.5	2.1	1.1	1.1	1.0	1.2	1.5
14						1.8	1.5	1.35	1.0	1.0	1.1	2.5
15						1.5	1.4	2.7	1.0	1.0	1.05	2.3
16						1.45	1.5	1.5	.95	1.0	1.0	1.9
17						1.4	1.4	1.3	.92	.95	1.0	1.8
18						1.4	1.35	1.7	.92	.9	1.4	1.7
19						1.4	1.4	1.45	.9	.9	1.2	1.6
20					1.4	1.4	1.4	1.3	.9	.9	1.15	1.5
21					1.4	1.4	1.35	1.35	.89	.9	1.9	1.4
22					1.4	1.35	1.3	1.35	1.05	.9	1.6	1.4
23					1.4	1.5	1.25	1.3	9.3	.9	2.1	2.9
24					1.4	1.6	1.2	1.35	2.1	1.0	2.9	2.2
25					1.4	1.55	1.2	1.2	1.5	.95	1.9	2.0
26					2.2	1.45	1.2	1.15	1.3	.9	1.6	1.9
27					1.55	1.40	1.15	1.1	1.2	1.4	1.5	1.8
28					1.4	1.40	1.15	1.05	1.8	1.1	1.4	1.7
29					1.4	1.50	1.1	1.05	1.8	1.0	1.3	1.6
30					1.4	1.40	2.1	1.00	1.5	.95	1.25	3.4
31					1.9	.....	1.3	1.00	.....	.9	.....	2.4
1908.												
1	2.10	2.40	1.70	1.95	2.00	1.45	1.05	.90	1.00	.80	1.20	1.50
2	1.90	1.90	1.70	1.90	1.90	1.40	1.00	.90	.95	.78	1.10	1.40
3	1.80	1.80	1.95	1.85	1.95	1.40	1.20	.90	.90	.76	1.05	1.20
4	1.70	1.75	1.90	1.80	1.80	1.50	1.20	.90	.90	.75	1.20	1.15
5	3.10	1.70	1.80	1.75	1.80	1.40	1.90	1.00	.95	.74	1.05	1.10
6	2.35	2.00	1.80	1.90	1.80	1.40	1.50	1.30	1.50	.74	1.05	1.10
7	2.25	1.80	1.75	1.80	2.50	1.35	1.50	1.10	1.20	.74	1.05	6.20
8	2.00	1.70	1.70	1.75	1.95	1.35	1.90	1.10	1.10	.72	1.00	2.60
9	1.80	1.65	1.70	1.70	1.90	1.30	2.20	1.40	1.05	.90	.98	1.90
10	1.70	2.20	1.65	1.70	1.85	1.30	1.70	1.05	1.00	1.50	.95	1.80
11	1.75	2.40	1.60	1.65	1.75	1.40	1.70	1.00	1.00	1.05	1.00	1.50
12	5.00	2.70	2.40	1.60	1.70	1.30	1.40	.95	1.00	.95	1.10	1.80
13	3.10	2.60	1.90	1.60	1.65	1.25	1.30	.90	.95	.85	1.05	1.55
14	2.50	2.50	1.85	1.55	1.60	1.60	1.25	.90	.90	.84	1.15	1.50
15	2.30	7.90	1.80	2.40	1.60	1.45	1.20	.90	.90	.82	1.15	1.40
16	2.10	3.80	1.75	2.20	1.55	1.30	1.30	.85	.85	.80	1.05	1.30
17	2.20	3.00	1.65	2.05	1.55	1.25	1.20	.85	.80	.80	1.05	1.30
18	2.05	2.60	1.60	1.95	1.60	1.30	1.15	.90	.80	.80	1.05	1.30
19	1.90	2.63	1.60	2.15	2.10	1.20	1.30	.85	.80	.80	.98	1.35
20	1.85	2.35	2.50	2.00	1.70	1.15	1.15	1.10	.80	.78	.97	1.30
21	1.80	2.20	2.60	1.90	1.60	1.25	1.10	.90	.80	.78	.97	1.25
22	1.80	2.05	2.20	1.80	1.55	1.30	1.05	1.50	.80	.76	.95	2.50
23	1.80	2.00	5.20	1.80	1.50	1.20	1.00	1.35	.80	2.00	.94	2.15
24	1.70	1.95	4.90	1.75	1.70	1.20	1.00	1.35	.80	1.50	.94	1.85
25	1.65	1.90	3.20	4.90	1.60	1.20	1.10	1.95	.80	1.20	.92	1.70
26	1.60	2.05	2.75	2.90	1.70	1.10	1.10	1.60	.80	1.10	.90	1.60
27	1.90	1.90	2.50	2.60	1.70	1.10	1.05	1.40	.80	1.00	.90	1.50
28	1.70	1.80	2.20	2.30	1.60	1.10	1.00	1.20	.95	1.10	.90	1.50
29	1.75	1.80	2.15	2.15	1.50	1.10	1.10	1.10	.85	2.10	.90	1.40
30	1.60	.....	2.05	2.15	1.60	1.05	1.05	1.10	.80	1.50	.88	1.40
31	1.50	.....	2.00	.....	1.50	.....	1 00	1.05	.....	1.35	.....	1.50

Daily discharge, in second-feet, of Hiwassee River near Hayesville, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							370	344	236	370	204	344
2							370	318	204	318	430	318
3							370	296	236	318	255	318
4								274	274	318	255	318
5							430	274	274	344	236	296
6						465	370	274	274	296	274	296
7						465	370	274	220	274	236	296
8							370	318	236	465	236	274
9							370	274	236	296	220	400
10							344	274	370	274	500	
11							500	255		236	370	
12								370	296	236	318	
13						500		274	274	236	318	500
14							500	400	236	236	274	
15						500	430		236	236	255	
16						465	500	500	220	236	236	
17						430	430	370	210	220	236	
18						430	400		210	204	430	
19						430	430	465	204	204	318	
20					430	430	430	370	204	204	296	500
21					430	430	400	400	201	204		430
22					430	400	370	400	255	204		430
23					430	500	344	370		204		
24					430		318	400		236		
25					430		318	318	500	220		
26						465	318	296	370	204		
27						430	296	274	318	430	500	
28					430	430	296	255		274	430	
29					430	500	274	255		236	370	
30					430	430		236	500	220	344	
31							370	236		204		
1908.												
1						465	255	204	236	176	318	500
2						430	236	204	220	171	274	430
3						430	318	204	204	166	255	318
4						500	318	204	204	164	318	296
5						430		236	220	162	255	274
6						430	500	370	500	162	255	274
7						400	500	274	318	162	255	
8						400		274	274	157	236	
9						370		430	255	204	230	
10						370		255	236	500	220	
11						430		274	236	255	236	500
12						370	430	220	236	220	274	
13						344	370	204	220	190	255	
14							344	204	204	187	296	500
15						465	318	204	204	182	296	430
16						370	370	190	190	176	255	370
17						344	318	190	176	176	255	370
18						370	296	204	176	176	255	370
19						318	370	190	176	176	230	400
20						296	296	274	176	171	226	370
21						344	274	204	176	171	226	344
22						370	255	500	176	166	220	
23					500	318	236	400	176		217	
24						318	236	400	176	500	217	
25						318	274		176	318	210	
26						274	274		176	274	204	
27						274	255	430	176	236	204	500
28						274	236	318	220	274	204	500
29					500	255	274	274	190		204	430
30							255	274	176	500	198	430
31	500				500		236	255		400		500

NOTE.—Daily discharge for 1907 and 1908 based on a well-defined rating curve. On missing days, beginning May 20, 1907, the discharge was greater than 530 second-feet.

HIWASSEE RIVER AT MURPHY, N. C.

This station is located at the highway bridge in Murphy, N. C., about 80 feet above the Louisville and Nashville Railroad bridge. The station was established July 26, 1896, and the record is continuous except for a short period from August 8 to October 19, 1897. There has been no change in gage datum since October 20, 1897, but prior to 1903 a wire gage was used which was broken a number of times, introducing uncertainty in the gage height records. The first gage was different.

The records are very valuable for water power estimates as well as other run-off problems.

The station is one-half mile above the mouth of Valley River. Backwater from Valley River is not apt to disturb the rating, though such an effect is possible.

At the measuring section the current is good and fairly regular, but the bed, which is rock, is uneven, requiring careful work in making soundings.[a]

Discharge measurements of Hiwassee River at Murphy, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 21	F. A. Murray	169	413	5.72	804
August 23	do	168	454	5.98	963
October 12	O. P. Hall	165	370	5.38	507
1908.					
April 15	M. R. Hall	174	627	6.96	2,250
April 17	do	172	560	6.57	1,670
August 15	F. P. Thomas	160	324	5.16	375
November 19[b]	M. R. Hall	168	404	5.92	415
November 20[b]	do	168	403	5.90	408

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

[b] Discharge measurements affected by fish-trap dam below the station; reduction in discharge from this cause over 50 per cent at a stage of 5.9 feet.

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Daily gage height, in feet, of Hiwassee River at Murphy, N. C., for 1907 and 1908.

[Observer, William Mingus.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	6.9	6.35	6.25	6.05	5.95	6.75	5.65	5.6	5.35	5.85	5.3	5.65
2	6.75	7.3	8.3	5.75	5.9	6.6	5.65	5.55	5.3	5.7	5.35	5.6
3	6.6	6.6	7.1	5.7	5.85	6.3	5.6	5.45	5.35	5.6	5.7	5.55
4	6.45	6.4	6.6	5.7	6.3	6.1	6.05	5.45	5.45	5.55	5.45	5.5
5	6.35	7.6	6.4	5.65	5.85	6.0	5.6	5.4	5.7	5.65	5.4	5.45
6	6.25	6.9	6.25	6.0	5.8	5.75	5.55	5.45	5.3	5.5	5.4	5.45
7	6.2	6.55	6.15	5.9	6.25	5.75	5.5	5.45	5.3	5.45	5.4	5.45
8	6.15	6.35	6.25	5.95	6.1	5.8	5.45	5.4	5.3	5.6	5.35	5.45
9	6.1	6.25	6.1	5.85	6.0	6.4	5.4	5.4	5.7	5.5	5.35	5.45
10	6.1	6.15	6.25	5.85	5.95	6.2	5.4	5.35	6.4	5.45	5.65	6.7
11	6.05	6.1	6.25	5.75	6.4	6.0	5.75	5.35	6.55	5.4	5.95	6.1
12	6.05	6.05	6.15	5.85	5.85	5.9	5.85	6.05	5.5	5.4	5.7	5.9
13	6.0	6.0	6.1	5.85	5.8	5.8	7.25	5.70	5.4	5.35	5.6	5.8
14	5.95	5.95	6.05	5.75	6.05	6.25	5.9	5.60	5.35	5.35	5.5	6.8
15	5.95	5.9	6.2	5.7	6.05	5.85	5.75	6.60	5.3	5.3	5.5	6.35
16	5.95	5.85	6.05	5.85	5.95	5.75	5.9	6.05	5.3	5.35	5.45	6.1
17	5.9	5.85	6.0	5.85	5.9	5.7	5.7	5.85	5.3	5.3	5.45	5.95
18	5.9	5.85	6.0	5.8	5.85	5.95	5.7	5.9	5.3	5.3	5.65	5.9
19	5.85	5.8	5.95	6.2	5.8	5.75	6.05	6.05	5.25	5.3	5.6	5.8
20	6.0	5.85	5.9	5.95	5.75	5.7	5.8	5.75	5.25	5.3	5.6	5.7
21	5.9	5.8	5.85	5.85	5.75	5.65	5.6	6.35	5.25	5.3	5.85	5.75
22	5.85	5.75	5.85	5.8	5.75	5.7	5.55	6.5	5.3	5.25	5.9	5.65
23	5.85	5.75	5.8	7.2	5.65	6.05	5.5	6.1	11.4	5.3	6.6	7.0
24	5.85	5.75	5.8	6.65	5.65	6.0	5.45	5.9	6.85	5.3	7.4	6.5
25	5.8	6.15	5.75	6.3	5.75	6.45	5.4	5.8	5.95	5.3	6.5	6.35
26	5.85	5.9	5.8	6.15	5.95	5.8	5.45	5.6	5.7	5.25	6.15	6.05
27	5.8	6.45	5.75	6.45	6.05	5.75	5.5	5.5	5.6	5.3	5.9	5.95
28	5.8	6.15	5.7	6.05	5.8	5.7	5.6	5.45	5.65	5.7	5.85	5.95
29	5.75	.....	5.7	6.0	5.7	6.05	5.4	5.4	6.8	5.35	5.75	5.9
30	5.75	.....	5.7	6.0	5.65	5.75	8.7	5.4	6.1	5.3	5.7	6.95
31	5.75	.....	5.7	.....	6.05	.....	5.85	5.35	.....	5.3	.....	7.0
1908.												
1	6.55	7.3	6.2	6.4	6.45	5.8	5.25	5.2	5.25	5.0	a 6.0	a 6.3
2	6.35	6.55	6.1	6.3	6.3	5.7	5.3	5.15	5.2	5.0	a 5.95	a 6.4
3	6.15	6.35	6.4	6.2	6.25	5.65	5.45	5.1	5.2	5.0	a 5.9	a 6.1
4	6.05	6.3	6.3	6.3	6.15	5.85	5.5	5.2	5.15	4.95	a 6.25	a 6.0
5	6.9	6.25	6.2	6.2	6.1	5.75	6.45	5.3	5.2	5.0	a 6.0	a 6.0
6	8.0	6.55	6.2	6.4	6.15	6.0	5.8	5.6	6.2	5.0	a 5.9	a 6.0
7	6.7	6.3	6.1	6.2	7.7	5.7	5.9	5.5	5.5	4.95	a 5.9	9.9
8	6.45	6.2	6.1	6.1	6.6	5.65	6.1	5.45	5.35	5.0	a 5.9	7.2
9	6.25	6.2	6.05	6.0	6.4	5.6	6.8	6.0	5.3	5.2	a 5.85	6.55
10	6.15	6.25	6.1	6.1	6.25	5.6	6.25	5.4	5.25	6.35	a 5.85	6.2
11	6.1	6.9	6.1	6.0	6.15	5.85	6.2	5.25	5.2	5.35	a 6.0	6.0
12	9.2	6.95	7.2	6.9	6.1	5.6	5.75	5.2	5.2	5.2	a 6.1	6.6
13	7.0	6.95	6.6	6.0	6.0	5.5	5.6	5.15	5.15	a 5.2	a 5.9	6.2
14	6.75	6.95	6.4	5.9	5.95	6.25	5.55	5.2	5.15	a 5.3	a 6.0	6.0
15	6.65	10.6	6.3	6.1	5.9	5.85	5.5	5.1	5.1	a 5.35	a 6.2	5.9
16	6.6	8.1	6.2	6.7	5.95	5.6	5.7	5.15	5.1	a 5.3	a 6.0	5.85
17	6.65	6.85	6.1	6.6	5.9	5.55	5.4	5.1	5.1	a 5.4	a 6.0	5.75
18	6.55	6.3	6.1	6.3	5.85	5.5	5.35	5.15	5.1	a 5.4	a 5.9	5.75
19	6.45	6.85	6.0	6.7	6.35	5.55	5.75	5.15	5.05	a 5.4	a 5.9	5.75
20	6.3	6.6	7.0	6.5	6.1	5.5	5.4	5.5	5.1	a 5.4	a 5.9	5.7
21	6.3	6.5	7.4	6.3	5.9	5.5	5.35	5.2	5.1	a 5.45	a 5.9	5.7
22	6.25	6.4	6.8	6.2	5.85	5.6	5.3	6.3	5.05	a 5.45	a 5.8	6.45
23	6.15	6.35	7.4	6.15	5.8	5.45	5.25	5.7	5.1	a 6.35	a 5.8	6.85
24	6.05	6.3	9.9	6.05	6.25	5.4	5.3	6.0	5.05	a 6.4	a 5.8	6.45
25	6.05	6.2	8.0	8.1	6.0	5.45	5.25	6.85	5.0	a 5.9	a 5.8	6.25
26	6.1	6.5	7.3	7.6	6.2	5.4	5.2	5.9	5.0	a 5.85	a 5.85	6.1
27	6.7	6.3	7.0	7.1	6.1	5.35	5.25	5.25	5.0	a 5.75	a 5.8	6.0
28	6.5	6.2	6.8	6.7	5.9	5.3	5.2	5.5	5.0	a 5.9	a 5.8	5.9
29	6.1	6.1	6.7	6.5	5.85	5.35	5.45	5.4	5.2	a 5.6	a 5.8	6.0
30	6.0	.....	6.5	6.4	6.2	5.3	5.3	5.3	5.15	a 6.3	a 5.7	5.85
31	6.0	.....	6.4	.....	6.9	.....	5.2	5.3	.....	a 6.1	.....	6.15

