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

WATER-SUPPLY PAPER 283

SURFACE WATER SUPPLY OF THE UNITED STATES

1910

PART III. OHIO RIVER BASIN

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

A. H. HORTON, M. R. HALL, AND H. J. JACKSON

WASHINGTON
GOVERNMENT PRINTING OFFICE
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SURFACE WATER SUPPLY OF THE OHIO RIVER BASIN, 1910.

By A. H. HORTON, M. R. HALL, and H. J. JACKSON.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of measurements of the flow of 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 private or State organizations. The organic law of the Geological Survey (Stat. L., vol. 20, p. 394) contains the following paragraph:

> 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 structures, mineral resources, and products of the national domain.

As water is the most abundant and most valuable of the minerals, the investigation of water resources is authorized under the provision for examining 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 gauging 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 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
1911	150,000

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor do they include all the streams that might purposefully be studied. The scope of the work is limited by the appropriations available. The field covered is the

widest and the character of the work is believed to be the best possible under the controlling conditions. The work would undoubtedly have greater scientific importance and ultimately be of more practical value if the money now expended for wide areas were concentrated on a few small drainage basins; but 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 kept during a period of years long enough to determine within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum. The length of such a period manifestly differs for different streams. Experience has shown that the records for some streams should cover 5 to 10 years and those for other streams 20 years or even more, the limit being determined by the relative importance of the stream and the relation of the results to other long-time records on adjacent streams.

In the performance of this work an effort is made to reach the highest degree of precision possible with a rational expenditure of time and a judicious expenditure of a small amount of money. In all engineering work there is a point beyond which refinement is needless and wasteful, and this statement applies with especial force to stream-flow measurements. It is confidently believed that the stream-flow data presented in the publications of the Survey are in general 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 stations. All persons are cautioned to exercise the greatest care in using such incomplete records.

Records have been obtained at nearly 2,000 different points in the United States. The surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in Hawaii has also been investigated. During 1910 regular gaging stations were maintained by the Survey and cooperating organizations at about 1,100 points in the United States, and many discharge measurements were made at other points. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular surface water supply papers and in special papers from time to time.

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey 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 have 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 12 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 1910. 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, 1910.

Part.	No.	Title.
I	281	North Atlantic coast.
II	282	South Atlantic coast and eastern Gulf of Mexico.
III	283	Ohio River basin.
IV	284	St. Lawrence River basin.
V	285	Upper Mississippi River and Hudson Bay basins.
VI	286	Missouri River basin.
VII	287	Lower Mississippi River basin.
VIII	288	Western Gulf of Mexico.
IX	289	Colorado River basin.
X	290	Great Basin.
XI	291	California.
XII	292	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 special papers:

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

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

Report.	Character of data.	Year.
10th A., pt. 2	Descriptive information only	
11th A., pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A., pt. 2	do	1884 to June 30, 1891.
13th A., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A., 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 A., 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 A., 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 A., 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 A., pt. 4	Monthly discharge (also for many earlier years)	1898.
W S. 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A., pt. 4	Monthly discharge	1899.
W S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A., pt. 4	Monthly discharge	1900.

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

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

Report.	Character of data.	Year.
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.
W S. 261 to 272	do	1909.
W S. 281 to 292	do	1910.

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 1909. Wherever the data for a drainage basin appears 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, 1899-1910.

	1899 [a]	1900 [b]	1901	1902	1903	1904	1905	1906	1907–8	1909	1910
Atlantic coast and eastern Gulf of Mexico:											
New England rivers	35	47	65, 75	82	97	124	165	201	241	261	281
Hudson River to Delaware River, inclusive	35	47, (48)	65, 75	82	97	125	166	202	241	261	281
Susquehanna River to York River, inclusive	35	48	65, 75	82	97	126	167	203	241	261	281
James River to Yadkin River, inclusive	(35), 36	48	65, 75	(82), 83	(97), 98	126	167	203	242	262	282
Santee River to Pearl River, inclusive	36	48	65, 75	83	98	127	168	204	242	262	282
St. Lawrence River	36	49	65, 75	(82), 83	97	129	170	206	244	264	284
Hudson Bay	.....	.....	66, 75	85	100	130	171	207	245	265	285
Mississippi River:											
Ohio River	36	48, (49)	65, 75	83	98	128	169	205	243	263	283
Upper Mississippi River	36	49	65, 75	83	98, (99)	128, (130)	171	207	245	265	285
Missouri River	(36), 37	49, (50)	66, 75	84	99	130, (131)	172	208	246	266	286
Lower Mississippi River	37	50	(65), 66, 75	(83), 84	(98), 99	(128), 131	(169), 173	(205), 209	247	267	287
Western Gulf of Mexico	37	50	66, 75	84	99	132	174	210	248	268	288
Pacific coast and Great Basin:											
Colorado River	(37), 38	50	66, 75	85	100	133, (134)	175, (177)	211, (213)	249, (251)	269, (271)	289, (291)
Great Basin	38, (39)	51	66, 75	85	100	133, (134)	176, (177)	212, (213)	250, (251)	270, (271)	290, (291)
South Pacific coast to Klamath River, inclusive	(38), 39	51	66, 75	85	100	134	177	213	251	271	291
North Pacific coast	38	51	66, 75	85	100	135	(177), 178	214	252	272	292

[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	Yuma and Salton Sea stations repeated.
271.	Great Basin	Owens River basin.

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined by measuring or estimating the drainage area; that is, the headwater stream having the largest drainage area is considered the continuation of the main stream and local changes in name and lake surface are disregarded. Records for all stations from the source to the mouth of the main stem of the river are presented first, and records for the tributaries in regular order from source to mouth follow, all records for each tributary basin being given before those of the next basin 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 simpler 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 several 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. The units used in this series of reports are second-feet, second-feet per square mile, and run-off in inches and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the unit for 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.

"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.

An "acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. The term 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 Mar. 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 646,317 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 equals 18.7 United States gallons per second.
100 California miner's inches equals 96 Colorado miner's inches.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches equals 104 California miner's inches.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.

1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

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

EXPLANATION OF DATA.

For each drainage basin there is given a brief general description covering such items as area, source, tributaries, topography, geology, forestation, rainfall, irrigation, storage, power, and other interesting or important facts.

For each regular current-meter gaging station the following data so far as available are given: Description of station, list of discharge measurements, table of daily gage heights, table of daily discharges, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

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 channels, and backwater; also 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 records 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 affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are 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.

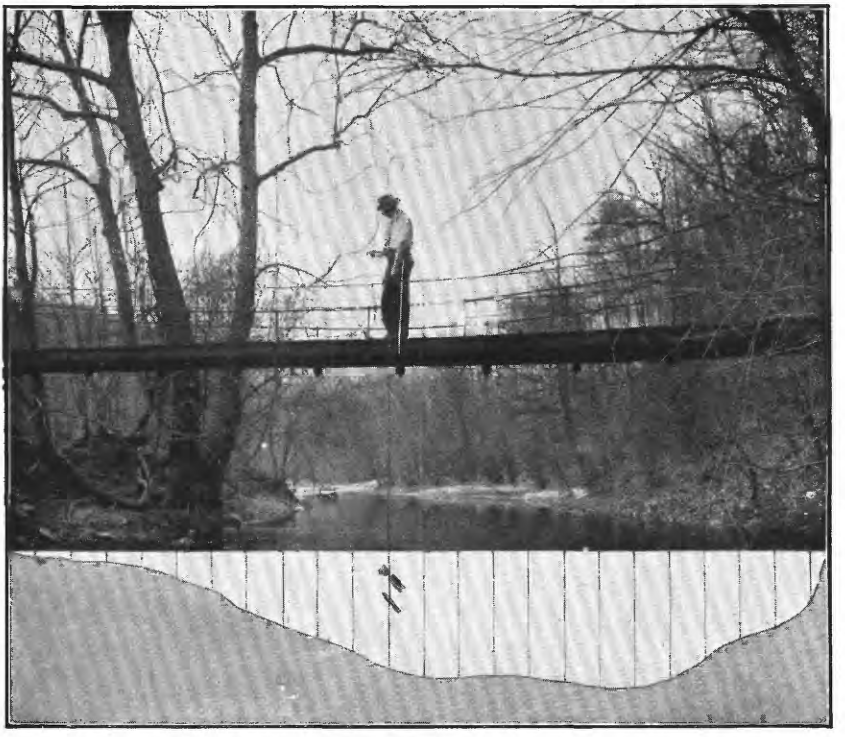
The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

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 not published in this report, but can be determined from the daily gage heights and daily discharges for the purpose of verifying the published results as follows:

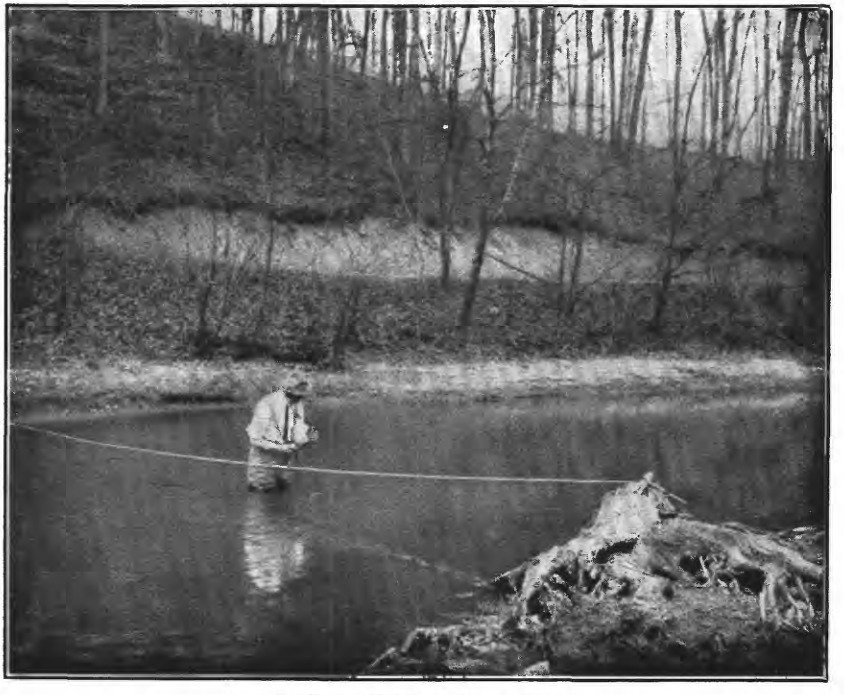
First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater conditions.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

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 stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum 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 pages 11 and 12, are based.