a Gage heights October 13 to December 6, 1908, affected by backwater from temporary fish-trap dam about 200 feet below the station. See discharge measurements November 19 and 20, 1908.

Rating table for Hiwassee River at Murphy, N. C., for 1907 and 1908

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
4.90	235	6.10	1,125	7.30	2,830	9.00	6,520
5.00	285	6.20	1,230	7.40	3,030	9.20	6,960
5.10	340	6.30	1,340	7.50	3,230	9.40	7,400
5.20	400	6.40	1,455	7.60	3,440	9.60	7,840
5.30	465	6.50	1,575	7.70	3,660	9.80	8,280
5.40	530	6.60	1,705	7.80	3,880	10.00	8,720
5.50	600	6.70	1,840	7.90	4,100	10.20	9,160
5.60	675	6.80	1,980	8.00	4,320	10.40	9,600
5.70	755	6.90	2,130	8.20	4,760	10.60	10,040
5.80	840	7.00	2,290	8.40	5,200	10.80	10,480
5.90	930	7.10	2,460	8.60	5,640	11.00	10,920
6.00	1,025	7.20	2,640	8.80	6,080		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on six discharge measurements made during 1907 and 1908 and is well defined below gage height 7.0 feet. Above gage height 7.6 feet the rating curve is a tangent, the difference being 220 per tenth.

This table supersedes the rating table used for 1907 in the Water powers of North Carolina : Bull. North Carolina Geol. Survey (in press)

Monthly discharge of Hiwassee River at Murphy, N. C., for 1907 and 1908.

[Drainage area, 410 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	2,130	798	1,090	2.66	3.07	A.
February	3,440	798	1,290	3.15.	3.28	A.
March	4,980	755	1,220	2.98	3.44	A.
April	2,640	715	1,030	2.51	2.80	A.
May	1,460	715	945	2.30	2.65	A.
June	1,910	715	1,020	2.49	2.78	A.
July	5,860	530	947	2.31	2.66	A.
August	1,700	498	787	1.92	2.21	A.
September	11,800	432	1,110	2.71	3.02	A.
October	885	432	546	1.33	1.53	A.
November	3,030	465	835	2.04	2.28	A.
December	2,290	565	1,080	2.63	3.03	A.
The year	11,800	432	992	2.42	32.75	
1908.						
January	6,960	1,020	1,720	4.20	4.84	A.
February	10,000	1,120	2,000	4.88	5.26	A.
March	8,500	1,020	1,930	4.71	5.43	A.
April	4,540	930	1,570	3.83	4.27	A.
May	3,660	840	1,250	3.05	3.52	A.
June	1,280	465	690	1.68	1.87	A.
July	1,980	400	701	1.71	1.97	A.
August	2,060	340	592	1.44	1.66	A.
September	1,230	285	400	.976	1.09	A.
October	1,400	260	433	1.06	1.22	C.
November	840	285	433	1.06	1.18	C.
December	8,500	498	1,330	3.24	3.74	A.
The year	10,000	260	1,090	2.65	36.05	

NOTE.—The above monthly discharge for 1907 supersedes the corresponding table given in Water powers of North Carolina: Bull. North Carolina Geol. Survey (in press).

Discharge October 13 to December 6, 1908, corrected on the basis of two discharge measurements and a comparison of gage heights with those recorded at Hayesville.

HIWASSEE RIVER AT RELIANCE, TENN.

This station is located at the Louisville and Nashville Railroad bridge at Reliance, Tenn. It is 2 miles above Spring Creek and 1 mile below Lost Creek. It was established August 17, 1900, to obtain water power and general run-off data. The water-power possibilities between Reliance and Murphy, N. C., are very great.

At ordinary stages the section is a fairly good one. The water is held back by a ledge of rock below and is rather sluggish at low stages. At one end of this ledge is a small corn mill, but it does not appear probable that the use of water power by this mill could affect the gage readings.

There has been no change in the gage datum.[a]

Discharge measurements of Hiwassee River at Reliance, Tenn., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 29	F. A. Murray	329	1,980	1.82	2,140
October 9	O. P. Hall	312	1,880	1.58	1,680
1908.					
December 19	M. R. Hall	310	2,000	1.60	1,630

Daily gage height, in feet, of Hiwassee River at Reliance, Tenn., for 1907 and 1908.

[Observer, C. V. Higdon.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.7	2.3	2.5	2.3	2.05	3.15	1.85	1.75	1.3	1.9	1.3	1.8
2	3.2	4.6	3.0	2.0	2.0	2.9	1.8	1.6	1.35	1.7	1.35	1.7
3	2.9	3.2	3.6	1.9	1.95	2.5	1.75	1.55	1.3	1.65	1.25	1.65
4	2.8	2.75	2.9	1.95	2.05	2.3	1.8	1.45	1.4	1.65	1.55	1.65
5	2.6	4.0	2.65	1.85	2.0	2.15	1.85	1.45	1.4	1.6	1.4	1.6
6	2.6	3.3	2.5	2.1	2.05	2.0	1.7	1.5	1.3	1.6	1.3	1.6
7	2.45	2.8	2.4	2.2	2.25	1.9	1.6	1.55	1.25	1.5	1.35	1.55
8	2.4	2.6	2.5	2.0	2.6	2.05	1.5	1.5	1.25	1.5	1.4	1.55
9	2.35	2.55	2.55	2.05	2.2	3.1	1.5	1.5	1.3	1.6	1.35	1.5
10	2.3	2.4	2.35	2.0	2.0	2.3	1.5	1.4	1.4	1.6	1.6	2.6
11	2.25	2.35	2.65	1.9	2.7	2.2	1.4	1.35	1.75	1.4	2.4	2.4
12	2.25	2.25	2.4	1.85	2.7	2.1	1.7	1.35	1.4	1.4	1.85	2.05
13	2.2	2.2	2.35	2.0	2.3	1.9	3.1	1.55	1.35	1.3	1.7	1.9
14	2.15	2.15	2.35	1.9	2.15	2.2	2.3	1.5	1.35	1.35	1.6	2.15
15	2.1	2.15	2.6	1.8	2.1	2.0	2.0	1.7	1.2	1.35	1.55	2.7
16	2.1	2.05	2.35	1.85	2.5	1.9	1.9	2.7	1.2	1.35	1.55	2.4
17	2.1	2.05	2.25	2.05	2.15	1.8	1.85	1.8	1.2	1.35	1.45	2.15
18	2.1	2.0	2.2	1.95	2.1	1.8	1.75	2.0	1.2	1.3	1.4	2.05
19	2.05	2.0	2.15	2.15	1.95	1.9	1.85	2.4	1.2	1.3	1.75	2.0
20	2.15	2.1	2.1	2.35	2.0	1.8	1.8	1.8	1.15	1.3	1.6	1.9
21	2.4	2.0	2.05	2.05	1.9	1.85	1.7	1.6	1.15	1.25	1.85	1.85
22	2.05	2.0	2.0	2.0	1.8	1.85	1.55	1.7	1.15	1.3	2.0	2.05
23	2.00	2.05	2.0	2.15	1.8	1.85	1.5	2.0	3.0	1.3	1.8	2.35
24	2.0	2.0	1.95	2.95	1.8	2.0	1.5	2.0	3.1	1.3	4.4	2.7
25	2.0	2.1	1.95	2.50	1.85	2.05	1.45	1.8	2.0	1.35	3.0	2.4
26	2.0	2.15	2.0	2.3	2.0	2.1	1.5	1.6	1.7	1.3	2.5	2.25
27	2.0	2.8	1.95	2.25	2.7	2.05	1.5	1.5	1.55	1.35	2.2	2.15
28	1.95	2.4	1.9	2.2	2.0	1.95	1.5	1.4	1.7	1.65	2.0	2.05
29	1.9	.....	1.9	2.1	1.85	1.8	1.5	1.45	1.75	1.35	1.9	2.05
30	1.9	.....	1.85	2.1	1.8	2.0	3.9	1.5	2.25	1.25	1.85	2.6
31	1.9	.....	1.95	.....	1.9	.....	2.1	1.35	.....	1.25	.....	3.8

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Hiwassee River at Reliance, Tenn., for 1907 and 1908— Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	3.9	2.95	2.3	2.45	2.55	1.85	1.35	1.3	1.25	1.05	1.4	4.0
2	2.6	2.95	2.3	2.4	2.35	1.75	1.3	1.25	1.25	1.0	1.2	2.15
3	2.4	2.4	2.5	2.35	2.25	1.75	1.4	1.2	1.2	1.0	1.25	1.7
4	2.4	2.35	2.4	2.25	2.2	2.45	2.1	1.2	1.2	1.0	1.25	1.45
5	4.4	2.25	2.4	2.3	2.25	2.5	2.55	1.5	1.25	1.0	1.45	1.4
6	3.2	2.3	2.35	2.45	2.3	2.1	2.1	1.55	2.5	1.0	1.3	1.4
7	2.9	2.3	2.3	2.4	2.5	2.0	1.95	1.8	1.8	1.0	1.25	4.5
8	2.75	2.2	2.25	2.25	2.8	1.8	2.0	1.6	1.45	1.0	1.2	4.2
9	2.5	2.15	2.2	2.2	2.5	1.75	1.9	1.65	1.3	1.05	1.2	2.7
10	2.35	2.25	2.2	2.15	2.35	1.7	2.2	1.75	1.25	1.35	1.15	2.2
11	2.25	2.95	2.15	2.1	2.25	1.75	2.1	1.4	1.2	1.65	1.2	2.0
12	5.4	2.6	3.1	2.1	2.3	1.8	1.9	1.3	1.2	1.25	1.3	2.15
13	3.9	2.7	2.95	2.05	2.1	1.65	1.7	1.3	1.2	1.15	1.3	2.25
14	3.2	2.85	2.65	2.0	2.05	1.8	1.65	1.25	1.15	1.15	1.25	2.0
15	2.8	4.2	2.5	2.1	2.0	2.05	1.55	1.25	1.15	1.15	1.35	1.85
16	2.7	4.7	2.4	3.0	2.0	1.8	1.5	1.2	1.15	1.1	1.4	1.75
17	2.9	3.6	2.35	2.55	2.0	1.65	1.6	1.2	1.15	1.05	1.3	1.7
18	2.65	3.0	2.25	2.5	2.0	1.6	1.45	1.15	1.1	1.05	1.2	1.65
19	2.55	2.85	2.25	3.0	2.4	1.6	1.6	1.2	1.1	1.05	1.15	1.65
20	2.4	2.85	2.35	2.7	2.2	1.6	1.6	1.5	1.1	1.0	1.15	1.65
21	2.35	2.6	3.6	2.5	2.05	1.6	1.4	1.4	1.05	1.05	1.15	1.6
22	2.3	2.5	2.9	2.35	1.95	1.6	1.4	1.8	1.05	1.05	1.2	2.45
23	2.25	2.4	2.4	2.25	1.9	1.6	1.3	2.2	1.05	1.05	1.15	3.4
24	2.15	2.3	7.7	2.2	1.95	1.5	1.55	1.8	1.05	2.25	1.15	2.55
25	2.05	2.5	4.3	2.4	1.95	1.5	1.45	1.95	1.05	1.55	1.15	2.25
26	2.05	2.5	3.5	4.0	2.0	1.45	1.3	1.8	1.05	1.3	1.15	2.1
27	2.2	2.5	3.1	3.0	1.95	1.4	1.3	1.75	1.0	1.2	1.2	1.95
28	2.25	2.4	2.9	2.55	1.9	1.4	1.25	1.6	1.05	1.25	1.15	1.9
29	2.2	2.3	2.7	2.25	2.0	1.35	1.35	1.35	1.05	1.35	1.1	2.0
30	2.1	.....	2.65	2.45	1.9	1.35	1.7	1.35	1.0	2.05	1.15	1.95
31	2.05	.....	2.5	.....	2.0	.....	1.35	1.35	.....	1.75	.....	2.05

Rating tables for Hiwassee River at Reliance, Tenn.

FOR 1907.

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	930	2.30	3,350	3.50	7,300	5.40	15,010
1.20	1,070	2.40	3,630	3.60	7,690	5.60	15,830
1.30	1,220	2.50	3,920	3.70	8,080	5.80	16,650
1.40	1,380	2.60	4,210	3.80	8,475	6.00	17,470
1.50	1,550	2.70	4,510	3.90	8,875	6.20	18,290
1.60	1,730	2.80	4,820	4.00	9,280	6.40	19,110
1.70	1,920	2.90	5,140	4.20	10,090	6.60	19,930
1.80	2,120	3.00	5,470	4.40	10,910	6.80	20,750
1 90	2,340	3.10	5,820	4.60	11,730	7.00	21,570
2.00	2,570	3.20	6,180	4.80	12,550	8.00	25,670
2 10	2,820	3.30	6,550	5.00	13,370		
2.20	3,080	3.40	6,920	5.20	14,190		

NOTE.—The above table is applicable only for open-channel conditions. It is based upon three discharge measurements made during 1907 and the form of the 1904-6 curve and is well defined. Above gage height 3.5 feet the table is the same as the 1906 table. Above gage height 4.2 feet the rating curve is a tangent, the difference being 410 per tenth.

FOR 1908.

1.00	690	1.70	1,830	2.40	3,550	3.10	5,805
1.10	820	1.80	2,040	2.50	3,840	3.20	6,170
1.20	960	1.90	2,260	2.60	4,140	3.30	6,540
1.30	1,110	2.00	2,495	2.70	4,450	3.40	6,915
1.40	1,270	2.10	2,740	2.80	4,770	3.50	7,300
1.50	1,445	2.20	3,000	2.90	5,100		
1.60	1,630	2.30	3,270	3.00	5,445		

NOTE.—The above table is applicable only for open-channel conditions. It is based upon one discharge measurement made during 1908, earlier high water measurements and the form of previous curves, and is fairly well defined below gage height 2.3 feet. Above gage height 3.5 feet the table is the same as the 1907 table.

Monthly discharge of Hiwassee River at Reliance, Tenn., for 1907 and 1908.

[Drainage area, 1,180 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum	Minimum.	Mean.	Per square mile.		
1907.						
January	8,080	2,340	3,390	2.87	3.31	A.
February	11,700	2,570	4,000	3.39	3.53	A.
March	7,690	2,230	3,470	2.94	3.39	A.
April	5,300	2,120	2,830	2.40	2.68	A.
May	4,510	2,120	2,870	2.43	2.80	A.
June	6,000	2,120	2,920	2.47	2.76	A.
July	8,880	1,380	2,290	1.94	2.24	A.
August	4,510	1,300	1,890	1.60	1.84	A.
September	5,820	1,000	1,740	1.47	1.64	A.
October	2,340	1,140	1,440	1.22	1.41	A.
November	10,900	1,140	2,350	1.99	2.22	A.
December	8,480	1,550	2,950	2.50	2.88	A.
The year	11,700	1,000	2,680	2.27	30.70	
1908.						
January	15,000	2,620	4,710	3.99	4.60	A.
February	12,100	2,870	4,600	3.90	4.21	A.
March	24,400	2,870	4,970	4.21	4.85	A.
April	9,280	2,500	3,740	3.17	3.54	A.
May	4,770	2,260	2,920	2.47	2.85	A.
June	3,840	1,190	1,920	1.63	1.82	A.
July	3,990	1,040	1,770	1.50	1.73	A.
August	3,000	890	1,450	1.23	1.42	A.
September	3,840	690	1,020	.864	.96	B.
October	3,140	690	1,050	.890	1.03	B.
November	1,360	820	1,000	.847	.94	B.
December	11,300	1,270	3,330	2.82	3.25	A.
The year	24,400	690	2,710	2.29	31.20	

TUSQUITEE CREEK NEAR HAYESVILLE, N. C.

This station was established on May 20, 1907, in cooperation with the Forest Service. It is at the wagon bridge about 3 miles northeast of Hayesville and 2½ miles above the mouth of the creek, which is a tributary to Hiwassee River.

Discharge measurements are made from the wooden wagon bridge where the current is somewhat rough and the bottom of the stream is rocky and not liable to change.[a]

Discharge measurements of Tusquitee Creek near Hayesville, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 20	F. A. Murray	34	66	1.50	114
August 21	F. P. Thomas	37	70	1.73	151
Do	F. A. Murray	35	65	1.72	144
October 14	O. P. Hall	27	49	1.22	55
1908.					
August 14	F. P. Thomas	30	30	0.98	36
Do	do	30	30	.98	36
November 20	M. R. Hall	25	46	1.10	39
Do	do	25	47	1.10	39

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Tusquitee Creek near Hayesville, N. C., for 1907 and 1908.

[Observer, T. C. Moore.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						3.0	1.4	1.5	1.3	1.6	1.2	1.45
2						2.5	1.4	1.4	1.3	1.5	1.95	1.4
3						2.0	1.4	1.4	1.35	1.45	1.5	1.4
4						1.85	1.35	1.3	1.35	1.45	1.4	1.35
5						1.8	1.3	1.3	1.3	1.5	1.35	1.35
6						1.7	1.35	1.5	1.25	1.4	1.35	1.35
7						1.7	1.3	1.3	1.25	1.4	1.3	1.35
8						2.0	1.3	1.3	1.25	1.4	1.3	1.35
9						1.8	1.35	1.3	1.3	1.35	1.25	1.4
10						1.7	1.3	1.3	1.65	1.3	2.25	2.9
11						1.7	1.4	1.25	1.4	1.3	1.7	2.1
12						1.65	1.5	1.4	1.25	1.25	1.6	1.8
13						1.6	2.0	1.3	1.2	1.25	1.5	1.5
14						1.6	1.5	1.4	1.2	1.25	1.45	1.6
15						1.5	1.5	1.3	1.2	1.2	1.4	1.6
16						1.5	1.5	1.8	1.2	1.2	1.35	1.6
17						1.5	1.5	1.6	1.2	1.2	1.35	1.55
18						1.5	1.45	2.1	1.2	1.2	1.65	1.5
19						1.5	1.6	1.7	1.2	1.2	1.45	1.5
20					1.5	1.55	1.55	1.6	1.15	1.15	1.4	1.5
21					1.5	1.5	1.4	1.8	1.15	1.15	1.5	1.45
22					1.5	1.5	1.4	2.0	2.85	1.15	1.7	1.45
23					1.4	1.4	1.4	1.85	2.4	1.2	1.9	1.7
24					1.4	1.45	1.35	1.75	1.55	1.2	2.2	1.7
25					1.5	1.45	1.3	1.7	1.4	1.2	1.9	1.65
26					2.6	1.55	1.3	1.6	1.35	1.2	1.8	1.6
27					1.85	1.4	1.35	1.5	1.3	1.55	1.7	1.6
28					1.7	1.4	1.35	1.5	2.5	1.35	1.6	1.7
29					1.6	1.5	3.4	1.4	2.1	1.3	1.55	1.6
30					1.65	1.45	2.0	1.35	1.75	1.25	1.5	3.0
31					2.4	.....	1.6	1.3	.....	1.2	.....	2.2
1908.												
1	2.0	1.85	1.6	1.8	1.8	1.75	1.25	1.15	1.25	1.1	1.1	2.0
2	1.85	1.75	1.8	1.75	1.75	1.65	1.7	1.15	1.2	1.0	1.1	2.4
3	1.75	1.65	1.7	1.7	1.7	1.6	1.4	1.1	1.15	1.0	1.1	1.6
4	2.35	1.6	1.7	1.7	1.65	1.7	1.5	1.1	1.15	1.0	1.2	1.35
5	2.3	1.6	1.7	1.65	1.65	2.05	1.5	1.2	1.15	1.0	1.1	1.3
6	2.1	1.7	1.65	1.7	1.7	1.8	1.45	1.6	1.5	1.0	1.1	2.45
7	2.0	1.6	1.65	1.65	2.1	1.7	1.4	1.2	1.35	1.0	1.1	4.0
8	1.85	1.6	1.6	1.6	1.95	1.6	1.4	1.25	1.3	1.0	1.1	2.2
9	1.8	1.55	1.6	1.6	1.85	1.6	1.4	1.3	1.25	1.2	1.1	1.8
10	1.8	1.7	1.6	1.6	1.8	1.55	1.95	1.2	1.2	1.2	1.05	1.7
11	1.7	1.65	2.3	1.55	1.75	1.55	1.55	1.2	1.2	1.15	1.3	1.65
12	2.3	1.65	2.25	1.5	1.7	1.5	1.45	1.2	1.15	1.1	1.2	1.9
13	2.1	1.7	2.0	1.5	1.65	1.5	1.4	1.1	1.15	1.1	1.1	1.75
14	2.0	2.2	1.9	1.5	1.6	1.8	1.35	1.1	1.15	1.1	1.4	1.65
15	1.9	2.8	1.8	2.0	1.6	1.55	1.35	1.1	1.1	1.1	1.3	1.6
16	1.9	2.3	1.75	1.8	1.55	1.5	1.35	1.1	1.1	1.1	1.2	1.55
17	1.85	2.25	1.7	1.75	1.5	1.45	1.35	1.1	1.1	1.05	1.15	1.5
18	1.8	2.0	1.7	1.75	2.15	1.4	1.3	1.15	1.1	1.05	1.1	1.45
19	1.8	1.9	1.65	1.95	1.8	1.4	1.5	1.5	1.05	1.0	1.1	1.5
20	1.75	1.8	2.15	1.8	1.7	1.4	1.4	1.2	1.05	1.0	1.1	1.4
21	1.7	1.8	2.1	1.75	1.65	1.4	1.3	1.6	1.1	1.0	1.1	1.55
22	1.7	1.75	1.8	1.7	1.6	1.35	1.25	1.65	1.1	1.0	1.1	2.2
23	1.7	1.7	3.7	1.65	1.55	1.35	1.25	1.6	1.1	1.4	1.1	2.0
24	1.6	1.6	3.4	1.6	1.5	1.35	1.2	1.5	1.1	1.2	1.05	1.8
25	1.6	1.6	2.6	3.1	1.9	1.35	1.2	1.8	1.05	1.15	1.05	1.75
26	1.75	1.7	2.3	2.2	1.7	1.3	1.2	1.55	1.05	1.1	1.05	1.7
27	1.8	1.65	2.1	2.1	1.65	1.3	1.2	1.5	1.15	1.1	1.0	1.65
28	1.65	1.6	2.0	2.0	1.7	1.3	1.6	1.35	1.15	1.25	1.0	1.6
29	1.6	1.6	1.9	1.9	3.55	1.3	1.25	1.3	1.1	1.5	1.0	1.6
30	1.6	.....	1.85	1.85	2.3	1.25	1.2	1.3	1.1	1.2	1.0	1.65
31	1.55	.....	1.8	.....	1.85	.....	1.2	1.25	.....	1.1	.....	1.7