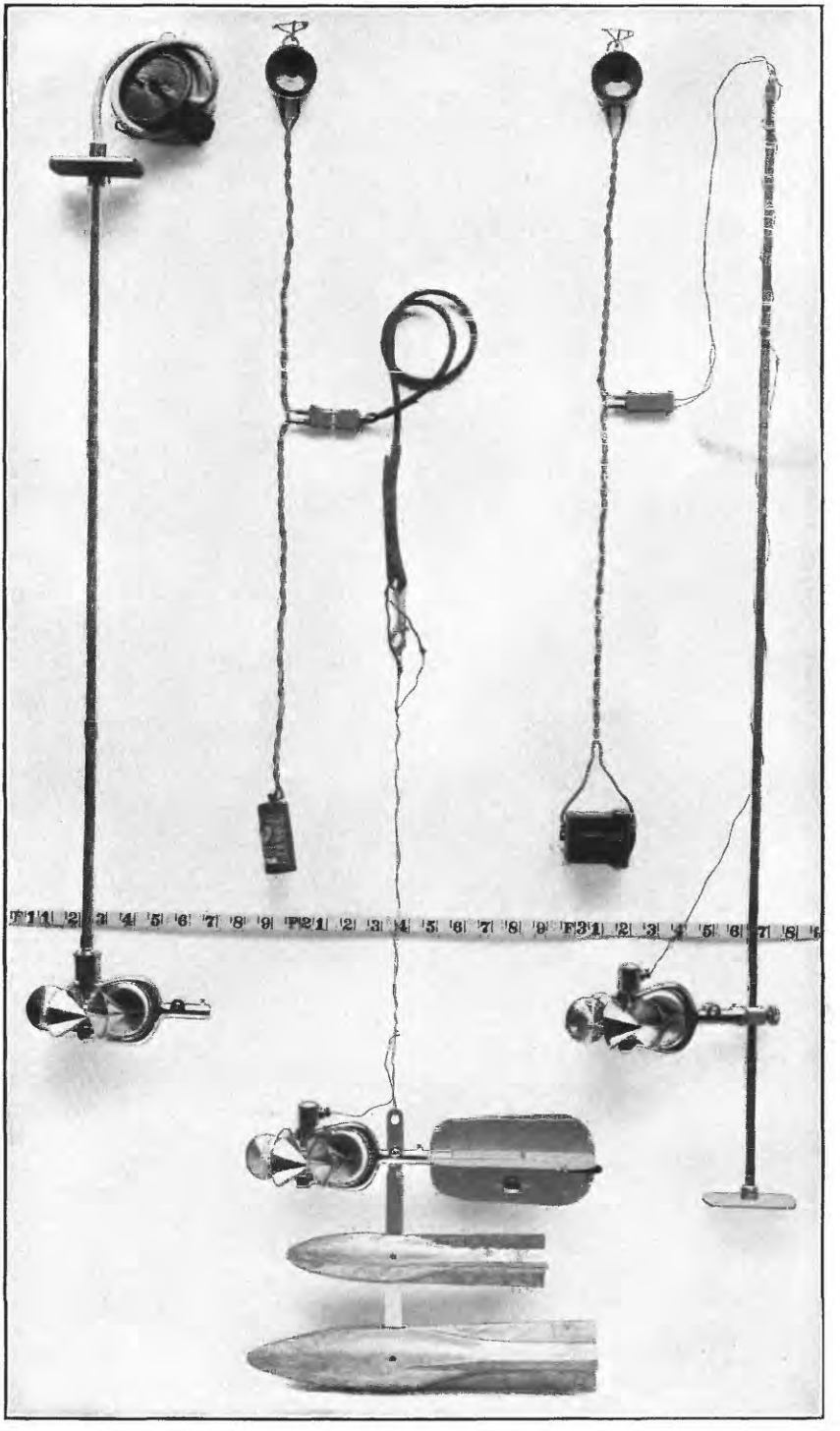


A. FOR BRIDGE MEASUREMENT.



B. FOR WADING MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909." Plate I shows typical gaging stations, indicating the method of suspending the current meter; Plate II shows the various types of current meters [1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream flow depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation of discharge to stage. Errors of the second group are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

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 experiments made to test the accuracy of current-meter work 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 the coefficient may be uncertain and conditions of flow are complicated.

The work is, of course, dependent on the reliability of the gage observers. With relatively few exceptions, the observers perform their work honestly. The records are, however, closely watched and the cause of any discrepancy is investigated. It is 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.

An effort is made to visit every station at least once each year for the purpose of making a measurement to determine the constancy of conditions of flow since the last measurement made in the preceding year, and also to check the elevation of the gage. On account of lack of funds or for other causes some stations were not visited during the current year. If conditions of flow have been reasonably permanent up to the time of the last preceding measurement, it is con-

[1] See Hoyt, J. C., and others, Use and care of the current meter as practiced by the United States Geological Survey; Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

sidered best to publish estimates of discharge based on the latest verified rating curve rather than to omit them altogether, although it should be distinctly understood that such records are at times subject to considerable error. This is also true, although to a less degree, of the period of records since the date of the last measurement of the current year. As a rule, the accuracy notes are based on the assumption that the rating curve used is strictly applicable to the current year.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily-discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly-discharge table. For 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 base data which are collected in the field each year by the Survey engineers are published, not only 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 use of the figures presented in these papers will verify all ratings and make such adjustments for earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for 5 or 10 year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The estimates 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.

The daily discharges are published to allow a more detailed study of the variation in flow and to determine the periods of deficient flow.

COOPERATIVE DATA.

Cooperative data of various kinds and data regarding the run-off at many stations maintained wholly by private funds are incorporated in the surface water-supply reports of the United States Geological Survey.

Many stations throughout the country are maintained for specific purposes by private parties who supply the records gratuitously to the United States Geological Survey for publication. When such records are furnished by responsible parties and appear to be reasonably accurate, they are verified, so far as possible, and estimated values of accuracy are given. Records clearly worthless or misleading are not published. As it is, however, impossible to completely verify all such records furnished—because of lack of funds or for other causes—they are published for what they are worth, as they are of value as a matter of record and afford at least approximate information regarding stream flow at the particular localities. The Survey does not, however, assume any responsibility for inaccuracies found in such records, although most of them are believed to be reasonably good.

COOPERATION AND ACKNOWLEDGMENTS.

For assistance rendered and records furnished special acknowledgment is due to members of the United States Corps of Engineers, the United States Weather Bureau, the Water Supply Commission of Pennsylvania, the North Carolina Geological Survey, the Ohio State Experiment Station, the Kentucky Geological Survey, the Madison Electric & Power Co., of Richmond, Ky., and F. W. Scheidenhelm. The State of Illinois has paid for the stream-gaging work 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 Red House, N. Y., have been collected under the direction of C. C. Covert, district engineer, assisted by W. G. Hoyt.

The field data for the Ohio River basin, with the exception of Allegheny River at Red House, N. Y., and for a portion of the Tennessee

River drainage basin have been collected under the direction of A. H. Horton, district engineer, assisted by H. J. Jackson, C. T. Bailey, M. E. McChristy, J. C. Dort, P. S. Monk, and R. A. Hanson. 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 basin have been collected under the direction of M. R. Hall, district engineer, assisted by F. P. Thomas.

The ratings, special estimates, and studies of the completed data were made by A. H. Horton, M. R. Hall, R. H. Bolster, and H. J. Jackson. The computations were made and the completed data prepared for publication under the direction of R. H. Bolster and H. J. Jackson by G. C. Stevens, H. J. Jackson, J. G. Mathers, H. D. Padgett, G. K. Larrison, A. H. Tuttle, H. J. Dean, O. de Carre, A. McMillan, and M. I. Walters. The report has been edited by Mrs. B. D. Wood.

GENERAL FEATURES OF OHIO RIVER DRAINAGE BASIN.

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 union of Allegheny and Monongahela rivers at Pittsburgh, Pa., and flows in a general southwesterly direction to its junction with the Mississippi at Cairo, Ill. The principal tributaries below Pittsburgh from the north and west are Beaver, Muskingum, Scioto, Miami, and Wabash rivers; those from the south and east are Monongahela, Little Kanawha, Kanawha, Guyandotte, Big Sandy, Licking, Kentucky, Green, Cumberland, 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 States of New York, Pennsylvania, Maryland, West Virginia, Virginia, North Carolina, Georgia, Alabama, Tennessee, Kentucky, Ohio, Indiana, and Illinois. Its northern boundaries are about 40 miles south of Buffalo, N. Y., its 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; those of the southern tributaries are located on the steep and rocky slopes of the western side of the Appalachian Mountains.

The topography of the basin 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. Between Evansville, Ind., and Shawneetown, Ill., its level is 65 or 75 feet

below the stream. It is thought that in the whole length of the valley no 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 dips toward the east bank sufficiently to allow boats to pass 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 wells and bridge soundings indicate 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 city. Thus a buried channel apparently occurs at the side of each of the three most conspicuous rock reefs touched by the stream.

Notwithstanding the great number of riffles and shoals, the Ohio is generally navigable throughout the entire season for 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 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 narrowness of the valley of Ohio River has been a subject of remark from the early days of settlement. At very few places between Pittsburgh and Louisville does its width exceed 2 miles, and usually it is scarcely more than 1 mile wide. In the vicinity of Louisville its width is perhaps 4 miles, but below the mouth of Salt River it narrows abruptly to 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 as it passes the elevated ridge below Shawneetown, where its width is reduced to about 2½ miles.

The depth of the valley ranges from about 600 feet down to scarcely 100 feet, being greatest on the border of the "panhandle" of West Virginia and least in the lower portion of its course. Its depth seldom falls below 300 feet in the portion above Louisville and probably averages 450 feet. The narrow portion below Louisville is about 300 feet deep. The broad portions at Louisville and in the lower parts of its course are but 100 to 150 feet deep. The work of the river in

excavating its narrow valley through the elevated districts is apparently commensurate with that accomplished in eroding the wide valley in the low districts, but the stream has accomplished less than it should have in the time since the beginning of development of the drainage lines—far less in proportion to its size than has been achieved by the small tributaries that 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 have all of the outlets for the old river systems been 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 Pittsburgh and Wheeling the bed of the river is composed of coarse gravel and bowlders and in places rock. Below Wheeling the gravel becomes finer, the bowlders are fewer, and bars of river sand appear. Below the mouth of the Kanawha the bed of the river becomes more distinctively sandy, although there are some gravel bars above Louisville.

The average width between banks does not increase materially from Pittsburgh 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 it is considerably more than a mile. There are many islands in the river—more than 50 above Louisville and about 30 below—ranging 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, extending over 632.5 miles. Of these pools 127 are above Louisville and 60 are below Louisville.

On the borders of Ohio the riffles (103 in number) cover an aggregate length of 137 miles and have a total fall of 170 feet. The pools with a length of 309 miles, have a fall of 64 feet, or but 2.5 inches to the mile. The greatest fall noted for a single mile on the border of Ohio is 3.2 feet at Letart Falls, Meigs County. There are 11 riffles

with a descent exceeding 2 feet to the mile. The least fall reported is 8 to 15 miles below Cincinnati, where a pool 7 miles long has a fall of but 3.5 inches; and another pool with a fall about as low is 23 to 30 miles above Cincinnati. These two are the most conspicuous pools in this section of the Ohio.

On the borders of Indiana, aside from the Louisville rapids, there are 55 riffles showing a total fall of 80.28 feet in stretches aggregating 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 to the mile. The elevation of normal low water at Davis Island Dam at Pittsburgh is 692 feet, and 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 deforested; the southern and eastern portions may be called partly 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 in the basin is about 45 inches, ranging from 35 inches along its northern boundary to 70 inches in the southeastern part at the sources of Tennessee River. The winters 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. In the region about the headwaters of Allegheny River, however, the winters are severe.

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

In quantity of discharge Ohio River is the main tributary of the Mississippi. Its mean annual discharge 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 approximately 1,500,000 cubic feet per second—about 30 times the low-water flow. A comparison of records of flow of Ohio River with those of the upper Mississippi and Missouri shows that although its drainage area is one-third that of the combined Mississippi and Missouri its 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 fact is accounted for by the greater rainfall in the Ohio Basin and by the general character of the region.

Navigation in the Ohio is stopped not only by low stages of the river but also occasionally by ice for periods averaging 10 to 12 days a year. Sometimes the ice forms and passes off without occasioning great loss; sometimes there may be more than one serious break-up during the same winter.

The United States Weather Bureau and the Army Engineer Corps have maintained a number of gages on Ohio River at various places. Measurements of the discharge of the river have been made by the engineers of the United States Geological Survey at a number of places where gages are located.

GAGING STATIONS MAINTAINED IN OHIO RIVER BASIN.

The following list comprises the gaging stations maintained in Ohio River basin by the United States Geological Survey and cooperative parties. The stations are arranged by river basins, in downstream order, as explained on page 11, tributaries being indicated by indention. Data for these stations have been published in the reports listed in tables on pages 9 to 11.

Allegheny River (head of Ohio River) at Red House, N. Y., 1903–1910.
Allegheny River at Kittanning, Pa., 1904–1910.
- Conewango Creek—
  - Chautauqua Lake outlet (Chadakoin River) near Jamestown, N. Y., 1895.
  - Chadakoin River near Jamestown, N. Y., 1904–5.
- Kiskiminitas River near Avonmore, Pa., 1907–1910.
- Kiskiminitas River at Salina, Pa., 1904–1906.
  - Blacklick Creek at Blacklick, Pa., 1904–1910.
- Tygart River (head of Monongahela River) at Belington, W. Va., 1907–1910.
- Tygart River at Fetterman, W. Va., 1907–1910.