Daily discharge, in second-feet, of Tusquitee Creek near Hayesville, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							84	102	68	120	53	93
2							84	84	68	102	190	84
3							84	84	76	93	102	84
4						170	76	68	76	93	84	76
5						160	68	68	68	102	76	76
6						140	76	102	60	84	76	76
7						140	68	68	60	84	68	76
8						200	68	68	60	84	68	76
9						160	76	68	68	76	60	84
10						140	68	68	130	68		
11						140	84	60	84	68	140	
12						130	102	84	60	60	120	160
13						120	200	68	53	60	102	102
14						120	102	84	53	60	93	120
15						102	102	68	53	53	84	120
16						102	102	160	53	53	76	120
17						102	102	120	53	53	76	111
18						102	93		53	53	130	102
19						102	120	140	53	53	93	102
20					102	111	111	120	46	46	84	102
21					102	102	84	160	46	46	102	93
22					102	102	84	200		46	140	93
23					84	84	84	170		53	180	140
24					84	93	76	150	111	53		140
25					102	93	68	140	84	53	180	130
26						111	68	120	76	53	160	120
27					170	84	76	102	68	111	140	120
28					140	84	76	102		76	120	140
29					120	102		84		68	111	120
30					130	93	200	76	150	60	102	
31							120	68		53		
1908.												
1	200	170	120	160	160	150	60	46	60	40	40	200
2	170	150	160	150	150	130	140	46	53	30	40	
3	150	130	140	140	140	120	84	40	46	30	40	120
4		120	140	140	130	140	102	40	46	30	53	76
5		120	140	130	130		102	53	46	30	40	68
6		140	130	140	140	160	93	120	102	30	40	
7	200	120	130	130		140	84	53	76	30	40	
8	170	120	120	120	190	120	84	60	68	30	40	
9	160	111	120	120	170	120	84	68	60	53	40	160
10	160	140	120	120	160	111	190	53	53	53	35	140
11	140	130		111	150	111	111	53	53	46	68	130
12		130		102	140	102	93	53	46	40	53	180
13		140	200	102	130	102	84	40	46	40	46	150
14	200		180	102	120	160	76	40	46	40	84	130
15	180		160	200	120	111	76	40	40	40	68	120
16	180		150	160	111	102	76	40	40	40	53	111
17	170		140	150	102	93	76	40	40	35	46	102
18	160	200	140	150		84	68	46	40	35	40	93
19	160	180	130	190	160	84	102	102	35	30	40	102
20	150	160		160	140	84	84	53	35	30	40	84
21	140	160		150	130	84	68	120	40	30	40	111
22	140	150	160	140	120	76	60	130	40	30	40	
23	140	140		130	111	76	60	120	40	84	40	200
24	120	120		120	102	76	53	102	40	53	35	160
25	120	120			180	76	53	160	35	46	35	150
26	150	140			140	68	53	111	35	40	35	140
27	160	130			130	68	53	102	46	40	30	130
28	130	120	200	200	140	68	120	76	46	60	30	120
29	120	120	180	180		68	60	68	40	102	30	120
30	120		170	170		60	53	68	40	53	30	130
31	111		160		170		53	60		40		140

NOTE.—Daily discharge for 1907 and 1908 based on a fairly well-defined rating curve. On missing days beginning May 20, 1907, the discharge was greater than 200 second-feet.

VALLEY RIVER AT TOMOTLA, N. C.

This station is located at a footbridge about 250 feet below a public road ford at Tomotla, N. C. It is 5 miles above Murphy, N. C., and about one-fourth mile above Rodgers Creek. It was established June 29, 1904. The records are probably of more value as showing the amount of water entering the Hiwassee River below the Murphy station than for estimates of power in Valley River.

Discharge measurements are made from the single-span footbridge, where the section is good for measurements.[a]

Discharge measurements of Valley River at Tomotla, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 18	F. A. Murray	58	145	1.89	228
August 20	do	56	118	1.38	131
Do	F. P. Thomas	55	118	1.39	163
October 15	O. P. Hall	56	115	1.23	111
1908.					
April 16	M. R. Hall	57	171	2.23	391
Do	do	57	172	2.22	390
August 15	F. P. Thomas	55	112	1.18	90
November 18	M. R. Hall	54	100	1.03	75
November 19	do	54	100	1.03	76

Daily gage height, in feet, of Valley River at Tomotla, N. C., for 1907 and 1908.

[Observer, J. T. Hayes.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.6	3.0	3.3	2.1	1.9	3.4	1.9	1.5	1.3	1.6	1.2	1.6
2	3.2	2.9	4.0	2.1	1.9	3.2	1.75	1.4	1.35	1.5	1.55	1.6
3	3.1	2.8	3.8	1.8	1.8	2.4	1.7	1.4	1.4	1.45	1.35	1.55
4	3.0	2.6	3.7	1.8	2.0	2.0	1.65	1.3	1.4	1.4	1.3	1.5
5	3.0	4.1	3.7	1.7	1.9	1.8	1.6	1.8	1.35	1.7	1.2	1.5
6	2.8	3.8	3.0	2.5	1.8	1.8	1.6	1.45	1.3	1.4	1.2	1.5
7	2.7	3.6	2.8	2.5	2.3	1.7	1.55	1.4	1.3	1.4	1.2	1.4
8	2.65	3.2	2.5	2.0	2.0	2.0	1.5	1.3	1.3	1.6	1.2	1.6
9	2.6	3.0	2.8	2.0	1.9	1.9	1.5	1.25	1.3	1.4	1.2	2.45
10	2.55	2.7	3.5	1.9	1.9	1.8	1.4	1.2	1.25	1.3	2.75	2.0
11	2.5	2.6	3.4	2.0	3.5	1.9	1.55	1.2	1.45	1.3	2.55	1.8
12	2.5	2.5	3.3	1.9	2.5	2.4	2.1	1.2	1.25	1.3	2.0	1.8
13	2.4	2.4	3.0	1.8	2.0	2.2	2.6	1.25	1.2	1.25	1.7	1.75
14	2.4	2.3	2.8	1.8	1.9	1.8	1.9	1.35	1.1	1.2	1.6	2.55
15	2.35	2.1	2.4	2.0	2.5	1.8	1.85	1.65	1.1	1.2	1.5	2.4
16	2.3	2.0	2.3	1.9	2.3	1.8	1.65	1.6	1.1	1.2	1.5	2.15
17	2.4	2.0	2.2	1.9	2.0	1.7	1.6	1.7	1.1	1.2	1.5	2.1
18	2.4	1.95	2.15	1.8	1.9	1.7	1.65	1.8	1.1	1.2	1.65	2.0
19	2.35	1.9	2.1	1.9	1.9	1.8	1.6	1.55	1.1	1.2	1.55	1.9
20	2.7	1.9	2.1	1.9	1.8	1.8	1.6	1.4	1.1	1.2	1.5	1.8
21	2.6	1.9	2.0	2.0	1.8	1.7	1.55	1.4	1.2	1.15	1.9	1.7
22	2.55	2.0	2.0	2.0	1.7	1.7	1.5	1.9	2.0	1.1	1.9	1.7
23	2.5	2.0	2.0	3.0	1.7	2.0	1.7	2.05	4.0	1.1	3.4	2.35
24	2.5	2.1	1.95	2.9	1.7	1.9	1.4	1.85	2.1	1.2	3.5	2.2
25	2.45	2.2	1.90	2.8	1.7	2.0	1.65	1.6	1.35	1.1	2.65	2.1
26	2.4	2.1	2.1	2.3	2.5	1.8	1.6	1.4	1.3	1.15	2.05	2.0
27	2.4	2.0	1.9	2.2	2.0	1.8	1.5	1.35	1.3	1.45	1.95	1.9
28	2.5	2.2	1.85	2.1	1.9	1.7	1.45	1.4	1.85	1.5	1.85	1.9
29	2.55	.....	1.8	2.0	1.8	2.5	1.7	1.4	2.15	1.2	1.8	2.0
30	2.6	.....	1.75	2.0	1.7	1.9	2.2	1.3	1.65	1.2	1.75	5.4
31	2.7	.....	2.1	.....	2.7	.....	1.85	1.3	.....	1.2	.....	3.5

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Valley River at Tomotla, N. C., for 1907 and 1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	2.85	3.2	2.1	2.1	2.05	1.55	1.2	1.15	1.2	0.9	1.0	1.3
2	2.45	2.55	2.2	2.05	2.0	1.5	1.2	1.2	1.2	.9	1.0	1.65
3	2.25	2.35	2.25	2.0	1.95	1.5	1.35	1.2	1.25	.9	1.0	1.15
4	3.0	2.15	2.25	1.95	1.9	1.95	1.85	1.25	1.3	.9	1.1	1.1
5	3.6	2.1	2.25	2.1	2.0	1.65	1.6	1.3	1.75	.9	1.0	1.1
6	2.95	2.25	2.1	2.05	1.9	1.6	1.7	1.35	1.55	.9	1.0	1.2
7	2.75	2.1	2.05	2.1	2.85	1.6	1.45	1.9	1.0	.9	1.0	6.3
8	2.5	2.0	2.0	1.85	2.35	1.6	2.05	1.4	1.0	.9	1.0	4.4
9	2.3	2.0	2.0	1.8	2.15	1.5	1.65	1.25	1.0	.95	1.0	3.25
10	2.2	2.2	2.0	1.8	2.05	1.45	2.2	1.2	.9	1.35	1.0	2.1
11	3.0	2.2	3.2	1.8	1.95	1.4	1.65	1.25	.9	1.0	1.0	1.5
12	4.0	2.2	2.7	1.7	1.85	1.5	1.55	1.2	.9	1.0	1.1	1.5
13	2.8	2.2	2.5	1.7	1.8	1.6	1.5	1.1	.9	.9	1.25	1.7
14	2.55	2.3	2.45	1.7	1.8	1.6	1.4	1.1	.9	.9	1.35	1.7
15	2.65	5.9	2.35	2.45	1.7	1.5	1.45	1.1	.9	.9	1.2	1.6
16	2.55	3.4	2.15	2.45	1.7	1.5	1.45	1.1	.9	.9	1.1	1.55
17	2.55	2.95	2.05	2.75	1.7	1.5	1.45	1.25	.9	.9	1.0	1.5
18	2.4	2.6	2.05	2.55	1.8	1.95	1.3	1.1	.9	.9	1.0	1.55
19	2.3	2.6	3.2	2.5	2.0	1.65	1.3	1.05	.9	.9	1.0	1.5
20	2.2	2.45	2.5	2.25	1.8	1.6	1.25	1.0	.9	.9	1.0	2.5
21	2.15	2.3	2.5	2.15	1.65	1.4	1.2	1.1	.9	.9	1.0	1.7
22	2.15	2.2	2.5	2.05	1.6	1.3	1.2	1.75	.9	.9	1.0	1.5
23	2.1	2.1	4.8	2.0	1.6	1.3	1.2	2.05	.9	1.3	1.0	1.6
24	2.05	2.1	5.4	1.9	1.7	1.3	1.25	1.8	.9	1.15	1.0	1.5
25	1.9	2.1	4.6	3.3	1.85	1.3	1.25	1.35	.9	1.0	1.0	1.5
26	1.95	2.25	3.4	2.85	1.85	1.3	1.2	1.9	.9	1.0	1.0	1.5
27	2.05	2.1	2.6	2.6	1.85	1.3	1.2	1.8	.9	1.4	1.05	1.55
28	1.9	2.0	2.4	2.3	1.7	1.3	1.25	1.3	.9	1.4	1.0	1.7
29	1.9	2.0	2.3	2.15	1.6	1.2	1.3	1.25	.9	1.25	1.05	1.45
30	1.85	.....	2.3	2.25	1.65	1.2	1.2	1.2	.9	1.1	1.0	1.7
31	2.0	.....	2.2	.....	1.6	.....	1.2	1.2	.....	1.0	.....	2.1

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

FOR 1907.

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	74	2.20	345	3.30	775	4.40	1,415
1.20	92	2.30	375	3.40	825	4.50	1,480
1.30	112	2.40	405	3.50	875	4.60	1,545
1.40	134	2.50	440	3.60	930	4.70	1,610
1.50	156	2.60	475	3.70	985	4.80	1,680
1.60	180	2.70	515	3.80	1,040	4.90	1,750
1.70	205	2.80	555	3.90	1,100	5.00	1,820
1.80	230	2.90	595	4.00	1,160	5.20	1,960
1.90	255	3.00	635	4.10	1,220	5.40	2,100
2.00	285	3.10	680	4.20	1,285		
2.10	315	3.20	725	4.30	1,350		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on six discharge measurements made during 1906 and 1907, and 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.

FOR 1908.

0.90	54	2.00	310	3.10	745	4.40	1,500
1.00	68	2.10	345	3.20	795	4.60	1,630
1.10	84	2.20	380	3.30	845	4.80	1,770
1.20	102	2.30	415	3.40	895	5.00	1,910
1.30	122	2.40	450	3.50	950	5.20	2,050
1.40	143	2.50	490	3.60	1,005	5.40	2,190
1.50	166	2.60	530	3.70	1,060	5.60	2,330
1.60	191	2.70	570	3.80	1,120	5.80	2,470
1.70	218	2.80	610	3.90	1,180	6.00	2,610
1.80	247	2.90	655	4.00	1,240	6.20	2,750
1.90	278	3.00	700	4.20	1,370	6.40	2,895

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on five discharge measurements made during 1908 and the form of previous curves and is well defined below gage height 2.5 feet.

Monthly discharge of Valley River at Tomotla, N. C., for 1907 and 1908.

[Drainage area, 106 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	930	375	490	4.62	5.33	C.
February	1,220	255	468	4.42	4.60	C
March	1,160	218	511	4.82	5.56	C.
April	635	205	316	2.98	3.32	C.
May	875	205	302	2.85	3.29	C.
June	825	205	294	2.77	3.09	C.
July	475	134	205	1.93	2.22	C.
August	300	92	153	1.44	1.66	C.
September	1,160	74	167	1.58	1.76	C.
October	205	74	114	1.08	1.24	C.
November	875	92	252	2.38	2.66	C.
December	2,100	134	338	3.19	3.68	C.
The year	2,100	74	301	2.84	38.41	
1908.						
January	1,240	262	486	4.58	5.28	C.
February	2,540	310	503	4.75	5.12	C.
March	2,190	310	588	5.55	6.40	C.
April	845	218	378	3.57	3.98	C.
May	632	191	273	2.58	2.97	C.
June	294	102	166	1.57	1.75	C.
July	380	102	153	1.44	1.66	C.
August	328	68	135	1.27	1.46	C.
September	232	54	72.9	.688	.77	C.
October	143	54	71.0	.670	.77	C.
November	132	68	74.9	.707	.79	C.
December	2,820	84	339	3.20	3.69	C
The year	2,820	54	270	2.55	34.64	

TOCCOA RIVER NEAR DIAL, GA.

This station was established on May 17, 1907, in cooperation with the Forest Service. It is located at Butts Bridge about 2 miles above Dial, Ga., and one-half mile below the mouth of Skeenah Creek. Blue Ridge, Ga., 18 miles from the station, is the nearest railroad point.

The current is swift and is somewhat rough and broken, but is fairly good for measurements.

The station was discontinued on December 31, 1907.

Discharge measurements of Toccoa River near Dial, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 17	F. A. Murray	73	173	3.50	335
August 19	do	69	185	3.29	246
Do	do	69	184	3.29	243
October 11	O. P. Hall	73	152	3.12	183

Daily gage height, in feet, of Toccoa River near Dial, Ga., for 1907 and 1908.

[Observer, Elzie Chastain.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						3.8	3.4	3.1	3.0	3.5	3.0	3.3
2						3.6	3.4	3.1	3.0	3.5	3.6	3.3
3						3.6	3.4	3.1	3.4	3.4	3.0	3.3
4						3.5	3.2	3.1	3.2	3.3	3.0	3.3
5						3.5	3.3	3.1	3.2	3.3	3.0	3.2
6						3.5	3.3	3.1	3.2	3.3	3.0	3.1
7						3.4	3.2	3.1	3.1	3.3	3.0	3.1
8						4.1	3.3	3.1	3.0	3.3	3.0	3.1
9						3.6	3.1	3.1	3.0	3.1	3.0	4.5
10						3.5	3.2	3.0	3.0	3.0	4.0	4.0
11						3.5	3.2	3.0	3.0	3.0	3.3	3.7
12						3.4	3.2	3.9	3.0	3.0	3.3	3.7
13						3.4	3.5	3.2	3.0	3.0	3.2	4.0
14						3.4	3.3	3.2	3.0	3.0	3.2	4.2
15						3.5	3.3	4.0	3.0	3.0	3.2	3.8
16						3.4	3.3	3.1	3.0	3.0	3.1	3.7
17					3.5	3.3	3.3	3.1	3.0	3.0	3.2	3.6
18					3.5	3.3	4.6	3.4	3.0	3.0	3.2	3.6
19					3.5	3.3	3.6	3.2	3.0	3.0	3.1	3.5
20					3.4	3.3	3.6	3.1	3.0	3.0	3.1	3.5
21					3.4	3.3	3.4	3.1	3.0	3.0	3.8	3.5
22					3.4	3.3	3.4	3.2	3.4	3.0	3.7	3.8
23					3.4	3.3	3.4	3.2	5.5	3.0	4.7	4.1
24					3.4	3.4	3.1	3.3	3.6	3.0	4.0	3.9
25					3.4	3.4	3.0	3.1	3.3	3.0	3.6	3.8
26					4.0	3.4	3.2	3.1	3.3	3.0	3.6	3.7
27					3.5	3.4	3.1	3.0	3.3	3.5	3.5	3.6
28					3.5	3.4	3.1	3.0	4.0	3.2	3.5	3.6
29					3.4	3.4	3.2	3.1	3.7	3.0	3.4	3.6
30					3.4	3.4	3.3	3.1	3.5	3.0	3.3	5.0
31					4.1	.....	3.3	3.1	.....	3.0	.....	4.0

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	3.8	4.2	3.8	3.7	3.8	3.4	16	4.2	4.6	3.6	4.0	3.6	3.4
2	3.7	4.0	3.8	3.7	3.8	3.4	17	3.8	4.2	3.6	4.0	3.6	3.35
3	3.7	3.7	3.8	3.7	3.9	3.4	18	3.8	4.1	3.6	4.2	3.7	3.5
4	4.0	3.7	3.8	3.7	3.8	3.5	19	3.8	4.1	3.5	4.1	3.65	3.4
5	4.2	4.0	3.8	3.8	3.9	3.5	20	3.8	4.0	4.5	3.9	3.6	3.4
6	4.0	3.8	3.8	3.8	3.7	3.5	21	3.8	4.0	3.9	3.8	3.6	3.4
7	4.0	3.7	3.7	3.7	4.0	3.4	22	3.8	4.0	3.9	3.8	3.5	3.4
8	3.8	3.6	3.7	3.7	3.8	3.4	23	3.8	4.0	6.0	3.8	3.4	3.4
9	3.7	3.7	3.6	3.7	3.7	3.4	24	3.7	3.8	4.5	3.8	3.4	3.3
10	3.7	4.6	3.6	3.65	3.7	3.4	25	3.7	3.8	4.3	4.5	3.5	3.3
11	5.7	4.2	3.6	3.6	3.7	3.4	26	3.8	4.1	4.0	4.0	3.5	3.25
12	4.5	4.0	3.8	3.6	3.7	3.4	27	3.8	4.0	4.0	4.0	3.5	3.25
13	4.2	4.1	3.6	3.6	3.65	3.5	28	3.8	3.8	4.0	4.0	3.5	3.2
14	4.0	4.0	3.6	3.6	3.65	3.5	29	3.7	3.8	3.8	3.9	3.4	3.2
15	3.9	7.6	3.6	4.3	3.6	3.4	30	3.6	.....	3.8	4.0	3.5	3.2
							31	4.5	.....	3.7	.....	3.5	.....

Daily discharge, in second-feet, of Toccoa River near Dial, Ga., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						500	290	177	150	335	150	247
2						385	290	177	150	335	385	247
3						385	290	177	290	290	150	247
4						335	210	177	210	247	150	247
5						335	247	177	210	247	150	210
6						335	247	177	210	247	150	177
7						290	210	177	177	247	150	177
8							247	177	150	247	150	177
9						385	177	177	150	177	150	.....
10						335	210	150	150	150	.....	.....
11						335	210	150	150	150	247	440
12						290	210	.....	150	150	247	440
13						290	335	210	150	150	210	.....
14						290	247	210	150	150	210	.....
15						335	247	.....	150	150	210	500
16						290	247	177	150	150	177	440
17					335	247	247	177	150	150	210	385
18					335	247	.....	290	150	150	210	385
19					335	247	385	210	150	150	177	335
20					290	247	385	177	150	150	177	335
21					290	247	290	177	150	150	500	335
22					290	247	290	210	290	150	440	500
23					290	247	290	210	.....	150	.....	.....
24					290	290	177	247	385	150	.....	.....
25					290	290	150	177	247	150	385	500
26						290	210	177	247	150	385	440
27					335	290	177	150	247	335	335	385
28					335	290	177	150	.....	210	335	385
29					290	290	210	177	440	150	290	385
30					290	290	247	177	335	150	247	.....
31						.....	247	177	.....	150	.....	.....

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	500	.....	500	440	500	290	16	.....	.....	385	.....	385	290
2	440	.....	500	440	500	290	17	500	.....	385	.....	385	268
3	440	440	500	440	550	290	18	500	.....	385	.....	440	335
4	.....	440	500	440	500	335	19	500	.....	335	.....	412	290
5	.....	.....	500	500	550	335	20	500	.....	.....	550	385	290
6	.....	500	500	500	440	335	21	500	.....	550	500	385	290
7	.....	440	440	440	.....	290	22	500	.....	550	500	335	290
8	500	385	440	440	500	290	23	500	.....	.....	500	290	290
9	440	440	385	440	440	290	24	440	500	.....	500	290	247
10	440	.....	385	412	440	290	25	440	500	.....	.....	335	247
11	.....	.....	385	385	440	290	26	500	.....	.....	.....	335	228
12	.....	.....	500	385	440	290	27	500	.....	.....	.....	335	228
13	.....	.....	385	385	412	290	28	500	500	.....	.....	335	210
14	.....	.....	385	385	412	335	29	440	500	500	550	290	210
15	550	.....	385	.....	412	335	30	385	.....	500	.....	335	210
							31	.....	.....	440	.....	335	.....

NOTE.—Daily discharge 1907–8 based on a fairly well-defined rating curve. On missing days from May 17, 1907, to June 30, 1908, the discharge was greater than 550 second-feet.

OCOEE RIVER AT McCAYS, TENN.

This station is located at a suspension footbridge just below McCays Ferry at McCays, Tenn., near the Georgia-Tennessee boundary and one-half mile below the railroad bridge of the Louisville and Nashville Railroad. It is one-half mile above the mouth of Fightingtown Creek. It was established March 21, 1903. The records are especially valuable for estimates of water power, there being a great amount of fall in the river below.

Discharge measurements are made from the suspension footbridge where the section is excellent. Swinging or shaking of the bridge

during discharge measurements may cause some error, but this is not thought to be serious.

The name of the town has been changed to Copperhill.

Discharge measurements of Ocoee River at McCays, Tenn., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 26	M. R. Hall	157	544	1.70	962
August 17	F. A. Murray	148	420	1.02	526
October 10	O. P. Hall	150	364	.93	509

Daily gage height, in feet, of Ocoee River at McCays, Tenn., for 1907 and 1908.

[Observer, Arch Ballew.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.95	3.2	2.05	1.8	1.5	3.0	1.2	1.0	0.7	1.2	0.78	1.15
2	2.5	2.65	4.2	1.5	1.45	2.05	1.2	1.0	.7	1.1	1.05	1.1
3	2.4	2.35	2.7	1.4	1.4	1.8	1.2	1.0	1.1	1.1	1.2	1.1
4	2.25	2.4	2.2	1.4	1.7	1.6	1.2	.9	1.15	1.1	.88	1.1
5	2.1	3.2	2.0	1.4	1.5	1.5	1.45	.9	.85	1.1	.82	1.1
6	2.1	2.65	1.9	2.25	1.4	1.45	1.25	1.0	.8	1.05	.85	1.0
7	2.0	2.2	1.9	1.6	1.6	1.4	1.1	.95	.75	.98	.85	1.0
8	1.9	2.1	2.0	1.6	1.7	2.1	1.0	.9	.8	1.1	.8	1.0
9	1.9	2.0	1.8	1.55	1.7	1.8	1.0	.85	1.4	1.0	.8	1.15
10	1.9	1.9	1.8	1.5	1.5	1.5	1.0	.88	1.1	.9	1.5	2.25
11	1.9	1.8	1.8	1.45	1.8	1.5	1.2	.8	1.45	.9	1.4	1.6
12	1.85	1.8	1.7	1.7	1.6	1.55	2.3	1.2	.85	.85	1.0	1.5
13	1.8	1.8	1.7	1.5	1.5	1.55	2.3	1.35	.75	.85	1.0	1.65
14	1.8	1.7	1.7	1.4	1.4	1.4	1.7	1.6	.7	.85	.9	2.3
15	1.8	1.7	1.85	1.4	1.95	1.3	1.3	1.15	.6	.85	.9	1.85
16	1.7	1.65	1.7	1.5	1.75	1.3	1.2	2.35	.7	.82	.82	1.7
17	1.7	1.6	1.6	1.5	1.6	1.2	1.2	1.0	.7	.8	.82	1.6
18	1.7	1.6	1.6	1.4	1.5	1.2	2.0	2.25	.7	.8	1.2	1.5
19	1.7	1.6	1.6	1.8	1.6	1.3	1.8	1.55	.7	.8	1.2	1.5
20	2.0	1.6	1.6	1.6	1.4	1.3	1.3	1.05	.65	.8	1.15	1.4
21	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.0	.65	.8	1.8	1.3
22	1.7	1.55	1.5	1.75	1.35	1.4	1.2	1.0	2.3	.8	1.6	1.3
23	1.7	1.5	1.5	2.3	1.3	1.4	1.1	1.0	4.8	.8	2.9	2.85
24	1.6	1.5	1.5	2.15	1.3	1.5	1.0	1.1	1.65	.8	2.9	1.2
25	1.6	1.75	1.45	1.9	1.35	2.35	1.0	1.1	1.2	.75	1.85	1.85
26	1.7	2.05	1.5	1.75	2.1	1.8	1.2	.9	1.0	.72	1.55	1.7
27	1.6	2.1	1.4	1.7	1.6	1.5	1.1	.8	1.3	1.1	1.45	1.6
28	1.55	1.9	1.4	1.6	1.4	1.3	1.0	.8	1.5	1.45	1.4	1.6
29	1.6	.....	1.4	1.55	1.3	1.6	1.0	.9	2.4	1.8	1.25	2.65
30	1.55	.....	1.4	1.5	2.0	1.3	1.5	.85	1.35	.8	1.2	3.4
31	1.65	.....	1.5	.....	2.15	.....	1.1	.8	.....	.8	.....	3.2
1908.												
1	2.35	3.5	2.0	2.0	2.2	1.5	1.0	.9	.9	.65	.7	1.3
2	2.1	2.35	2.0	1.95	2.1	1.4	1.05	.9	.9	.62	.7	1.45
3	1.9	2.0	2.0	1.9	2.0	1.45	1.25	.85	.82	.6	.75	.92
4	1.8	2.0	2.0	1.9	2.0	2.05	1.95	.85	.8	.6	.9	.8
5	3.4	1.9	1.9	2.05	2.15	1.75	2.6	1.25	1.65	.6	.75	1.05
6	2.5	2.1	1.9	2.45	2.0	1.7	2.05	1.3	2.1	.6	.7	1.2
7	2.4	1.85	1.9	2.05	3.5	1.45	2.1	1.15	1.25	.6	.7	6.1
8	2.15	1.8	1.9	1.95	2.3	1.4	1.7	1.3	1.0	.6	.7	2.75
9	1.95	1.95	1.85	1.9	2.1	1.4	1.9	1.5	.95	1.2	.68	1.8
10	1.9	2.6	1.8	1.85	2.0	1.45	2.7	1.05	.9	1.6	.65	1.5
11	3.0	2.95	1.9	1.8	1.95	1.5	1.8	.95	.9	.85	.75	1.3
12	4.2	2.5	2.15	1.8	1.9	1.3	1.45	.92	.8	.75	.82	1.6
13	3.0	2.5	1.9	1.75	1.85	1.3	1.35	.85	.8	.7	.7	1.35
14	2.55	2.55	1.85	1.8	1.8	1.5	1.3	.85	.8	.7	.8	1.2
15	2.3	6.5	1.8	2.95	1.8	1.45	1.2	.8	.8	.7	.85	1.2
16	2.3	3.6	1.8	2.1	1.8	1.3	1.2	.8	.75	.65	.72	1.15
17	2.3	3.0	1.75	2.45	1.8	1.3	1.1	.82	.8	.65	.7	1.1
18	2.15	2.8	1.7	2.75	2.0	1.3	1.3	1.15	.75	.6	.65	1.1
19	2.0	2.8	1.75	2.8	2.05	1.3	1.2	.88	.75	.6	.65	1.2
20	2.0	2.55	2.65	2.45	1.9	1.2	1.1	.95	.75	.6	.65	1.3