Monongahela River at Lock No. 4, Pa., 1886–1906. Flood stage record only.
- Buckhannon River at Hall, W. Va., 1907–1909.
- West Fork River at Enterprise, W. Va., 1907–1910.
- Buffalo Creek at Barrackville, W. Va., 1907–8.
- Cheat River at Morgantown, W. Va., 1899–1900; 1902–1905; 1908–1910.
- Youghiogheny River at Friendsville, Md., 1898–1904.
- Youghiogheny River at Confluence, Pa., 1904–1909.
  - Casselman River at Confluence, Pa., 1904–1910.
  - Laurel Hill Creek at Confluence, Pa., 1904–1910.
  - Indian Creek in Westmoreland County, Pa., 1892–3.

Beaver River—
- Mahoning River at Youngstown, Ohio, 1903–1906.

Cross Creek near Mingo Junction, Ohio, 1903.
McMahon River at Steel, Ohio, 1903.
Muskingum River at Zanesville, Ohio, 1905–1910.
- Mohican River at Pomerene, Ohio, 1910.
  - Licking River at Pleasant Valley, Ohio, 1902–1906.
  - Jonathan Creek at Powells, Ohio, 1902–3.

Kanawha River—
- New River (South Fork) (head of Kanawha River) at New River, N. C., 1900–1901.
- New River (South Fork) near Crumpler, N. C., 1908–1910.

New River at Oldtown, Va., 1900–1903.
New River near Grayson, Va., 1908–1910.
New River at Radford, Va., 1898–1910.
New River at Fayette, W. Va., 1895–1904; 1908–1910.
New River (North Fork) at Weaversford, N. C., 1900–1901.
New River (North Fork) near Crumpler, N. C., 1908–1910.
Reed Creek at Grahams Forge, Va., 1908–1910.
Big Reed Island Creek near Allisonia, Va., 1908–1910.
Little River near Copper Valley, Va., 1908–1910.
Walker Creek at Staffordsville, Va., 1908–1910.
Wolf Creek near Narrows, Va., 1908–1910.
Bluestone River at Lilly, W. Va., 1908–1910.
Greenbrier River near Marlinton, W. Va., 1908–1910.
Greenbrier River at Alderson, W. Va., 1895–1906; 1907–1910.
Gauley River at Allingdale, W. Va., 1908–1910.
Gauley River near Summersville, W. Va., 1908–1910.
Gauley River at Belva, W. Va., 1908–1910.
Cherry River at Richwood, W. Va., 1908–1910.
Meadow River near Russellville, W. Va., 1908–1910.
Elk River at Webster Springs, W. Va., 1908–1910.
Elk River at Gassaway, W. Va., 1908–1910.
Elk River at Clendennin, W. Va., 1908–1910.
Coal River at Brushton, W. Va., 1908–1910.
Coal River at Tornado, W. Va., 1908–1910.
Pocotaligo River at Sissonville, W. Va., 1908–1910.
Scioto River near Columbus, Ohio, 1903–1906.
Olentangy River near Columbus, Ohio, 1903–1905.
Miami River—
Little Miami River at Loveland, Ohio, 1906.
Little Miami River near Morrow, Ohio, 1903.
Miami River at Hamilton, Ohio, 1910.
Miami River at Dayton, Ohio, 1905–1909.
Mad River near Springfield, Ohio, 1904–1906.
Kentucky River at Frankfort, Ky., 1905–6.
Dix River near Danville, Ky., 1905.
Dix River near Burgin, Ky., 1910.
Salt River (Rolling Fork) at New Haven, Ky., 1905–6.
Wabash River at Logansport, Ind., 1903–1906.
Wabash River at La Fayette, Ind., 1901–1903.
Wabash River at Terre Haute, Ind., 1902–3 and 1905–6.
Wabash River at Mount Carmel, Ind., 1884–1910 (gage-height records by United States Weather Bureau).
Tippecanoe River at Delphi, Ind., 1903–1906; 1908.
Embarrass River near Oakland, Ill., 1909–10.
Embarrass River at St. Marie, Ill., 1909–10.
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; 1909–10.
Little Wabash River at Clay City, Ill., 1909–10.
Little Wabash River at Golden Gate, Ill., 1909–10.
Little Wabash River at Carmi, Ill., 1909–10.
Skillet Fork at Wayne City, Ill., 1909–10.
Skillet Fork at Mill Shoals, Ill., 1909–10.

Cumberland River at Nashville, Tenn., 1901–1904.
Tennessee River—
French Broad River at Rosman, N. C., 1907–1909.
French Broad River at Horseshoe, N. C., 1904–1906.
French Broad River at Asheville, N. C., 1895–1910.
French Broad River at Newport, Tenn., 1900–1905; 1907.
Tennessee River at Knoxville, Tenn., 1899–1910.
Tennessee River at Chattanooga, Tenn., 1895–1910.
Davidson River near Davidson River, N. C., 1904–1909.
Little River at Calhoun, N. C., 1907–8.
Mills River (North Fork) at Pinkbed, N. C., 1904–1909.
Mills River (South Fork) near Sitton, N. C., 1904–1909.
Mud Creek at Naples, N. C., 1907.
Swannanoa River at Swannanoa, N. C., 1907–1909.
Swannanoa River at Biltmore, N. C., 1905.
Ivy River at Democrat, N. C., 1907.
Pigeon River at Canton, N. C., 1907–1909.
Pigeon River at Newport, Tenn., 1900–1909.
Nolichucky River at Chucky Valley, Tenn., 1900–1901.
Nolichucky River at Greeneville, Tenn., 1903–1908.
North Toe River at Spruce Pine, N. C., 1907–8.
Holston River (South Fork) near Chilhowie, Va., 1907–1909.
Holston River (South Fork) at Bluff City, Tenn., 1900–1910.
Holston River near Rogersville, Tenn., 1904–1909.
Holston River (Middle Fork) at Chilhowie, Va., 1907–1910.
Watauga River at Butler, Tenn., 1900–1901.
Watauga River near Elizabethton, Tenn., 1903–1908.
Elk Creek at Lineback, Tenn., 1900–1901.
Roane Creek at Butler, Tenn., 1900–1901.
Doe River at Elizabethton, Tenn., 1907–8.
Holston River (North Fork) at Daltville, Va., 1907–8.
Little Tennessee River at Franklin, N. C., 1907–1910.
Little Tennessee River at Judson, N. C., 1896–1910.
Little Tennessee River at McGhee, Tenn., 1905–1910.
Cullasagee River at Cullasagee, N. C., 1907–1909.
Nantahala River near Nantahala, N. C., 1907–1909.
Tuckasegee River near East Laport, N. C., 1907–1909.
Tuckasegee River at Bryson, N. C., 1896–1910.
Scotts Creek near Dillsboro, N. C., 1907–8.
Oconalufty River near Cherokee, N. C., 1907–8.
Cheoah River at Millsaps, N. C., 1907–8.
Clinch River at Clinchport, Va., 1907–1909.
Hiwassee River near Hayesville, N. C., 1907–1909.
Hiwassee River at Murphy, N. C., 1896–1910.
Hiwassee River at Reliance, Tenn., 1900–1910.
Hiwassee River at Charlestown, Tenn., 1899–1901; 1903.
Tusquitee Creek near Hayesville, N. C., 1907–1909.
Valley River at Tomotla, N. C., 1904–1909.
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 (Copper Hill), Tenn., 1903–1910.
Elk Creek near Elkmont, Ala., 1904–1908.
Duck River at Columbia, Tenn., 1904–1908.

ALLEGHENY RIVER BASIN.

GENERAL FEATURES.

Allegheny River drains the western slopes of the Allegheny Mountains in Pennsylvania and New York.

The river rises in the central part of Potter County, in northern Pennsylvania, flows in a general northwesterly direction into New York to about the central part of Cattaraugus County, where it turns and flows southwestward back into Pennsylvania; at Franklin, in Venango County, it turns and flows southeastward to the mouth of Mahoning Creek, in Armstrong County, where it again bends to the southwest, and at Pittsburgh joins the Monongahela to form the Ohio. The river is about 290 miles long (map measurement) and its drainage area, which is nearly 50 per cent greater than that of the Monongahela, comprises about 11,100 square miles.

The important tributaries, beginning at the source and following down the right bank, are 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 Kiskiminitas River.

The elevation of the sources of the river is about 2,500 feet above sea level; at Olean, N. Y., the elevation is 1,420 feet; at Franklin, Pa., the elevation is 960 feet; at Pittsburgh the elevation is 692 feet.

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

The bed of the stream is composed chiefly of gravel ranging in size from small pebbles to cobblestones. The banks are made up of sand, gravel, or clay. The area is underlain by shales, and except in stream valleys the soil has little depth.

This basin is exceptionally rich in natural resources, coal, oil, gas, limestone, glass sand, and building stones occurring in abundance.

This basin was at one time covered with timber, the principal varieties being pine and hemlock. At present, 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.

The mean annual rainfall in this region is about 40 inches and the winters are severe. Snowfall is heavy in the upper part of the basin and lasts for long periods, and ice forms to a thickness of about 2 feet. 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 reservoirs of large capacity.

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 fall of the main river and tributaries is comparatively large and if the stream were in a district where fuels were more expensive, it would undoubtedly be much used for power. When the price of coal advances so that water power can 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 and the rest into the Genesee.

ALLEGHENY RIVER AT RED HOUSE, N. Y.

This station, which is located at the Red House highway bridge, near the stations of the Erie and Pennsylvania railroads, 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 river 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, enters the Allegheny in the State of Pennsylvania.

The datum of the chain gage attached to the highway bridge 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 New York State engineer and surveyor.

Discharge measurements of Allegheny River at Red House, N. Y., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 24[a]	W. G. Hoyt	255	173	3.04	326
Aug. 25	C. C. Covert	344	1,050	3.30	604

[a] Measurement July 24 made by wading below bridge.

Daily gage height, in feet, of Allegheny River at Red House, N. Y., for 1910.

[W. E. Coe, observer.[a]]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.0	.....	10.5	5.0	7.0	4.5	3.0	3.0	3.02	3.1	4.35	5.0
2	.....	.....	13.6	5.0	7.0	4.5	3.0	3.0	3.12	3.1	4.4	4.9
3	.....	.....	11.4	5.0	7.5	4.5	3.0	2.8	3.2	3.1	4.5	4.85
4	.....	.....	11.0	4.8	8.0	4.5	3.0	2.75	3.35	3.02	4.6	4.6
5	.....	5.0	10.9	4.5	8.0	4.5	3.0	2.7	3.8	2.98	4.55	4.55
6	.....	.....	10.3	4.5	7.0	4.5	3.0	2.7	5.5	3.27	4.45	4.4
7	.....	.....	10.5	4.5	7.0	4.5	3.0	2.7	5.62	3.88	4.25	4.2
8	4.0	.....	9.5	4.5	7.0	4.5	3.0	2.7	4.8	3.8	4.0	4.1
9	.....	.....	9.1	4.2	7.0	4.5	3.0	2.7	4.4	3.61	3.9	4.0
10	.....	.....	9.0	4.0	6.5	4.0	3.0	3.0	4.12	3.4	4.4	4.0
11	.....	.....	9.0	4.0	6.5	4.0	3.5	3.1	3.8	3.28	5.7	3.95
12	.....	4.5	8.8	4.0	6.0	4.0	3.5	3.1	3.6	3.2	5.5	3.95
13	.....	.....	8.0	4.1	6.0	4.0	3.5	3.0	3.52	3.05	4.6	3.9
14	.....	.....	7.4	4.1	6.0	4.0	4.0	3.0	3.4	3.9	4.9	3.9
15	4.0	.....	6.0	3.8	5.5	4.0	4.0	2.9	3.32	3.0	4.9	3.9
16	.....	.....	5.6	3.6	5.5	3.5	4.0	2.9	3.18	3.0	4.8	3.95
17	.....	.....	5.5	3.6	5.0	3.5	4.0	2.9	3.15	3.0	4.75	3.95
18	.....	.....	5.5	3.8	4.0	3.5	3.5	2.9	3.1	3.0	4.6	3.95
19	.....	4.5	5.4	3.8	4.0	4.0	3.5	3.0	3.1	3.05	4.65	3.95
20	.....	.....	6.0	5.0	4.0	4.0	3.5	3.0	3.05	3.0	4.5	3.95
21	.....	.....	6.6	6.2	4.0	4.0	3.5	3.0	3.0	3.02	4.45	3.95
22	5.0	.....	7.0	6.4	4.0	3.5	3.5	2.9	3.0	2.92	4.4	3.95
23	.....	.....	7.0	6.6	4.0	3.5	3.5	3.0	2.9	3.1	4.7	3.95
24	.....	.....	7.1	7.4	4.5	3.5	3.05	3.2	3.01	3.25	5.35	3.95
25	.....	.....	7.1	8.0	4.5	3.5	3.05	3.3	3.32	3.4	5.5	3.95
26	.....	5.0	7.3	9.2	4.0	3.0	3.0	3.2	3.4	3.6	5.65	4.0
27	.....	8.1	7.3	9.0	4.0	3.0	3.0	3.2	3.5	3.8	5.6	4.2
28	.....	9.1	7.2	8.5	4.0	3.0	3.0	3.2	3.4	4.1	5.8	4.4
29	4.5	.....	7.2	8.2	4.0	3.0	3.05	3.2	3.3	4.35	5.5	4.55
30	.....	.....	7.0	8.6	4.0	3.0	3.05	3.15	3.25	4.35	5.3	6.5
31	.....	.....	6.5	.....	4.5	.....	3.05	3.0	.....	4.25	.....	7.3

[a] Observer Jan. 1 to Aug. 24, inclusive, found to be unreliable; records for this period are questionable. Present observer, Mr. W. E. Coe, is considered reliable.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to Feb. 27 and about Dec. 12 to 26.