Daily gage height, in feet, of Ocoee River at McCays, Tenn., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
21	1.95	2.4	2.8	2.25	1.75	1.55	1.0	0.85	0.78	0.62	0.65	1.45
22	1.9	2.3	2.3	2.1	1.7	1.45	1.0	2.8	.7	.6	.65	2.95
23	1.9	2.3	3.8	2.1	1.6	1.3	1.6	2.25	.72	.75	.65	2.2
24	1.8	2.2	4.7	2.0	1.7	1.2	1.15	1.8	.7	.88	.65	1.75
25	1.8	2.25	3.1	4.2	1.85	1.2	1.0	2.6	.65	.7	.65	1.55
26	1.8	2.6	2.65	2.7	1.9	1.1	1.0	1.5	.65	.62	.65	1.4
27	2.1	2.3	2.45	2.55	1.85	1.05	.9	1.25	.65	.6	.62	1.3
28	1.8	2.1	2.3	2.3	1.65	1.05	1.0	1.1	.7	.75	.6	1.3
29	1.9	2.05	2.2	2.2	1.6	1.05	1.35	1.0	.75	1.2	.6	1.3
30	1.8	.....	2.1	2.2	1.8	1.05	1.15	1.0	.65	1.0	.65	1.2
31	1.8	.....	2.1	.....	1.5	.....	1.0	.9	.....	.8	.....	1.45

Rating table for Ocoee River at McCays, Tenn., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.60	360	1.80	990	3.00	1,790	4.40	2,850
.70	400	1.90	1,055	3.10	1,860	4.60	3,015
.80	445	2.00	1,120	3.20	1,930	4.80	3,185
.90	490	2.10	1,185	3.30	2,000	5.00	3,360
1.00	540	2.20	1,250	3.40	2,075	5.20	3,540
1.10	590	2.30	1,315	3.50	2,150	5.40	3,730
1.20	640	2.40	1,380	3.60	2,225	5.60	3,930
1.30	695	2.50	1,445	3.70	2,300	5.80	4,130
1.40	750	2.60	1,510	3.80	2,375	6.00	4,330
1.50	810	2.70	1,580	3.90	2,450	6.20	4,530
1.60	870	2.80	1,650	4.00	2,530	6.40	4,740
1.70	930	2.90	1,720	4.20	2,690	6.60	4,960

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on seven discharge measurements made during 1906 and 1907 and the form of previous curves, and is well defined between gage heights 0.9 feet and 3.5 feet. Above gage height 1.0 foot the table is the same as the 1906 table.

Monthly discharge of Ocoee River at McCays, Tenn., for 1907 and 1908.

[Drainage area, 374 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	1,760	840	1,040	2.78	3.20	A.
February	1,930	810	1,110	2.97	3.09	A.
March	2,690	750	995	2.66	3.07	A.
April	1,320	750	891	2.38	2.66	A.
May	1,220	695	857	2.29	2.64	A.
June	1,790	640	861	2.30	2.57	A.
July	1,320	540	705	1.89	2.18	A.
August	1,350	445	598	1.60	1.84	A.
September	3,180	360	670	1.79	2.00	A.
October	990	409	522	1.40	1.61	A.
November	1,720	436	694	1.86	2.08	A.
December	2,080	540	920	2.46	2.84	A.
The year	3,180	360	822	2.20	29.78	
1908.						
January	2,690	990	1,270	3.40	3.92	A.
February	4,850	990	1,520	4.06	4.38	A.
March	3,100	930	1,280	3.42	3.94	A.
April	2,690	960	1,280	3.42	3.82	A.
May	2,150	810	1,080	2.89	3.33	A.
June	1,150	565	736	1.97	2.20	A.
July	1,580	490	768	2.05	2.36	A.
August	1,650	445	658	1.76	2.03	A.
September	1,180	380	485	1.30	1.45	A.
October	870	360	424	1.13	1.30	A.
November	490	360	400	1.07	1.19	A.
December	4,430	445	903	2.41	2.78	A.
The year	4,850	360	900	2.41	32.70	

ELK RIVER NEAR ELKMONT, ALA.

This station 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.

It was established June 24, 1904, for the purpose of obtaining flow data for the lower tributaries of the Tennessee River. There are also good water power possibilities on this river.

The station was discontinued on February 3, 1908.

Daily gage height, in feet, of Elk River near Elkmont, Ala., for 1907 and 1908.

[Observer, J. D. Tennison.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	12.5	13.0	11.8	2.9	5.1	4.5	2.3	2.2	2.0	1.9	1.65	3.2
2	7.5	12.9	18.7	2.8	3.85	3.6	2.3	2.0	1.9	1.8	2.75	3.1
3	7.0	12.6	12.5	2.8	3.6	3.4	3.7	2.0	1.7	1.9	.....	3.0
4	7.2	9.8	8.5	2.7	3.7	3.25	2.85	1.95	2.0	1.9	2.5	2.8
5	6.7	8.5	8.0	2.6	3.6	3.2	2.4	1.85	2.2	2.0	2.4	2.3
6	6.0	5.8	6.7	3.2	4.0	2.95	2.35	1.85	2.1	1.8	2.3	2.3
7	5.4	5.0	5.6	3.0	6.7	2.85	2.3	1.85	2.1	1.9	2.0	2.4
8	4.6	4.0	5.6	2.85	9.0	2.7	2.2	1.9	2.0	1.9	1.9	2.5
9	4.4	4.0	5.0	3.1	9.3	2.6	2.1	2.65	2.1	1.85	1.8	2.8
10	4.2	3.9	.....	3.0	7.2	2.7	2.0	2.7	2.1	1.8	3.7	3.0
11	4.0	3.8	7.1	2.85	13.0	3.6	2.2	2.5	2.0	1.8	3.65	3.35
12	3.9	3.7	6.2	2.85	10.2	3.15	3.35	2.3	1.95	1.7	3.35	3.0
13	3.7	3.55	5.6	2.8	8.5	2.75	5.35	2.2	1.9	1.6	3.3	2.95
14	3.5	3.4	5.7	2.75	7.3	2.75	3.15	2.0	1.8	1.6	1.95	3.0
15	3.45	3.3	6.5	2.6	7.9	3.2	2.95	1.9	1.7	1.6	1.9	3.1
16	3.25	3.25	9.8	2.5	6.4	3.4	2.7	2.35	1.7	1.6	2.0	3.5
17	3.15	3.2	7.9	2.6	6.0	2.9	2.5	2.15	1.85	1.6	2.0	3.3
18	3.15	3.1	6.3	2.6	5.4	2.7	2.3	2.0	1.8	1.6	2.6	3.2
19	3.15	3.0	5.3	2.8	4.4	2.5	2.2	1.95	1.8	1.5	2.6	3.1
20	4.6	2.95	4.5	3.1	4.0	2.4	2.3	1.85	1.8	1.6	3.5	3.0
21	4.5	2.95	4.2	3.15	3.6	2.35	2.1	1.8	1.7	1.6	3.3	3.0
22	4.0	2.9	3.9	3.2	3.2	2.3	2.0	1.9	4.7	1.65	3.4	2.9
23	3.8	2.85	3.75	3.5	3.2	2.3	2.1	2.1	4.5	1.7	3.6	4.8
24	3.6	3.1	3.5	3.2	3.15	2.5	2.1	2.05	3.4	1.65	3.5	3.8
25	3.4	3.6	3.4	2.9	3.1	2.3	2.0	1.9	3.0	1.6	3.5	3.3
26	3.3	3.35	3.3	2.9	3.05	3.0	2.05	1.8	2.6	1.6	3.5	3.0
27	3.2	3.4	3.2	2.85	3.0	3.4	2.1	1.7	2.7	1.6	3.6	3.0
28	3.1	3.7	3.1	.....	2.8	3.0	2.0	2.0	2.6	1.6	3.4	2.9
29	3.1	.....	3.0	2.8	2.75	2.7	2.15	2.1	2.0	1.6	2.7	3.0
30	3.4	.....	3.0	4.8	2.7	2.3	2.45	1.9	2.0	1.65	2.7	12.5
31	4.0	.....	3.1	.....	2.85	.....	2.4	2.0	.....	1.6	.....	10.5

Day.	Jan.	Feb.	Day.	Jan.	Feb.	Day.	Jan.	Feb.
1908.			1908.			1908.		
1	7.5	9.5	11	5.2	.....	21	4.3	.....
2	6.1	5.9	12	5.6	.....	22	4.0	.....
3	5.0	.....	13	5.4	.....	23	3.9	.....
4	6.5	.....	14	5.2	.....	24	3.6	.....
5	10.4	.....	15	4.6	.....	25	3.5	.....
6	8.4	.....	16	5.6	.....	26	3.3	.....
7	7.4	.....	17	5.4	.....	27	3.2	.....
8	5.8	.....	18	5.2	.....	28	3.1	.....
9	4.8	.....	19	5.0	.....	29	3.0	.....
10	4.2	.....	20	4.4	.....	30	2.95	.....
						31	3.0	.....

Rating table for Elk River near Elkmont, Ala., for 1905 to 1908.

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	3.10	1,970	4.70	5,190	7.40	12,880
1.60	375	3.20	2,130	4.80	5,430	7.60	13,520
1.70	440	3.30	2,300	4.90	5,680	7.80	14,160
1.80	510	3.40	2,480	5.00	5,930	8.00	14,800
1.90	585	3.50	2,660	5.20	6,450	9.00	18,000
2.00	660	3.60	2,840	5.40	6,980	10.00	21,200
2.10	740	3.70	3,030	5.60	7,520	11.00	24,400
2.20	830	3.80	3,220	5.80	8,080	12.00	27,600
2.30	930	3.90	3,420	6.00	8,640	13.00	30,800
2.40	1,040	4.00	3,620	6.20	9,210	14.00	34,000
2.50	1,150	4.10	3,830	6.40	9,790	15.00	37,200
2.60	1,270	4.20	4,040	6.60	10,380	16.00	40,400
2.70	1,400	4.30	4,260	6.80	10,980	17.00	43,600
2.80	1,530	4.40	4,490	7.00	11,600	18.00	46,800
2.90	1,670	4.50	4,720	7.20	12,240	19.00	50,000
3.00	1,820	4.60	4,950				

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on discharge measurements made during 1904 to 1906 and is well defined between gage heights 1.2 feet and 4.0 feet.

Monthly discharge of Elk River near Elkmont, Ala., for 1905, 1907, and 1908.

[Drainage area, 1,700 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1905.						
January	26,000	1,040	3,850	2.26	2.61	A.
February	39,100	1,530	12,400	7.29	7.59	B.
March	31,100	1,820	6,320	3.72	4.29	B.
April	4,260	830	1,650	.971	1.08	A.
May	29,500	1,150	4,620	2.72	3.14	A.
June	22,500	930	4,500	2.65	2.96	A.
July	31,400	660	4,070	2.39	2.76	A.
August	4,720	440	1,320	.776	.89	A.
September	6,450	345	914	.538	.60	A.
October	10,100	315	2,040	1.20	1.38	A.
November	1,270	475	663	.390	.44	A.
December	28,900	585	6,550	3.85	4.44	A.
The year	39,100	315	4,070	2.40	32.19	
1907.						
January	29,200	1,970	5,350	3.15	3.63	B.
February	30,800	1,600	6,920	4.07	4.24	B.
March	49,000	1,820	9,910	5.83	6.72	B.
April	5,430	1,150	1,790	1.05	1.17	A.
May	30,800	1,400	7,490	4.41	5.08	B.
June	4,720	930	1,760	1.04	1.16	A.
July	6,840	660	1,270	.747	.86	A.
August	1,400	440	716	.421	.49	A.
September	5,190	440	1,070	.629	.70	A.
October	660	315	447	.263	.30	A.
November	3,030	408	1,670	.982	1.10	A.
December	29,200	930	3,520	2.07	2.39	B.
The year	49,000	315	3,490	2.06	27.84	
1908.						
January	22,500	1,740	6,440	3.79	4.37	A.

NOTE.—The 1905 table of monthly discharge was omitted from Water-Supply Paper 205 through an oversight.

DUCK RIVER AT COLUMBIA, TENN.

This station is located at the highway bridge two blocks north of the public square at Columbia, Tenn. It is about 2 miles above the mouth of Rutherford Creek.

The original gage was established by the United States Weather Bureau, but readings were not made except at special times during high water. On October 21, 1904, an observer was employed by the United States Geological Survey and daily gage readings were maintained, using the United States Weather Bureau's vertical gage until a chain gage was installed in 1905. This gage is on the same datum.

The measuring section is good except at very low stage, when it becomes sluggish. Some of the discharge measurements have been made from a boat at a swifter place a short distance above.

Daily gage height, in feet, of Duck River at Columbia, Tenn., for 1907 and 1908.

[Observer, W. O. Cherry.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	18.0	8.6	7.4	1.4	2.2	5.0	1.05	1.0	0.9	0.8	0.75	1.6
2	10.0	17.4	19.3	1.35	1.85	4.2	1.4	1.05	.75	.8	1.2	1.55
3	6.0	13.5	18.3	1.3	1.7	3.4	6.0	.95	2.15	.85	2.65	1.35
4	6.9	8.0	10.4	1.25	1.9	2.75	2.95	.9	1.35	.75	2.0	1.25
5	7.2	6.4	6.0	1.3	1.9	2.3	1.6	.8	1.0	.7	1.4	1.2
6	5.7	4.3	4.2	1.55	7.8	2.0	1.25	.85	.9	.75	1.15	1.15
7	4.7	3.6	3.7	1.85	12.2	1.65	1.15	.75	.85	.75	1.0	1.1
8	3.7	3.1	3.6	1.75	9.4	1.45	1.05	.75	.9	.85	.9	1.05
9	.....	2.9	3.2	1.65	7.8	6.9	.95	.95	.8	.95	.8	1.0
10	3.2	2.7	10.6	1.45	5.9	4.7	1.05	1.15	1.0	.9	1.65	1.6
11	2.7	2.55	11.8	1.4	6.4	3.0	1.1	1.0	.9	.8	3.8	2.9
12	2.55	2.35	8.0	1.35	6.0	2.2	2.05	.9	1.1	.8	2.65	2.35
13	2.35	2.15	5.3	1.25	4.1	1.8	9.0	.9	1.25	.7	1.8	2.05
14	2.25	2.0	15.4	1.2	3.8	1.45	5.1	.8	.95	.75	1.45	2.5
15	2.2	1.85	16.4	1.2	5.5	3.4	3.0	.8	.8	.7	1.25	3.0
16	2.15	1.75	11.2	1.2	4.8	2.25	2.0	.85	.75	.7	1.1	2.65
17	2.45	1.6	7.2	1.15	3.8	1.65	1.6	.85	.7	.8	.8	2.35
18	2.5	1.55	5.2	1.1	3.2	1.45	1.3	.85	.75	.7	1.15	2.25
19	2.25	1.5	4.2	1.1	2.65	1.25	1.15	.85	.8	.65	1.3	2.6
20	4.6	1.4	3.6	1.75	2.3	1.1	2.0	.85	.65	.55	1.9	2.45
21	4.8	1.35	3.2	1.8	2.05	1.0	2.65	.85	.6	.6	2.95	2.1
22	3.7	1.3	2.7	1.55	1.75	1.0	1.9	.8	1.95	.6	2.6	2.0
23	3.2	1.2	2.35	1.45	1.6	.95	1.45	.85	7.5	.55	3.8	5.0
24	2.85	1.65	2.15	1.35	1.6	1.05	1.25	.75	3.7	.5	6.0	6.4
25	2.3	3.0	2.05	1.3	1.5	1.8	1.15	.7	2.05	.5	4.0	4.7
26	2.0	3.0	1.85	1.3	1.45	2.1	1.05	.7	1.4	.6	3.2	4.2
27	1.95	3.4	1.75	1.25	1.35	1.7	1.0	.7	1.15	.55	2.5	3.3
28	1.85	3.4	1.65	1.3	1.3	1.55	.9	.65	1.05	.6	2.1	2.65
29	1.7	.....	1.55	1.35	1.2	1.25	1.1	1.0	.85	.55	1.9	2.55
30	1.6	.....	1.45	2.2	1.15	1.15	1.05	1.2	.8	.6	1.75	5.2
31	1.6	.....	1.4	.....	2.85	.....	1.0	.95	.....	.7	.....	11.4
1908.												
1	8.6	9.3	2.8	2.7	2.0	1.8	.9	.7	.9	.95	.6	1.8
2	5.8	9.0	3.9	2.55	1.85	1.55	.9	1.05	.8	.9	.6	1.3
3	3.7	5.2	6.3	2.3	1.6	1.9	2.0	1.0	.8	.85	.6	1.2
4	5.9	4.5	6.2	2.0	1.55	3.1	1.25	.7	.7	.8	.6	1.15
5	12.9	4.4	5.2	2.35	4.7	2.9	1.2	.75	6.6	.8	.7	1.05
6	11.0	5.7	4.6	3.0	8.4	2.3	1.65	.75	3.2	.7	.7	1.15
7	7.4	4.8	3.8	2.65	5.8	1.85	1.6	.85	2.3	.7	.7	5.4
8	5.0	4.1	3.2	2.45	4.0	1.65	1.4	.9	1.5	.7	.65	5.8
9	3.8	3.5	3.0	2.15	3.0	3.1	1.25	1.15	1.25	.7	.7	3.2
10	3.2	10.4	2.95	1.95	2.6	2.5	1.2	1.25	1.05	.7	.7	2.6
11	3.4	16.6	3.8	1.75	2.25	2.35	1.1	1.15	1.0	.7	.6	2.0
12	5.4	11.6	10.1	1.65	1.95	2.5	1.0	1.05	.9	.7	.65	2.3
13	5.8	9.6	11.8	1.55	1.75	1.9	1.0	.95	.8	.75	.7	2.3
14	5.0	8.4	7.4	1.5	1.55	1.6	.9	.9	.8	.7	.7	2.05
15	4.4	14.6	4.8	1.4	2.35	1.5	.9	.85	.8	.7	.6	1.75

Daily gage height, in feet, of Duck River at Columbia, Tenn., for 1907 and 1908—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	4.4	12.6	4.0	1.6	2.6	1.35	0.8	0.8	0.8	0.7	0.6	1.6
17	5.7	7.8	3.2	1.5	2.3	1.3	.8	.8	.7	.75	.7	1.35
18	4.8	5.6	2.75	2.3	2.75	1.2	.8	.8	.7	.65	.7	1.3
19	4.2	5.4	2.55	3.2	4.1	1.05	.7	.8	.7	.7	.65	1.2
20	3.4	5.8	3.2	2.65	3.5	1.0	.75	2.6	.7	.65	.6	1.2
21	2.95	4.4	2.95	2.35	2.6	.95	.7	3.9	3.9	.6	.6	1.1
22	2.75	4.1	3.3	1.95	2.2	.9	.85	2.25	4.8	.6	.6	2.3
23	2.55	3.4	4.2	1.75	2.05	.95	.8	1.6	3.2	.6	.65	9.7
24	2.35	2.9	9.0	4.6	1.6	1.05	.85	1.3	2.0	.6	.7	6.2
25	2.1	2.7	7.4	8.8	1.45	1.7	.85	1.4	1.3	.55	.7	3.1
26	1.95	3.6	5.4	4.6	3.9	1.55	.8	1.2	1.15	.55	.7	2.8
27	1.9	3.8	4.2	4.8	4.6	1.25	.7	1.05	1.0	.5	.7	2.5
28	1.8	3.6	3.6	3.2	3.2	1.1	.7	1.0	1.0	.6	1.9	2.6
29	1.75	3.0	3.4	2.4	2.3	.95	.75	.95	.95	.6	2.45	2.05
30	1.6	.....	3.8	2.15	2.25	.9	.75	.85	1.05	.6	2.45	2.25
31	1.75	.....	3.1	.....	2.2	.....	.7	.8	.....	.....	.....	2.35

Rating table for Duck River at Columbia, Tenn., for 1907 and 1908.

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	100	2.10	1,160	3.70	2,530	6.60	5,140
.60	145	2.20	1,240	3.80	2,620	6.80	5,320
.70	195	2.30	1,320	3.90	2,710	7.00	5,500
.80	250	2.40	1,400	4.00	2,800	8.00	6,400
.90	310	2.50	1,480	4.20	2,980	9.00	7,300
1.00	375	2.60	1,560	4.40	3,160	10.00	8,200
1.10	440	2.70	1,645	4.60	3,340	11.00	9,100
1.20	510	2.80	1,730	4.80	3,520	12.00	10,000
1.30	580	2.90	1,815	5.00	3,700	13.00	10,900
1.40	650	3.00	1,900	5.20	3,880	14.00	11,800
1.50	720	3.10	1,990	5.40	4,060	15.00	12,700
1.60	790	3.20	2,080	5.60	4,240	16.00	13,600
1.70	860	3.30	2,170	5.80	4,420	17.00	14,500
1.80	930	3.40	2,260	6.00	4,600	18.00	15,400
1.90	1,005	3.50	2,350	6.20	4,780	19.00	16,300
2.00	1,080	3.60	2,440	6.40	4,960	20.00	17,200

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on discharge measurements made during 1901 and 1905 to 1906 and is well defined between gage heights 0.5 foot and 4.0 feet. Above gage height 4.0 feet it is based on one measurement made in 1901 at gage height 11.9 feet. Above gage height 3.0 feet the rating curve is a tangent, the difference being 90 per tenth.

Monthly discharge of Duck River at Columbia, Tenn., for 1907 and 1908.

[Drainage area, 1,260 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	15,400	790	2,790	2.21	2.55	B.
February	14,900	510	2,730	2.17	2.26	B.
March	16,600	650	4,960	3.94	4.54	B.
April	1,240	440	660	.524	.58	A.
May	10,200	475	2,550	2.02	2.33	A.
June	5,410	342	1,350	1.07	1.19	A.
July	7,300	310	1,150	.913	1.05	A.
August	510	170	295	.234	.27	A.
September	5,950	145	668	.530	.59	A.
October	342	100	197	.156	.18	A.
November	4,600	222	1,180	.936	1.04	A.
December	9,460	375	1,820	1.44	1.66	A.
The year	16,600	100	1,700	1.35	18.24	

Monthly discharge of Duck River at Columbia, Tenn., for 1907 and 1908—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908.						
January	10,800	790	3,210	2.55	2.94	A.
February	14,100	1,640	5,110	4.06	4.38	B.
March	9,820	1,520	3,440	2.73	3.15	A.
April	7,120	650	1,660	1.32	1.47	A.
May	6,760	685	1,840	1.46	1.68	A.
June	1,990	310	852	.676	.75	A.
July	1,080	195	375	.298	.34	A.
August	2,710	195	509	.404	.47	A.
September	5,140	195	854	.678	.76	A.
October	342	100	189	.150	.17	A.
November	1,440	145	285	.226	.25	A.
December	7,930	408	1,590	1.26	1.45	A.
The year	14,100	100	1,660	1.32	17.81	

MISCELLANEOUS MEASUREMENTS IN OHIO RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in the Ohio River drainage basin during 1907 and 1908:

Miscellaneous measurements in Ohio River basin in 1907 and 1908.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Sept. 17, 1908	Ohio River	Mississippi River	Henderson, Ky.	[a] 3.06	14,500
Aug. 25, 1908	Allegheny River	Ohio River	Suspension bridge, Warren, Pa.	[b] −0.17	886
Do.	do	do	Highway bridge, Tionesta, Pa.	(c)	1,030
May 28, 1907	do	do	Aspinwall, Pa.	20.5	31,600
Aug. 25, 1908	Conewango Creek	Allegheny River	Fifth street bridge, Warren, Pa.	(d)	226
Do.	Brokenstraw Creek	do	First bridge above mouth, about ½ mile, Irvineton, Pa.	(e)	45.3
Do.	Tionesta Creek	do	First highway bridge above mouth, Tionesta, Pa.	(f)	58.4
Aug. 24, 1908	Oil Creek	do	Center-street bridge, Oil City, Pa.	(g)	59.2
Do.	French Creek	do	Highway bridge, Carlton, Pa.	[h] 0.11	100
Do.	Clarion River	do	Highway bridge, Clarion, Pa.	(i)	154
Do.	Red Bank Creek	do	Highway bridge, Brookville, Pa.	[b] −0.3	[k] 78.2
Aug. 23, 1908	Mahoning Creek	do	Highway bridge, near mouth, Mahoning, Pa.	(l)	99.0

[a] United States Corps Engineer gage at Evansville, Ind.
[b] Weather Bureau gage.
[c] Reference point is top of guard railing, 58 feet from guard rail post at west end of bridge, downstream side. Distance to water surface, 29.95 feet.
[d] Reference point, top of hand rail opposite end of second panel from left abutment, downstream side of bridge. Distance to water surface, 21.40 feet.
[e] Water surface 13.00 feet below top of coping stone at west end of bridge, upstream side.
[f] Water surface to top of second floor beam from north end, downstream side, was 22.75 feet.
[g] Reference point, top of board walk, downstream side, 30 feet from bend in guard railing at west end of bridge. Distance to water surface, 19.75 feet.
[h] Water supply commission of Pennsylvania gage.
[i] Reference point is top of downstream hand rail, three panels from right end of bridge. Distance to water surface, 33.56 feet.
[k] Discharge includes that of mill race.
[l] Reference point, top of lower chord at south edge of pier, downstream side. Distance to water surface, 27.70 feet.