Daily discharge, in second-feet, of Allegheny River at Red House, N. Y., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	23,600	3,130	8,740	2,200	320	320	337	405	1,970	3,130
2	.....	.....	41,000	3,130	8,740	2,200	320	320	424	405	2,040	2,920
3	.....	.....	28,400	3,130	10,400	2,200	320	190	500	405	2,200	2,820
4	.....	.....	26,200	2,720	12,300	2,200	320	168	655	337	2,360	2,360
5	.....	.....	25,600	2,200	12,300	2,200	320	145	1,200	306	2,280	2,280
6	.....	.....	22,600	2,200	8,740	2,200	320	145	4,320	570	2,120	2,040
7	.....	.....	23,600	2,200	8,740	2,200	320	145	4,620	1,310	1,820	1,750
8	.....	.....	18,800	2,200	8,740	2,200	320	145	2,720	1,200	1,470	1,610
9	.....	.....	17,000	1,750	8,740	2,200	320	145	2,040	958	1,340	1,470
10	.....	.....	16,500	1,470	7,150	1,470	320	320	1,640	710	2,040	1,470
11	.....	.....	16,500	1,470	7,150	1,470	825	405	1,200	580	4,830	1,400
12	.....	.....	15,700	1,470	5,660	1,470	825	405	945	500	4,320	1,200
13	.....	.....	12,300	1,610	5,660	1,470	825	320	849	362	2,360	1,000
14	.....	.....	10,100	1,610	5,660	1,470	1,470	320	710	320	2,920	800
15	.....	.....	5,660	1,200	4,320	1,470	1,470	250	622	320	2,920	700
16	.....	.....	4,570	945	4,320	825	1,470	250	481	320	2,720	600
17	.....	.....	4,320	945	3,130	825	1,470	250	452	320	2,630	500
18	.....	.....	4,320	1,200	1,470	825	825	250	405	320	2,360	400
19	.....	.....	4,060	1,200	1,470	1,470	825	320	405	362	2,450	400
20	.....	.....	5,660	3,130	1,470	1,470	825	320	362	320	2,200	400
21	.....	.....	7,460	6,240	1,470	1,470	825	320	320	337	2,120	400
22	.....	.....	8,740	6,840	1,470	825	825	250	320	264	2,040	500
23	.....	.....	8,740	7,460	1,470	825	825	320	250	405	2,540	500
24	.....	.....	9,070	10,100	2,200	825	362	500	328	550	3,940	600
25	.....	.....	9,070	12,300	2,200	825	362	600	622	710	4,320	600
26	.....	.....	9,740	17,400	1,470	320	320	500	710	945	4,700	1,000
27	.....	10,800	9,740	16,500	1,470	320	320	500	825	1,200	4,570	1,750
28	.....	17,000	9,400	14,400	1,470	320	320	500	710	1,610	5,100	2,040
29	.....	.....	9,400	13,100	1,470	320	362	500	600	1,970	4,320	2,280
30	.....	.....	8,740	14,800	1,470	320	362	452	550	1,970	3,820	7,150
31	.....	.....	7,150	.....	2,200	.....	362	320	.....	1,820	.....	9,740

NOTE.—Daily discharge determined by means of a discharge rating curve that is well defined. Discharge Dec. 12 to 26 estimated by means of climatologic records, the discharge at Kittanning and in adjacent drainage areas. Discharge Feb. 27 estimated. Determinations for Dec. 12 to 26, published in the report of the New York State engineer and surveyor, have been revised.

Monthly discharge of Allegheny River at Red House, N. Y., for 1910.

[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.		
January	.....	.....	2,500	1.52	1.75	D.
February	17,000	.....	2,200	1.34	1.40	D.
March	41,000	4,060	13,700	8.35	9.63	A.
April	17,400	945	5,270	3.21	3.58	A.
May	12,300	1,470	4,940	3.01	3.47	A.
June	2,200	320	1,350	.823	.92	A.
July	1,470	320	622	.379	.44	A.
August	600	145	319	.195	.22	B.
September	4,620	250	1,000	.610	.68	A.
October	1,970	264	713	.435	.50	A.
November	5,100	1,340	2,890	1.76	1.96	B.
December	9,740	400	1,800	1.10	1.27	C.
The year	41,000	145	3,120	1.90	25.82	

NOTE.—Discharge Jan. 1 to Feb. 26 estimated by means of climatologic records, the discharge at Kittanning, and in adjacent drainage areas. Mean discharge Feb. 1 to 26 estimated 1,300 second-feet. Determinations for January, February, and December, published in the report of the New York State engineer and surveyor, have been revised.

ALLEGHENY RIVER AT KITTANNING, PA.

This station, which is located at the Market Street Bridge in the city of Kittanning, Pa., was established by the United States Geological Survey August 18, 1904, to obtain general comparative and statistical data regarding the flow of Allegheny River for the study of flood prevention at Pittsburgh and on Ohio River and for the determination of the regimen of flow for power and navigation projects and for the prevention of pollution. The station is now maintained by the Water Supply Commission of Pennsylvania, who have furnished the records of gage height for 1910.

No important tributaries enter the Allegheny in the immediate vicinity of Kittanning. Crooked River enters from the east 4 miles below, and Kiskiminitas River enters from the east over 12 miles below the station.

The datum of the chain gage attached to the bridge has remained constant since the installation of the station.

The flow is obstructed by 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 for falling stage, due to increase and decrease of slope. The difference at times amounts to as much as 15 per cent, and as the variation differs for each flood it is difficult to determine accurately the daily discharge at high stages.

Two discharge measurements were made at this station during 1910. The gage chain was found to be 0.10 foot too long, and was adjusted to its proper length on March 3, 1910. The last previous inspection of this station was made September 25, 1908.

Discharge measurements of Allegheny River at Kittanning, Pa., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 3	K. C. Grant	870	17,900	20.80	138,000
Mar. 5	F. W. Scheidenhelm	858	16,400	19.08	118,000

Daily gage height, in feet, of Allegheny River at Kittanning, Pa., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.55	6.78	19.95	6.83	8.26	4.96	2.36	1.83	1.68	2.95	5.48	8.30
2	4.48	6.12	20.72	6.42	8.12	5.04	2.32	1.85	2.04	2.62	6.22	7.60
3	5.46	6.24	20.74	6.23	8.12	5.36	2.29	1.86	2.86	2.68	6.74	7.03
4	5.65	6.18	20.35	6.01	8.10	5.68	2.25	1.80	4.78	3.02	6.82	6.52
5	6.00	6.12	19.86	5.81	8.04	6.02	2.21	1.72	4.68	3.50	6.75	6.20
6	6.80	6.12	20.45	6.00	7.92	5.98	2.16	1.62	3.51	3.50	5.62	6.10
7	6.76	6.02	20.75	6.23	7.81	5.92	2.24	1.60	3.12	3.52	6.21	5.60
8	6.63	5.81	17.92	5.88	7.76	5.62	2.20	1.60	3.10	3.71	6.82	5.25
9	6.58	6.14	16.42	5.21	7.34	5.21	2.18	1.60	3.22	3.80	6.90	5.00
10	6.55	6.22	13.76	4.42	7.18	5.15	2.17	1.60	3.35	3.85	7.00	4.80
11	6.24	6.18	12.22	4.40	6.09	5.02	2.10	1.65	3.46	3.79	7.12	4.20
12	5.95	6.05	10.90	4.36	5.48	4.82	2.20	1.74	3.58	3.54	8.40	4.40
13	6.00	5.86	10.00	4.30	5.16	4.68	2.22	1.85	3.31	3.26	8.80	4.72
14	5.45	5.52	10.00	4.25	4.83	4.51	2.10	2.00	3.04	3.02	8.22	4.66
15	5.51	5.50	9.04	4.16	4.60	4.22	2.24	1.91	2.77	2.72	7.87	4.60
16	5.75	5.32	8.51	4.08	4.48	4.10	2.51	1.85	2.38	2.20	7.45	4.00
17	6.05	5.51	8.00	4.25	4.39	3.96	2.88	1.75	2.22	2.41	6.82	3.65
18	10.80	5.62	7.82	4.20	4.42	3.91	2.92	1.71	2.19	2.48	6.40	3.40
19	14.32	5.80	7.88	5.12	4.48	3.74	2.86	1.65	2.08	2.44	6.20	3.86
20	13.06	6.10	8.12	5.40	4.50	3.62	2.64	1.64	1.98	2.50	5.98	4.55
21	13.02	6.32	8.88	6.32	4.58	3.44	2.48	1.59	1.91	2.56	6.00	4.80
22	13.42	6.46	11.11	7.32	5.12	3.26	2.32	1.52	1.94	2.48	6.20	5.10
23	10.11	6.64	10.92	7.15	5.26	3.02	2.20	1.48	2.08	2.40	6.40	5.60
24	10.08	6.82	10.62	7.02	5.35	2.90	2.15	1.56	3.12	2.61	6.60	6.00
25	9.46	7.04	10.52	9.24	5.35	2.67	2.12	1.92	6.00	2.82	7.90	6.50
26	8.76	7.10	10.60	12.48	5.28	2.58	2.08	2.00	5.36	2.96	9.03	6.30
27	8.12	7.30	9.72	12.25	5.24	2.56	1.98	2.10	4.72	3.03	9.00	5.80
28	8.72	16.72	8.73	11.64	5.18	2.60	1.90	2.11	4.12	3.73	8.30	5.80
29	7.96	.....	8.15	9.96	5.12	2.51	1.85	1.93	3.70	4.02	7.85	6.00
30	7.51	.....	7.15	8.82	5.12	2.43	1.85	1.77	3.32	4.60	8.40	14.75
31	7.12	.....	7.21	.....	5.10	.....	1.81	1.73	.....	5.20	.....	13.60

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to 17, Feb. 5 to 21, and Dec. 12 to 28.

Daily discharge, in second-feet, of Allegheny River at Kittanning, Pa., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	17,300	120,000	17,600	24,900	9,390	2,130	1,350	1,170	3,270	11,500	25,200
2	.....	14,300	129,000	15,600	24,200	9,700	2,060	1,380	1,640	2,600	14,700	21,400
3	.....	14,800	129,000	14,800	24,200	11,000	2,010	1,390	3,080	2,710	17,100	18,600
4	.....	14,500	124,000	13,800	24,100	12,300	1,950	1,310	8,720	3,430	17,500	16,100
5	.....	.....	119,000	12,900	23,800	13,800	1,890	1,210	8,360	4,640	17,200	14,600
6	.....	.....	126,000	13,700	23,100	13,600	1,810	1,100	4,670	4,640	12,100	14,200
7	.....	.....	129,000	14,800	22,500	13,400	1,930	1,080	3,670	4,700	14,700	12,000
8	.....	.....	97,800	13,200	22,300	12,100	1,870	1,080	3,620	5,240	17,500	10,500
9	.....	.....	83,100	10,400	20,100	10,400	1,840	1,080	3,910	5,500	17,900	9,540
10	.....	.....	60,200	7,470	19,300	10,100	1,820	1,080	4,240	5,650	18,400	8,800
11	.....	.....	48,700	7,400	14,100	9,620	1,720	1,140	4,530	5,470	19,000	6,740
12	.....	.....	40,100	7,270	11,500	8,870	1,870	1,240	4,860	4,750	25,700	.....
13	.....	.....	34,700	7,060	10,200	8,360	1,900	1,380	4,140	4,010	27,900	.....
14	.....	.....	34,700	6,900	8,910	7,770	1,720	1,580	3,480	3,430	24,700	.....
15	.....	.....	29,300	6,610	8,080	6,800	1,930	1,450	2,890	2,790	22,800	.....
16	.....	.....	26,300	6,350	7,670	6,420	2,400	1,380	2,170	1,870	20,700	.....
17	.....	.....	23,500	6,900	7,370	5,980	3,120	1,250	1,900	2,220	17,500	.....
18	39,500	.....	22,600	6,740	7,470	5,830	3,200	1,200	1,860	2,340	15,500	.....
19	64,700	.....	22,900	10,000	7,670	5,330	3,080	1,140	1,690	2,270	14,600	.....
20	54,700	.....	24,200	11,100	7,740	4,980	2,640	1,120	1,550	2,380	13,600	.....
21	54,400	.....	28,400	15,200	8,020	4,480	2,340	1,070	1,450	2,490	13,700	.....
22	57,500	15,800	41,400	20,000	10,000	4,010	2,060	1,000	1,500	2,340	14,600	.....
23	35,400	16,700	40,200	19,100	10,600	3,410	1,870	960	1,690	2,200	15,500	.....
24	35,200	17,500	38,400	18,500	10,900	3,160	1,800	1,040	3,670	2,580	16,500	.....
25	31,600	18,600	37,800	30,400	10,900	2,690	1,750	1,470	13,700	2,990	23,000	.....

Daily discharge, in second-feet, of Allegheny River at Kittanning, Pa., for 1910—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	27,700	18,900	38,300	50,500	10,600	2,520	1,690	1,580	11,000	3,300	29,200	.....
27	24,200	19,900	33,100	48,900	10,500	2,490	1,550	1,720	8,510	3,460	29,000	.....
28	27,500	85,900	27,500	44,800	10,200	2,560	1,440	1,740	6,480	5,300	25,200	.....
29	23,300	.....	24,400	34,500	10,000	2,400	1,380	1,480	5,210	6,170	22,700	13,700
30	21,000	.....	19,100	26,000	10,000	2,250	1,380	1,270	4,160	8,080	25,700	68,300
31	19,000	.....	19,400	.....	9,930	.....	1,320	1,230	.....	10,300	.....	58,900

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined up to discharge 1,870 second-feet (gage height 2.2 feet); well defined between discharges 2,030 and 20,400 second-feet (gage heights 2.3 and 7.4 feet); and poorly defined above discharge 20,900 second-feet (gage height 7.5 feet); as noted in description of station. Discharge January 1 to 17, February 5 to 21, and December 12 to 28, estimated because of ice, from climatologic records and discharge of adjacent drainage areas. Mean discharge January 1 to 17, estimated at 4,500 second-feet. Mean discharge February 5 to 21, estimated at 8,350 second-feet, varying from about 3,000 to 14,000 second-feet. Mean discharge December 12 to 28, estimated at 5,000 second-feet, varying from about 3,000 to 10,000 second-feet.

Monthly discharge of Allegheny River at Kittanning, Pa., for 1910.

[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.		
January[a]	64,700	.....	19,100	2.20	2.54	C.
February[a]	85,900	.....	14,100	1.62	1.69	C.
March	129,000	19,100	57,200	6.58	7.59	A.
April	50,500	6,350	17,400	2.00	2.23	A.
May	24,900	7,470	13,900	1.60	1.84	A.
June	13,800	2,250	7,190	.827	.92	A.
July	3,200	1,320	1,980	.228	.26	A.
August	1,740	960	1,270	.146	.17	B.
September	13,700	1,170	4,320	.497	.55	A.
October	10,300	1,870	3,970	.457	.53	A.
November	29,200	11,500	19,200	2.21	2.47	A.
December[a]	68,300	.....	12,400	1.43	1.65	C.
The year	129,000	.....	14,400	1.66	22.44	

[a] See footnotes under table of daily discharge for periods of estimated discharge.

KISKIMINITAS RIVER AT AVONMORE, PA.

Kiskiminitas River is formed at Saltsburg, Pa., by the union of Conemaugh River with Loyalhanna Creek.

The gaging station, which is about 5 miles below the junction, 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, which has furnished the records of gage height for 1910.

This river is subject to sudden violent floods similar to those which occur in Youghiogheny and Monongahela rivers and which, when combined, have such disastrous effects at Pittsburgh and other cities on Ohio River. In the flood of March 19, 1908, the Kiskiminitas rose to a crest height of 30.8 feet, and its discharge was estimated at 80,500 second-feet, or 46 second-feet per square mile from a drainage area of 1,750 square miles.

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 chain gage attached to the bridge has remained unchanged since the establishment of the station. The gage chain was found to be 0.05 foot too long and was adjusted to its proper length on March 2, 1910. The last previous inspection of this station was made September 25, 1908.

The following discharge measurement was made by K. C. Grant, an engineer of the Water Supply Commission of Pennsylvania:

March 2, 1910: Width, 444 feet; area, 6,430 square feet; gage height, 16.70 feet discharge, 27,200 second-feet.

Daily gage height, in feet, of Kiskiminitas River at Avonmore, Pa., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.05	5.35	18.25	3.57	5.73	4.45	3.37	1.96	1.80	2.39	2.12	4.13
2	5.25	4.85	16.38	3.44	5.06	4.79	3.19	1.96	1.83	2.25	2.09	3.15
3	8.35	5.05	15.10	3.37	4.70	4.99	3.07	1.91	1.95	2.13	2.09	3.13
4	11.45	5.95	12.78	3.27	4.68	4.79	2.95	1.91	3.71	2.06	2.09	3.35
5	7.35	5.55	11.45	3.29	4.50	4.42	2.99	1.88	5.50	2.03	2.12	3.34
6	9.45	5.05	11.28	3.37	4.06	4.92	2.79	1.86	3.64	1.97	2.14	4.01
7	11.45	6.75	12.20	3.24	3.80	5.88	2.79	1.86	4.35	2.00	2.09	4.61
8	9.05	6.85	10.00	3.14	3.68	5.02	3.41	1.86	3.67	1.99	2.09	4.28
9	7.15	7.45	8.37	3.09	3.66	4.49	3.17	1.86	3.17	1.96	2.04	3.95
10	6.25	6.35	7.27	2.96	3.76	5.07	2.92	1.91	2.93	1.94	2.04	3.43
11	8.25	7.85	6.51	2.91	3.73	6.82	2.71	2.06	2.70	1.94	2.09	4.01
12	10.95	7.45	5.99	2.77	4.78	6.89	2.61	2.36	2.85	1.92	2.10	3.93
13	11.95	7.05	5.69	2.71	4.76	6.18	2.70	2.26	3.10	1.89	2.14	3.78
14	11.45	7.35	5.54	2.74	4.16	5.62	2.84	2.16	4.30	1.89	2.10	3.81
15	11.75	7.45	4.94	2.64	3.90	5.09	2.67	1.87	3.65	1.89	2.14	3.73
16	11.45	10.75	4.67	2.66	3.69	5.08	2.52	1.94	2.95	1.90	2.16	3.63
17	10.75	23.50	5.01	2.83	3.48	4.95	6.31	1.88	2.70	1.89	2.26	3.65
18	13.75	20.95	4.99	3.28	3.56	5.28	4.11	1.86	2.60	1.89	2.24	3.59
19	19.95	16.45	4.71	5.66	3.68	10.37	3.88	1.88	2.37	1.89	2.24	3.72
20	11.55	15.25	4.79	5.58	3.62	7.63	3.14	1.94	2.30	1.86	2.33	4.02
21	8.55	17.75	5.14	6.36	3.92	6.27	2.76	2.56	2.23	1.86	2.24	4.48
22	17.15	18.95	5.34	6.56	5.06	5.12	2.54	2.18	2.17	1.95	2.18	4.41
23	10.65	11.05	5.04	6.06	4.63	4.62	2.40	2.02	2.13	2.29	2.23	4.31
24	8.75	8.35	4.87	5.66	4.46	4.17	2.36	1.97	2.21	2.68	2.33	5.75
25	7.45	7.25	4.71	9.93	4.88	3.81	2.24	1.90	2.50	2.34	2.33	6.93
26	6.35	6.65	4.54	11.38	5.99	3.57	2.18	1.95	2.43	2.20	2.53	5.63
27	8.05	7.95	4.24	8.86	5.29	3.37	2.11	1.90	2.39	2.19	2.69	4.26
28	8.15	17.50	4.04	7.58	4.72	3.33	2.10	1.85	2.30	2.19	2.75	4.98
29	7.05	.....	3.84	6.60	4.43	4.92	2.06	1.85	2.75	2.15	3.95	9.57
30	6.15	.....	3.77	6.16	4.09	4.11	2.04	1.80	2.65	2.14	4.25	13.83
31	5.85	.....	3.71	.....	4.02	.....	1.96	1.84	.....	2.09	.....	9.53

NOTE.—Gage heights Mar. 9 to Dec. 31 differ by 0.02 foot, or less, from those published by the Water Supply Commission of Pennsylvania, owing to differences in methods of interpretation of corrections to be applied for errors in gage. Relation of gage height to discharge probably affected by ice about Jan. 1, 2, 10, 11, 12, 13, Feb. 7 to 16, and Dec. 11 to 24.

Daily discharge, in second-feet, of Kiskiminitas River at Avonmore, Pa., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	200	2,880	33,300	1,100	3,340	1,870	949	185	128	367	248	1,570
2	1,800	2,300	27,200	998	2,530	2,230	824	185	138	304	236	798
3	7,060	2,520	23,300	949	2,130	2,450	746	167	182	253	236	784
4	13,300	3,620	16,800	879	2,110	2,230	670	167	1,210	224	236	935
5	5,500	3,120	13,300	893	1,920	1,840	694	156	3,060	212	248	928
6	9,000	2,520	12,900	949	1,500	2,370	574	149	1,150	189	257	1,460
7	13,300	.....	15,300	858	1,280	3,530	574	149	1,770	200	236	2,030
8	8,270	.....	10,000	791	1,180	2,480	977	149	1,180	196	236	1,700
9	5,210	.....	7,100	758	1,170	1,910	810	149	810	185	216	1,400
10	3,500	.....	5,380	676	1,250	2,540	652	167	658	178	216	991
11	3,000	.....	4,350	646	1,220	4,760	530	224	525	178	236	.....
12	2,500	.....	3,680	564	2,220	4,850	476	354	610	170	240	.....
13	7,000	.....	3,290	530	2,200	3,920	525	308	765	160	257	.....
14	13,300	.....	3,110	547	1,590	3,200	604	265	1,720	160	240	.....
15	14,100	.....	2,390	492	1,360	2,570	508	152	1,160	160	257	.....
16	13,300	.....	2,100	503	1,190	2,560	430	178	670	163	265	.....
17	11,600	51,900	2,470	598	1,030	2,400	4,090	156	525	160	308	.....
18	19,500	42,600	2,450	896	1,090	2,800	1,550	149	470	160	300	.....
19	39,100	27,400	2,140	3,250	1,180	10,800	1,340	156	358	160	300	.....
20	13,600	23,800	2,230	3,160	1,140	5,920	791	178	326	149	340	.....
21	7,400	31,700	2,630	4,160	1,380	4,040	558	450	295	149	300	.....
22	29,700	35,700	2,870	4,420	2,530	2,600	440	274	269	182	274	.....
23	11,400	12,400	2,510	3,770	2,050	2,040	372	208	253	322	295	.....
24	7,740	7,060	2,320	3,250	1,880	1,600	354	189	286	514	340	.....
25	5,640	5,350	2,140	9,910	2,330	1,290	300	163	420	344	340	4,900
26	4,140	4,540	1,960	13,200	3,680	1,100	274	182	386	282	435	3,220
27	6,580	6,420	1,670	7,930	2,810	949	244	163	367	278	520	1,680
28	6,740	30,800	1,490	5,340	2,150	921	240	146	326	278	552	2,440
29	5,070	.....	1,310	4,470	1,850	2,370	224	146	552	261	1,400	9,220
30	3,880	.....	1,260	3,900	1,530	1,550	216	128	498	257	1,680	19,700
31	3,500	.....	1,210	.....	1,470	.....	185	142	.....	236	.....	9,150

NOTE.—Daily discharge determined by means of a discharge rating curve well defined between discharges 65 and 23,000 second-feet (gage heights 1.6 and 15.0 feet). Daily discharge Jan. 1, 2, 10 to 13, Feb. 7 to 16, and Dec. 11 to 24, estimated, because of ice, from climatologic records and discharge of adjacent drainage areas. Mean discharge Feb. 7 to 16 estimated 1,760 second-feet, varying from about 900 to 5,000 second-feet. Mean discharge Dec. 11 to 24 estimated 665 second-feet, varying from about 400 to 2,000 second-feet.