Miscellaneous measurements in Ohio River basin in 1907 and 1908—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height	Discharge.
				Feet.	*Sec.-ft.*
Nov. 18, 1908	Cheat River	Monongahela River	⅜ mile above bridge at Ice's Ferry, W. Va.	*a* 1.61	131
Dec. 9, 1908	do	do	¼ mile below Uneva cable station, W. Va.	*a* 1.86	223
Aug. 22, 1908	Youghiogheny River	do	Connellsville, Pa	(*b*)	253
Do	Turtle Creek	do	East Pittsburg, Pa	*c* 0.79	26.4
July 25, 1908	Little Kanawha River	Ohio River	Glenville, W. Va	(*d*)	112
Aug. 19, 1908	New River	Ohio River	Hinton, W. Va	*e* 1.90	3,490
Sept. 29, 1908	Kanawha River	do	Point Pleasant, W. Va.	(*f*)	2,130
Sept. 22, 1908	Miami River	do	Hamilton, Ohio	(*d*)	401
Do	do	do	do	(*d*)	287
Sept. 23, 1908	do	do	do	(*d*)	279
Do	do	do	do	(*d*)	284
Aug. 26, 1907	Savannah Creek	Tuckaseegee River	At mouth, near Dillsboro, N. C.	*g* 0.60	45
Apr. 20, 1907	Soco Creek	Oconolufty River	Cherokee, N. C	*g* 2.22	96
Aug. 27, 1907	do	do	do	*g* 1.76	29
Oct. 19, 1907	do	do	do	*g* 1.78	36
Aug. 24, 1907	Snowbird Creek	Cheoah River	Millsaps, N. C	*g* 1.50	109
Oct. 16, 1907	do	do	do	*g* 1.30	99
May 30, 1907	Tellico River	Little Tennessee River	Tellico Plains, Tenn	*g* 3.80	211
Aug. 15, 1907	do	do	At wagon bridge, 1 mile above mouth, near McGhee, Tenn.	*g* 3.14	424
Aug. 21, 1907	Fires Creek	Hiwassee River	Near mouth, 15 miles above Murphy, N. C.	*g* 2.56	108
Aug. 22, 1907	Brasstown Creek	do	Near mouth, 7 miles above Murphy, N. C.	*g* 3.07	104
Aug. 17, 1907	Fightingtown Creek	Ocoee River	Near mouth at McCays, Tenn.	*g* 2.80	108

a Reference old Cheat River gage at Uneva.
b Reference point, top of hand rail beside down spout of gage box at a point 200 feet from edge of pier beside B. & O. R. R. tracks on river side. Distance to water surface, 32.09 feet.
c Water supply commission of Pennsylvania gage.
d Referenced.
e Weather Bureau gage.
f Upper gage lock No. 11, 17.40 feet. Lower gage lock No. 11, 6.50 feet.
g Gage height determined from reference point.

SUMMARIES OF DISCHARGE PER SQUARE MILE.

The following tables of summaries of discharge per square mile are given to allow of ready comparison of relative rates of run-off from different areas in the Ohio River drainage basin.

They show in a general way the seasonal distribution of run-off and the effect of snow, ground, surface, and artificial storage. But the most important fact worth noting is the almost entire lack of uniformity or agreement between any two stations. It indicates that the discharge of each stream is a law unto itself, and that all projects dependent upon stream flow, if they are to be developed along the safest and most economical lines, must be based on records of stream flow collected with great care over a long series of years as near the location of the project under consideration as possible.

Summary of discharge, in second-feet per square mile, for Ohio River basin for 1907 and 1908.

Station.	Drainage area.	1907.													1908.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	Sq. m.																									
Allegheny River at Red House, N. Y.	1,640	3.43	0.61	3.72	2.46	2.32	1.65	1.05	0.18	0.22	1.32	1.04	2.01	1.67	1.83	3.59	6.28	3.55	3.87	1.46	0.79	0.45	0.12	0.09	0.15	0.22	1.87
Allegheny River at Kittanning, Pa	8,690	3.95	1.02	3.96	2.20	2.27	1.82	.85	.24	.36	1.17	1.97	2.46	1.86	2.09	3.37	6.17	2.97	3.87	1.11	1.05	.31	.11	.11	.13	.51	1.82
Kiskiminetas River at Avonmore, Pa.	1,750	....	....	....	....	....	....	1.03	.63	1.36	.97	1.99	2.95	....	3.57	3.37	8.23	3.15	3.47	.65	.34	.20	.05	.06	.08	.41	1.97
Blacklick Creek at Blacklick, Pa.	403	5.66	1.28	6.38	1.62	1.32	1.69	.55	.21	1.20	1.44	1.89	2.63	2.16	2.22	2.63	7.02	2.88	3.90	.70	.50	.24	.04	.06	.10	.75	1.75
Youghiogheny River at Confluence, Pa.	435	9.66	2.85	9.40	2.57	3.36	3.38	3.54	1.57	.87	1.07	3.52	5.15	3.91	3.31	4.71	8.99	3.98	6.34	.77	.36	.27	.09	.07	.09	.34	2.44
Casselman River at Confluence, Pa.	450	7.29	2.27	7.91	2.62	3.62	3.96	1.88	.69	.68	.56	2.67	4.18	3.19	2.84	4.00	7.18	3.64	4.73	.79	.54	.14	.04	.06	.06	.36	2.03
Laurel Hill Creek at Confluence, Pa.	118	7.79	2.13	8.08	3.22	3.77	3.75	2.69	1.29	.84	.84	3.57	4.85	3.57	3.35	4.58	8.73	5.05	5.14	.96	.98	.22	.06	.08	.10	.64	2.49
New River at Radford, Va.	2,720	....	....	....	....	....	3.30	1.30	.92	1.99	.81	1.51	2.18	....	3.10	3.62	2.68	2.44	2.02	1.94	1.65	1.64	1.00	2.21	1.79	2.15	2.19
Greenbrier River at Alderson, W. Va.	1,340	....	....	....	....	....	4.69	1.08	.59	.73	.74	2.57	3.19	....	3.48	4.28	5.81	4.08	3.95	.98	.96	.52	.14	.14	.20	.82	2.11
East Branch White River at Shoals, Ind.	4,900	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.47	....	....	....	....	.08	.09	....	....
French Broad River near Asheville, N. C.	987	2.39	1.77	1.74	2.04	2.13	1.83	1.11	.78	.85	.56	1.51	2.94	1.64	3.50	4.49	2.96	2.47	2.21	1.37	1.89	2.82	1.60	2.31	1.66	2.22	2.46
French Broad River at Newport, Tenn.	1,740	....	....	....	....	....	....	....	....	1.02	.61	1.29	1.95	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tennessee River at Knoxville, Tenn.	8,990	1.68	1.35	2.20	1.91	1.58	2.51	1.29	.93	1.15	.68	1.40	1.55	1.52	2.91	2.60	2.97	2.32	1.61	1.17	1.09	1.20	.62	.96	1.05	2.15	1.72
Tennessee River at Chattanooga, Tenn.	21,400	2.22	1.95	2.93	2.21	1.96	2.47	1.25	.99	1.12	.77	1.76	1.61	1.77	3.32	3.26	2.93	2.44	2.10	1.42	1.15	1.18	.72	.59	.85	2.11	1.84
Davidsons River near Davidsons River, N. C.	41	2.46	2.02	2.09	2.19	2.63	2.17	1.47	1.25	2.02	1.08	2.07	4.05	2.12	3.98	5.78	4.02	3.80	3.46	2.49	2.98	4.51	2.68	2.78	2.06	2.59	3.43
North Fork of Mills River at Pinkbed, N. C.	24	3.05	2.37	2.28	2.76	3.60	2.75	1.87	1.40	1.78	1.27	1.90	3.33	2.36	3.52	6.67	3.77	3.78	3.49	2.13	2.71	3.95	2.55	3.72	2.89	3.25	3.54
South Fork of Mills River near Sitton, Tenn.	40.5	3.43	2.62	2.79	2.91	4.07	3.56	2.28	1.65	2.28	1.31	2.67	4.40	2.91	4.52	7.04	4.81	3.88	3.60	2.24	3.38	5.80	3.23	3.38	2.96	3.53	4.03
Pigeon River at Newport, Tenn.	655	1.66	1.48	1.92	1.79	2.09	1.88	1.26	.91	....	....	....	1.71	....	3.37	3.33	3.57	2.20	1.91	1.29	1.39	1.79	.88	1.30	1.28	2.78	2.09
Nolichucky River near Greenville, Tenn.	1,100	1.69	1.25	2.01	1.82	1.53	2.65	1.45	.96	1.31	.85	1.03	1.48	1.50	2.87	2.76	3.26	2.42	2.01	1.44	1.68	1.69	.84	1.77	1.43	2.38	2.05
South Fork of Holston River at Bluff City, Tenn.	828	1.80	1.32	2.42	2.13	1.51	3.97	2.14	1.27	1.68	.98	1.93	2.02	1.93	3.47	2.46	3.27	2.92	2.02	1.49	1.01	.60	.44	.53	.86	2.68	1.81
Holston River near Rogersville, Tenn.	3,060	1.65	1.35	2.33	2.06	1.45	3.37	1.37	1.04	1.47	.79	1.74	1.65	1.69	2.76	2.49	3.09	2.86	1.85	1.57	1.22	.87	.60	.68	.89	2.41	1.77
Watauga River near Elizabethton, Tenn.	408	1.76	1.37	2.45	2.12	1.30	4.12	1.74	1.21	2.52	1.12	1.50	2.97	2.02	4.12	3.50	....	3.31	2.35	1.95	2.60	1.61	.88	1.90	1.49	3.24	....
Little Tennessee River at Judson, N. C.	675	3.47	3.32	3.57	3.11	3.08	3.05	1.90	1.43	1.87	1.33	2.40	3.87	2.70	5.16	6.56	5.33	4.68	3.35	2.16	2.28	2.18	1.39	1.67	1.54	4.41	3.39
Little Tennessee River at McGhee, Tenn.	2,470	2.81	3.03	3.06	2.69	2.81	2.80	1.82	1.27	1.55	1.25	2.30	2.63	2.34	4.01	3.89	4.21	2.98	2.66	1.79	1.81	1.92	1.12	1.03	1.05	2.93	2.45
Tuckaseegee River at Bryson, N. C.	662	2.45	2.55	2.73	2.24	2.66	2.48	1.77	1.30	1.60	1.19	2.24	2.99	2.18	3.41	4.20	4.17	3.34	3.04	1.90	1.86	1.83	1.21	1.18	1.15	2.73	2.50
Hiwassee River at Murphy, N. C.	410	2.66	3.15	2.98	2.51	2.30	2.49	2.31	1.92	2.71	1.33	2.04	2.63	2.42	4.20	4.88	4.71	3.83	3.05	1.68	1.71	1.44	.98	1.06	1.06	3.24	2.65
Hiwassee River at Reliance, Tenn.	1,180	2.87	3.39	2.94	2.40	2.43	2.47	1.94	1.60	1.47	1.22	1.99	2.50	2.27	3.99	3.90	4.21	3.17	2.47	1.63	1.50	1.23	.86	.89	.85	2.82	2.29
Valley River at Tomotla, N. C.	106	4.62	4.42	4.82	2.98	2.85	2.77	1.93	1.44	1.58	1.08	2.38	3.19	2.84	4.58	4.75	5.55	3.57	2.58	1.57	1.44	1.27	.69	.67	.71	3.20	2.55
Ocoee River at McCays, Tenn.	374	2.78	2.97	2.66	2.38	2.29	2.30	1.89	1.60	1.79	1.40	1.86	2.46	2.20	3.40	4.06	3.42	3.42	2.89	1.97	2.05	1.76	1.30	1.13	1.07	2.41	2.41
Elk River near Elkmont, Ala.	1,700	3.15	4.07	5.83	1.05	4.41	1.04	.75	.42	.63	.26	.98	2.07	2.06	3.79	....	....	....	....	....	....	....	....	....	....	....	....
Duck River at Columbia, Tenn.	1,260	2.21	2.17	3.94	.52	2.02	1.07	.91	.23	.53	.16	.94	1.44	1.35	2.55	4.06	2.73	1.32	1.46	.68	.30	.40	.68	.15	.23	1.26	1.32

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