Monthly discharge of Kiskiminitas River at Avonmore, Pa., for 1910.

[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.		
January	39,100	200	9,630	5.50	6.34	C.
February	51,900	.....	11,200	6.40	6.66	C.
March	33,300	1,210	6,910	3.95	4.55	A.
April	13,200	492	2,700	1.54	1.72	A.
May	3,680	1,030	1,820	1.04	1.20	A.
June	10,800	921	2,860	1.63	1.82	A.
July	4,090	185	701	.401	.46	A.
August	450	128	191	.109	.13	A.
September	3,060	128	702	.401	.45	A.
October	514	149	227	.130	.15	A.
November	1,680	216	375	.214	.24	A.
December	19,700	.....	2,330	1.33	1.53	C.
The year	51,900	128	3,260	1.86	25.25	

NOTE.—See footnotes to table of daily discharge for notes relative to periods during which discharge was estimated.

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 which the records of gage height in the following table are furnished.

The station is about 6 miles above the junction of Blacklick Creek with Conemaugh River and 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.

Changes in rating curves necessitated by construction work on bridge to which gage is attached have been discussed in Water-Supply Paper 263.

The gage chain was found to be 0.03 foot too long and was adjusted to its proper length on March 1, 1910. The last previous inspection of this station was made September 24, 1908.

The following discharge measurement was made by K. C. Grant:

March 1, 1910: Width, 208 feet; area, 1,500 square feet; gage height, 7.94 feet; discharge, 7,180 second-feet.

Daily gage height, in feet, of Blacklick Creek at Blacklick, Pa., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.44	3.57	8.28	2.88	3.63	3.34	2.46	2.12	2.02	2.28	2.26	3.08
2	2.87	3.44	7.28	2.82	3.42	3.49	2.38	2.09	2.12	2.23	2.32	2.98
3	4.69	3.63	7.06	2.77	3.34	3.38	2.38	2.06	2.43	2.21	2.30	2.98
4	4.65	3.67	6.19	2.74	3.40	3.22	2.33	2.05	5.19	2.20	2.32	2.94
5	4.05	3.56	5.95	2.76	3.24	3.14	2.30	2.04	4.16	2.20	2.31	2.86
6	5.47	3.33	5.84	2.74	3.10	3.79	2.28	2.04	3.74	2.18	2.28	2.78
7	5.15	3.23	6.24	2.72	3.02	3.56	2.35	2.04	3.80	2.22	2.26	2.87
8	5.27	3.32	5.10	2.68	2.98	3.38	2.40	2.06	3.21	2.18	2.26	2.82
9	7.63	3.37	4.53	2.66	2.99	3.22	2.34	2.03	3.08	2.20	2.24	2.78
10	7.19	3.59	4.16	2.62	3.00	3.72	2.32	2.14	2.96	2.18	2.26	2.81
11	6.51	3.55	3.95	2.56	3.01	3.84	2.28	2.30	2.84	2.18	2.30	2.88
12	6.33	3.45	3.82	2.53	3.32	3.72	2.24	2.38	2.74	2.19	2.30	2.94
13	6.43	3.53	3.70	2.50	3.05	3.52	2.35	2.26	3.25	2.16	2.30	2.94
14	6.34	3.49	3.83	2.50	2.92	3.37	2.40	2.19	3.14	2.13	2.28	3.10
15	5.52	3.37	3.66	2.48	2.84	3.25	2.33	2.12	2.86	2.12	2.44	3.08
16	4.51	5.37	3.40	2.59	2.80	3.58	4.56	2.19	2.66	2.12	2.38	3.03
17	3.81	5.88	3.44	2.68	2.74	3.38	4.10	2.18	2.54	2.12	2.38	3.01
18	10.15	5.01	3.34	3.41	2.92	3.23	3.22	2.20	2.46	2.10	2.40	3.00
19	8.35	4.31	3.32	3.79	3.02	3.18	2.78	2.28	2.42	2.10	2.36	3.16
20	5.76	4.05	3.45	3.79	2.87	3.04	2.61	2.21	2.38	2.10	2.34	3.56
21	7.11	4.69	3.66	4.54	3.56	2.91	2.47	2.18	2.35	2.10	2.32	3.66
22	7.16	5.96	3.54	4.24	3.86	2.76	2.38	2.15	2.31	2.79	2.40	3.62
23	5.39	5.35	3.44	3.88	3.56	2.72	2.34	2.10	2.29	2.77	2.41	3.54
24	4.81	4.61	3.39	3.78	3.39	2.60	2.30	2.06	2.35	2.68	2.48	4.60
25	4.37	4.35	3.34	6.03	4.05	2.52	2.27	2.06	2.35	2.46	2.56	4.25
26	3.97	4.07	3.25	5.52	3.86	2.46	2.24	2.11	2.40	2.38	2.81	3.92
27	5.01	6.01	3.16	4.76	3.56	2.41	2.22	2.08	2.34	2.36	2.72	3.76
28	4.64	9.27	3.02	4.27	3.38	2.66	2.22	2.07	2.38	2.35	2.60	6.65
29	4.21	.....	2.96	4.00	3.22	2.79	2.18	2.05	2.48	2.32	3.57	6.00
30	3.86	.....	2.97	3.88	3.13	2.57	2.18	2.06	2.32	2.30	3.38	7.63
31	3.79	.....	2.92	.....	3.22	.....	2.15	2.03	.....	2.30	.....	5.98

NOTE.—Relation of gage height to discharge probably affected by ice from about Jan. 8 to 15, Feb. 8 to 16, and Dec. 7 to 28.

Daily discharge, in second-feet, of Blacklick Creek at Blacklick, Pa., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	122	639	7,910	272	681	492	128	42	24	78	73	356
2	268	551	5,740	248	538	583	105	36	42	66	88	312
3	1,610	681	5,280	230	492	514	105	31	119	61	83	312
4	1,570	709	3,650	219	525	426	91	30	2,180	59	88	296
5	1,010	632	3,250	226	437	385	83	28	1,100	59	86	264
6	2,540	486	3,070	219	365	798	78	28	760	55	78	233
7	2,130	432	3,740	212	329	632	96	28	805	64	73	.....
8	.....	.....	2,070	198	312	514	110	31	420	55	73	.....
9	.....	.....	1,450	192	316	426	94	26	356	59	69	.....
10	.....	.....	1,100	179	320	745	88	46	304	55	73	.....
11	.....	.....	925	159	324	837	78	83	256	55	83	.....
12	.....	.....	821	150	481	765	69	105	219	57	83	.....
13	.....	.....	730	140	342	604	96	73	442	51	83	.....
14	.....	.....	829	140	288	508	110	57	385	44	78	.....
15	.....	.....	702	134	256	442	91	42	264	42	122	.....
16	1,430	.....	525	169	240	646	1,480	57	192	42	105	.....
17	813	3,140	551	198	219	514	1,050	55	153	42	105	.....
18	12,300	1,960	492	532	288	432	426	59	128	38	110	.....
19	8,080	1,240	481	798	329	405	233	78	116	38	99	.....
20	2,950	1,010	558	798	268	338	175	61	105	38	94	.....
21	5,380	1,610	702	1,460	632	284	131	55	96	38	88	.....
22	5,490	3,270	618	1,180	853	226	105	48	86	236	110	.....
23	2,440	2,380	551	869	632	212	94	38	81	230	113	.....
24	1,740	1,530	520	790	520	172	83	31	96	198	134	.....
25	1,290	1,280	492	3,380	1,010	146	76	31	96	128	159	.....
26	941	1,020	442	2,610	853	128	69	40	110	105	244	.....
27	1,960	3,350	395	1,690	632	113	64	35	94	99	212	.....
28	1,560	10,200	329	1,200	514	192	64	33	105	96	240	.....
29	1,150	.....	304	965	426	236	55	30	134	88	639	3,330
30	853	.....	308	869	380	162	55	31	88	83	514	6,480
31	798	.....	288	.....	426	.....	48	26	.....	83	.....	3,300

NOTE.—Daily discharge determined by means of a discharge rating curve well defined between 7.5 and 1,320 second-feet (gage heights 1.9 and 4.4 feet), poorly defined between discharges 1,420 and 7,290 second-feet (gage heights 4.5 and 8.0 feet), and an extension above discharge 7,510 second-feet (gage height 8.1 feet). Daily discharge Jan. 8 to 15, Feb. 8 to 16, and Dec. 7 to 28 estimated, because of ice, from climatologic records and discharge of adjacent drainage areas. Mean discharge Jan. 8 to 15 estimated about 1,240 second-feet, varying from about 700 to 2,000 second-feet. Mean discharge Feb. 8 to 16 estimated 389 second-feet, varying from about 200 to 1,000 second-feet. Mean discharge Dec. 7 to 28 estimated about 275 second-feet, varying from about 120 to 1,000 second-feet.

Monthly discharge of Blacklick Creek at Blacklick, Pa., for 1910.

[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.		
January [a]	12,300	122	2,200	5.46	6.30	B.
February [a]	10,200	.....	1,420	3.52	3.66	B.
March	7,910	288	1,580	3.92	4.52	A.
April	3,380	134	681	1.69	1.89	A.
May	1,010	219	459	1.14	1.31	A.
June	837	113	429	1.06	1.18	A.
July	1,480	48	182	.452	.52	A.
August	105	26	45	.122	.14	A.
September	2,180	24	312	.774	.86	A.
October	236	38	78.8	.196	.23	A.
November	639	69	140	.347	.39	A.
December [a]	6,480	.....	675	1.67	1.92	C.
The year	12,300	24	680	1.69	22.92	

[a] See footnotes to table of daily discharge for notes relative to periods during which discharge was estimated.

MONONGAHELA RIVER BASIN.

GENERAL FEATURES.

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 union of Tygart and West Fork rivers—two streams whose headwaters drain the western slopes of the Allegheny Mountains. From this junction point it flows northeastward across the Pennsylvania State line to the mouth of Cheat River, thence northward, and unites with Allegheny River to form the Ohio at Pittsburgh, Pa. The river is 125 miles long and its drainage area comprises about 7,350 square miles. It is navigable through its entire length by means of locks and dams.

The Tygart, also called Tygart 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., and flows northerly; the West Fork rises in the western part of Upshur County, W. Va., flows northwestward into Lewis County and thence in a slight northeasterly direction to its junction with the Tygart at Fairmont, W. Va. The Tygart is about 100 miles long (map measurement) and its drainage area above its mouth is about 1,420 square miles; the West Fork is about 70 miles (map measurement) long and drains about 845 square miles.

The sources of the West Fork head at an altitude of 1,500 feet above sea level; those of the Tygart at 3,500 feet. At Fairmont the Monongahela has an elevation of 860 feet, and at the mouth of the river at Pittsburgh the elevation is 692 feet above sea level.

The headwater country is mountainous, 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, but remains very rolling. The steep slopes and rocky soil of the upper country cause the heavy rains to run off rapidly, 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 basin is exceptionally rich in natural resources, as it is underlain by very valuable and extensive coal beds and contains oil and gas in abundance.

The important tributaries of the Monongahela, 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 country drained by Cheat and Youghiogheny rivers resembles 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.

This basin was at one time covered with forests, but the greater part of the timber has been cut off, and though some still remains at the headwaters, the area of timbered land is small when compared to the total area of the 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 winters 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 reservoir sites, 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 unfavorable for water-power development.

TYGART RIVER AT BELINGTON, W. VA.

This station, which is located at the highway bridge at Belington, W. Va., was established June 5, 1907.

Mill Creek is tributary one-fourth mile below the gage.

In general the winters are mild. Ice may affect the relation of gage height to discharge for two or three weeks at a time during December, January, and February.

The records are reliable and accurate. The datum of the chain gage attached to the bridge has remained unchanged.

Discharge measurements of Tygart River at Belington, W. Va., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 17	C. T. Bailey	213	1,560	9.08	5,360
20	do	200	813	5.46	1,420
20	do	200	757	5.15	1,100
Aug 22	do	180	212	2.44	75.5
Oct 10	do	178	194	2.29	32.4

Daily gage height, in feet, of Tygart River at Belington, W. Va., for 1910.

[S. A. Campbell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	4.2	4.9	3.0	3.8	3.7	3.1	3.0	2.2	2.8	2.7	3.9
2	4.1	3.8	5.4	3.0	3.6	4.5	3.1	2.8	2.2	2.6	2.7	3.7
3	11.4	4.3	5.0	3.0	3.5	4.8	3.0	2.6	2.3	2.5	2.7	3.8
4	10.3	5.0	4.7	3.0	3.6	5.0	3.3	2.7	2.3	2.5	2.7	3.5
5	6.6	5.0	4.4	3.2	3.4	5.3	3.6	2.6	2.8	2.4	2.7	3.1
6	5.6	5.2	4.2	3.2	3.2	8.8	3.9	2.6	3.0	2.3	2.6	3.8
7	9.3	6.8	4.0	3.1	3.2	7.9	3.4	2.6	3.3	2.2	2.6	3.7
8	8.3	6.2	3.9	3.2	3.2	5.7	3.6	2.5	3.0	2.2	2.5	3.6
9	7.5	6.2	3.7	3.1	3.6	4.8	3.9	2.4	2.9	2.2	2.5	3.6
10	4.8	7.8	3.5	3.0	4.1	4.8	3.8	2.5	2.8	2.2	2.5	3.5
11	4.1	7.9	3.5	3.0	4.0	5.3	3.8	2.4	2.7	2.7	2.5	3.3
12	3.9	8.3	3.5	3.0	5.4	6.8	3.2	2.4	2.6	2.6	2.5	3.3
13	3.9	7.8	3.4	3.0	8.3	7.2	4.0	2.3	2.5	2.4	2.4	3.3
14	4.8	7.8	3.4	3.3	5.9	6.3	5.5	2.4	3.0	2.4	2.3	3.3
15	6.4	7.8	3.4	3.5	5.4	5.7	4.7	2.4	3.4	2.3	2.3	3.2
16	4.9	10.6	3.4	3.4	4.2	10.35	4.1	2.2	3.0	2.3	2.4	3.0
17	4.6	9.0	3.3	3.4	3.9	14.15	4.1	2.2	2.8	2.2	2.3	3.0
18	5.3	8.4	3.3	3.4	3.8	11.5	4.4	2.2	2.7	2.2	2.4	3.1
19	10.8	7.1	3.2	3.8	3.7	11.4	4.2	2.0	2.6	2.2	2.4	3.2
20	7.5	5.5	3.2	4.0	3.6	11.4	3.7	2.1	2.5	2.2	2.4	3.8
21	5.8	5.2	3.1	4.0	3.6	6.5	3.3	2.1	2.5	2.1	2.4	4.3
22	8.0	6.8	3.3	4.6	3.5	6.5	3.2	2.5	2.4	2.2	2.4	3.8
23	7.5	8.2	3.3	5.1	3.4	6.0	3.0	2.6	2.4	2.2	2.4	3.6
24	5.2	6.1	3.2	4.8	3.4	4.8	2.8	2.4	2.3	2.2	2.4	4.8
25	4.6	5.1	3.2	6.6	4.3	4.0	2.8	2.6	2.3	2.7	2.5	6.6
26	4.2	4.6	3.2	5.9	5.1	3.9	2.7	2.6	2.3	2.5	2.8	6.4
27	5.0	4.4	3.1	5.4	4.4	3.5	2.6	2.4	2.3	2.5	2.8	5.4
28	6.8	4.1	3.1	4.8	4.0	3.4	2.8	2.3	2.5	2.5	3.3	4.7
29	5.7	.....	3.1	4.4	3.8	4.0	2.9	2.2	3.0	2.6	5.4	4.6
30	5.4	.....	3.0	4.0	3.5	3.3	3.2	2.2	3.0	2.7	4.2	7.4
31	4.6	.....	3.0	.....	3.5	.....	3.0	2.2	.....	2.8	.....	7.8

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 and 2, Feb. 5 to 16, and Dec. 6 to 24. Observer reported ice gorged Feb. 10 to 16.

Daily discharge, in second-feet, of Tygart River at Belington, W. Va., for 1907–1910.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.								1907.							
1	.....	363	546	183	246	644	546	16	6,870	644	183	246	213	546	2,620
2	.....	546	321	213	213	595	452	17	1,310	2,620	246	321	213	498	1,920
3	.....	1,500	282	246	183	1,250	363	18	1,070	16,500	363	246	246	407	1,190
4	.....	1,190	213	363	213	2,000	321	19	595	1,920	282	1,070	213	363	959
5	850	644	282	904	1,500	1,700	407	20	546	1,500	246	644	183	321	850
6	1,500	363	321	644	1,020	1,310	452	21	498	1,130	183	452	156	246	694
7	1,130	452	246	363	694	3,620	407	22	363	644	132	321	156	282	546
8	1,020	644	246	213	1,070	2,620	363	23	321	850	213	213	132	321	644
9	6,410	959	156	183	1,630	2,000	321	24	282	797	5,500	363	132	1,850	4,730
10	2,300	4,620	363	132	1,250	2,230	1,250	25	797	904	4,010	498	132	3,230	2,620
11	1,370	1,700	595	213	745	2,790	4,310	26	644	904	1,070	246	110	1,920	1,780
12	1,130	3,050	452	595	595	1,850	2,000	27	452	850	644	183	156	1,310	959
13	4,730	3,520	321	644	407	1,310	1,370	28	363	644	498	156	363	904	745
14	5,610	3,320	246	407	321	797	1,780	29	321	1,190	363	183	2,150	745	694
15	7,470	1,190	213	282	282	694	4,730	30	246	1,020	282	213	1,920	546	959
								31	.....	904	246	.....	1,630	.....	1,190

Daily discharge, in second-feet, of Tygart River at Belington, W. Va., for 1907–1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	1,070	745	797	5,610	498	959	73	183	36	12	7	26
2	959	1,850	8,190	3,230	546	644	59	132	36	12	7	26
3	850	1,700	4,520	2,540	644	546	47	36	36	12	12	26
4	694	1,440	2,460	1,630	745	595	213	90	26	7	7	26
5	797	1,310	1,500	1,070	4,310	2,000	904	156	26	7	18	26
6	904	2,620	1,920	904	6,410	1,070	498	246	26	7	26	36
7	745	2,790	3,910	745	3,320	694	321	110	26	7	36	36
8	1,920	1,920	2,790	797	6,300	546	246	110	26	7	26	36
9	2,460	1,560	2,540	2,960	3,230	363	213	132	18	7	18	36
10	2,300	1,020	2,380	3,140	6,520	282	183	156	18	7	18	36
11	2,070	904	2,070	4,310	5,950	213	156	132	18	7	18	47
12	5,500	1,920	1,310	4,110	2,300	246	90	156	18	7	18	73
13	7,230	4,520	1,070	2,230	1,500	213	110	90	18	7	18	132
14	3,620	6,060	904	1,310	850	183	90	73	18	4	18	183
15	1,700	5,950	850	959	745	246	183	59	18	4	18	156
16	1,190	8,920	904	1,190	1,630	282	132	47	18	4	18	110
17	1,020	2,620	850	2,300	1,130	321	90	47	12	7	18	90
18	850	1,920	959	1,500	694	183	183	47	12	7	18	73
19	745	1,310	1,630	1,630	959	156	321	36	12	7	18	73
20	694	1,250	3,710	2,150	2,790	213	156	36	12	7	18	132
21	745	1,070	2,150	1,560	3,620	246	132	36	12	7	18	183
22	850	797	1,190	1,020	2,870	282	246	36	12	7	18	110
23	1,700	644	1,020	850	1,920	213	246	36	7	7	18	132
24	1,500	595	959	546	1,070	183	282	36	7	7	18	110
25	1,370	498	850	498	904	156	546	18	7	7	18	90
26	694	546	745	644	2,070	156	1,700	47	7	7	18	90
27	2,000	850	595	694	1,250	132	2,460	47	7	7	18	90
28	2,230	745	644	745	850	132	904	59	7	7	18	90
29	1,560	595	904	595	644	110	644	90	7	7	18	90
30	1,370	.....	2,150	546	3,710	90	407	73	12	12	26	90
31	850	.....	2,070	.....	1,920	.....	282	47	.....	7	.....	156
1909.												
1	183	180	1,130	1,020	1,560	132	407	2,070	90	90	246	282
2	452	160	959	850	1,440	213	246	644	73	73	213	246
3	407	140	797	1,190	1,190	282	156	452	59	73	246	246
4	183	250	1,850	1,560	1,310	183	156	282	73	59	213	213
5	156	300	1,440	1,850	1,190	183	110	213	73	59	156	213
6	156	546	1,190	2,000	959	1,130	73	156	90	47	156	183
7	452	644	1,630	1,440	850	694	73	183	90	47	156	213
8	321	904	3,230	1,070	595	1,020	73	132	73	47	132	213
9	282	595	2,300	745	546	2,540	73	90	73	47	132	213
10	246	1,630	2,000	595	452	1,370	73	90	90	47	2,960	183
11	183	2,870	1,780	546	694	1,630	59	73	694	36	2,230	183
12	156	1,440	1,130	452	850	1,310	47	73	498	282	1,250	183
13	183	959	850	407	644	1,070	47	59	183	595	797	183
14	282	1,070	904	2,960	546	745	47	47	110	321	644	850
15	2,070	1,250	1,070	5,390	452	595	73	47	90	213	407	1,310
16	2,540	1,310	850	1,920	363	694	110	452	850	321	363	850
17	2,070	1,850	745	1,130	321	694	90	904	1,700	246	321	595
18	1,630	1,440	595	850	246	2,960	73	644	407	321	282	452
19	694	1,070	452	595	183	1,560	59	363	321	595	246	.....
20	595	959	498	546	183	1,070	59	246	183	745	246	.....
21	595	1,130	498	1,850	213	452	59	321	132	850	213	.....
22	498	1,440	452	3,520	282	363	47	282	110	452	213	.....
23	407	1,370	452	3,620	282	246	73	246	90	407	246	.....
24	363	1,370	407	4,310	282	213	183	183	321	5,720	282	.....
25	363	2,300	452	2,540	246	183	183	132	110	2,070	595	.....
26	363	1,850	694	1,560	213	156	156	90	156	1,190	498	.....
27	321	1,560	1,250	1,560	213	110	110	73	183	644	407	.....
28	282	1,370	1,630	1,310	246	321	110	73	156	595	363	.....
29	246	.....	1,850	1,370	282	321	90	59	132	452	282	.....
30	220	.....	1,440	1,130	246	213	90	26	110	363	282	.....
31	200	.....	1,190	.....	183	.....	3,520	132	.....	321	.....	.....

Daily discharge, in second-feet, of Tygart River at Belington, W. Va., for 1907–1910—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	100	694	1,070	183	498	452	213	183	36	132	110	546
2	400	498	1,370	183	407	850	213	132	36	90	110	452
3	7,110	745	1,130	183	363	1,020	183	90	47	73	110	498
4	5,840	1,130	959	183	407	1,130	282	110	47	73	110	363
5	2,230	.....	797	246	321	1,310	407	90	132	59	110	213
6	1,500	.....	694	246	246	4,210	546	90	183	47	90	.....
7	4,730	.....	595	213	246	3,320	321	90	282	36	90	.....
8	3,710	.....	546	246	246	1,560	407	73	183	36	73	.....
9	2,960	.....	452	213	407	1,020	546	59	156	36	73	.....
10	1,020	.....	363	183	644	1,020	498	73	132	36	73	.....
11	644	.....	363	183	595	1,310	498	59	110	110	73	.....
12	546	.....	363	183	1,370	2,380	246	59	90	90	73	.....
13	546	.....	321	183	3,710	2,700	595	47	73	59	59	.....
14	1,020	.....	321	282	1,700	2,000	1,440	59	183	59	47	.....
15	2,070	.....	321	363	1,370	1,560	959	59	321	47	47	.....
16	1,070	.....	321	321	694	5,890	644	36	183	47	59	.....
17	904	4,410	282	321	546	10,500	644	36	132	36	47	.....
18	1,310	3,810	282	321	498	7,230	797	36	110	36	59	.....
19	6,410	2,620	246	498	452	7,110	694	18	90	36	59	.....
20	2,960	1,440	246	595	407	7,110	452	26	73	36	59	.....
21	1,630	1,250	213	595	407	2,150	282	26	73	26	59	.....
22	3,420	2,380	282	904	363	2,150	246	73	59	36	59	.....
23	2,960	3,620	282	1,190	321	1,780	183	90	59	36	59	.....
24	1,250	1,850	246	1,020	321	1,020	132	59	47	36	59	.....
25	904	1,190	246	2,230	745	595	132	90	47	110	73	2,230
26	694	904	246	1,700	1,190	546	110	90	47	73	132	2,070
27	1,130	797	213	1,370	797	363	90	59	47	73	132	1,370
28	2,380	644	213	1,020	595	321	132	47	73	73	282	959
29	1,560	.....	213	797	498	595	156	36	183	90	1,370	904
30	1,370	.....	183	595	363	282	246	36	183	110	694	2,870
31	904	.....	183	.....	363	.....	183	36	.....	132	.....	3,230

NOTE.—Daily discharge determined by means of a discharge rating curve poorly defined up to 36 second-feet (gage height 2.2 feet); well defined between 47 and 2,150 second-feet (gage height 2.3 and 6.5 feet), and poorly defined above 2,230 second-feet (gage height 6.6 feet). No notes relative to ice were kept by the gage observer during 1907 and 1908. From a study of climatologic data for the winter periods it appears that the relation of gage height to discharge was not affected by ice during 1907 and 1908. Daily discharge determinations for November, 1908, are probably much too high.

Daily discharge Jan. 30 to Feb. 5, 1909 and Dec. 19 to 31, 1909, estimated because of ice, from climatologic records and runoff in adjacent drainage areas. Mean discharge Dec. 19 to 31, 1909, estimated 135 second-feet.

Daily discharge Jan. 1 and 2, Feb. 5 to 16, and Dec. 6 to 24, 1910, estimated, because of ice, from climatologic records, discharge of adjacent drainage areas, and gage observer's notes. Mean discharge Feb. 5 to 16, 1910, estimated about 833 second-feet, varying from about 400 to 3,000 second-feet. Mean discharge Dec. 6 to 24, 1910, estimated about 100 second-feet, varying from about 50 to 300 second-feet.

Monthly discharge of Tygart River at Belington, W. Va., for 1907–1910.

[Drainage area, 390 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
June 5–30	7,470	246	1,850	4.74	4.58	B.
July	16,500	363	1,840	4.72	5.44	B.
August	5,500	132	621	1.59	1.83	A.
September	1,070	132	365	.936	1.04	A.
October	2,150	110	596	1.53	1.76	A.
November	3,620	246	1,300	3.33	3.72	A.
December	4,730	321	1,360	3.49	4.02	A.
1908.						
January	7,230	694	1,680	4.31	4.97	A.
February	8,920	498	2,020	5.18	5.59	B.
March	8,190	595	1,890	4.85	5.59	A.
April	5,610	498	1,730	4.44	4.95	A.
May	6,520	498	2,320	5.95	6.86	B.
June	2,000	90	388	.995	1.11	A.
July	2,460	47	391	1.00	1.15	A.
August	246	18	83.8	.215	.25	B.
September	36	7	17.2	.044	.05	C.
October	12	7	7.35	.019	.02	D.
November	36	7	18.1	.046	.05	D.
December	183	26	84.2	.216	.25	C.
The year	8,920	7	884	2.27	30.84	
1909.						
January	2,540	156	552	1.42	1.64	B.
February	2,870	[a]140	1,140	2.92	3.04	B.
March	3,230	407	1,150	2.95	3.40	A.
April	5,390	407	1,660	4.26	4.75	A.
May	1,560	183	557	1.43	1.65	A.
June	2,960	110	755	1.94	2.16	A.
July	3,520	47	217	.556	.64	A.
August	2,070	26	285	.731	.84	A.
September	1,700	59	244	.626	.70	A.
October	5,720	36	559	1.43	1.65	B.
November	2,960	132	493	1.26	1.41	A.
December	1,310	.....	276	.708	.82	C.
The year	5,720	.....	652	1.67	22.70	
1910.						
January	7,110	[b]100	2,110	5.41	6.24	B.
February	4,410	.....	1,360	3.49	3.63	C.
March	1,370	183	437	1.12	1.29	A.
April	2,230	183	558	1.43	1.60	A.
May	3,710	246	680	1.74	2.01	A.
June	10,500	282	2,450	6.28	7.01	B.
July	1,440	90	402	1.03	1.19	A.
August	183	18	66.7	.171	.20	B.
September	321	36	114	.292	.33	A.
October	132	26	63.5	.163	.19	B.
November	1,370	47	148	.379	.42	B.
December	3,230	.....	568	1.46	1.68	D.
The year	10,500	18	740	1.90	25.79	

[a] February, 1909, minimum discharge estimated.
[b] January, 1910, minimum discharge estimated.

NOTE.—See footnotes to tables of daily discharge for notes relative to estimated periods.

TYGART RIVER AT FETTERMAN, W. VA.

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

Otter Creek is tributary from the west about three-fourths mile below the station.

The winters are mild; ice may exist for short periods during January, February, and December.

The records are reliable and accurate.

The datum of the chain gage attached to the bridge has not been changed.

Discharge measurements of Tygart River at Fetterman, W. Va., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 18	C. T. Bailey	271	2,930	9.56	11,800
19	do	271	2,470	7.85	7,470
21	do	271	2,040	6.35	4,020
Aug. 20	do	65	61.2	3.05	[a] 70.1
Oct. 8	do	92	95.3	3.24	[a] 122

[a] Measurements Aug. 20 and Oct. 8 not at regular section.

Daily gage height, in feet, of Tygart River at Fetterman, W. Va., for 1910.

[Joseph Gerken, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5.6	5.75	3.95	4.7	4.7	4.30	4.35	3.1	3.55	3.7	5.2
2	5.9	5.2	6.1	3.9	4.55	5.05	4.1	3.95	3.25	3.6	3.8	4.7
3	13.4	6.1	5.95	3.9	4.45	5.7	4.3	3.7	3.35	3.45	3.7	4.45
4	13.25	6.7	5.65	3.9	4.4	6.05	4.6	3.55	3.6	3.4	3.7	4.35
5	9.3	6.35	5.4	4.05	4.3	5.65	4.85	3.45	3.55	3.45	3.7	4.3
6	7.15	6.2	5.15	4.15	4.3	8.5	4.75	3.45	3.55	3.3	3.7	4.35
7	12.95	6.15	5.05	4.1	4.25	9.2	4.65	3.45	3.95	3.2	3.7	4.35
8	10.25	5.95	4.95	4.1	4.2	6.85	5.3	3.45	4.0	3.3	3.7	4.3
9	7.8	5.6	4.75	4.1	4.4	6.2	4.95	3.45	3.9	3.15	3.7	4.3
10	6.4	5.95	4.65	4.05	4.8	5.75	4.6	3.45	3.7	3.1	3.6	4.3
11	5.45	6.65	4.55	4.0	4.95	5.9	4.4	3.4	3.65	3.1	3.65	4.3
12	5.05	7.15	4.5	4.0	6.25	6.05	4.3	3.2	3.6	3.1	3.7	.....
13	5.0	8.05	4.45	4.0	8.9	6.5	4.35	3.15	3.65	3.1	3.7	.....
14	7.35	8.3	4.4	4.0	7.15	6.35	5.25	3.1	4.4	3.05	3.6	.....
15	8.25	8.15	4.35	4.2	5.9	6.0	5.45	3.05	4.15	3.05	3.5	.....
16	7.0	7.8	4.25	4.25	5.35	8.6	5.0	3.25	4.1	3.15	3.5	.....
17	6.1	9.7	4.2	4.2	5.0	14.5	4.7	3.2	3.9	3.1	3.5	4.1
18	9.3	9.45	4.2	4.35	4.85	11.35	4.55	3.1	3.75	3.1	3.45	.....
19	13.8	8.25	4.15	4.35	4.7	11.65	4.4	3.0	3.65	3.1	3.4	.....
20	10.05	7.4	4.1	4.45	4.6	12.7	4.35	2.9	3.55	3.1	3.4	.....
21	8.9	6.65	4.1	4.65	4.55	8.25	4.3	2.95	3.5	3.0	3.4	.....
22	9.95	8.9	4.1	4.95	4.5	6.65	4.1	2.9	3.45	3.0	3.4	.....
23	7.8	10.15	4.15	5.55	4.4	6.2	3.9	2.9	3.4	3.0	3.4	4.4
24	6.5	7.6	4.1	5.85	4.35	5.7	3.8	2.85	3.4	3.0	3.4	6.0
25	5.85	6.4	4.05	6.9	4.75	5.25	3.6	3.0	3.3	3.0	3.4	8.8
26	5.55	5.75	4.0	6.5	5.55	4.9	3.5	3.3	3.4	3.0	3.45	7.55
27	7.75	5.4	4.0	5.9	5.5	4.7	3.45	3.15	3.2	3.05	3.5	6.9
28	9.0	5.4	4.0	5.55	5.15	4.5	3.4	3.1	3.15	3.1	4.4	6.2
29	7.4	.....	4.0	5.2	4.9	4.35	3.35	3.05	3.05	3.1	5.9	5.7
30	6.5	.....	4.0	4.9	4.8	4.3	3.5	3.0	3.3	3.2	5.7	7.75
31	5.95	.....	4.0	.....	4.6	.....	4.15	3.0	.....	3.5	.....	9.15

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 and 2, Feb. 6 to 16, and Dec. 6 to 24. Ice reported 3 to 7 inches thick Dec. 10 to 24; river reported open Dec. 25.

Daily discharge, in second-feet, of Tygart River at Fetterman, W. Va., for 1907–1910.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.								1907.							
1....	.....	2,080	1,040	802	607	2,150	1,570	16....	8,910	2,330	525	653	1,110	1,740	9,200
2....	.....	4,100	916	750	607	2,680	1,400	17....	4,460	16,600	525	566	1,020	1,400	5,370
3....	3,030	4,640	802	750	607	6,110	1,320	16....	3,030	33,600	525	653	859	1,180	3,830
4....	2,850	2,680	802	750	607	6,760	1,110	19....	2,250	23,300	653	1,900	654	1,820	3,120
5....	2,590	1,650	653	1,250	3,650	5,280	1,040	20....	1,400	9,380	566	1,820	607	1,820	2,590
6....	4,640	1,110	1,250	1,820	6,110	4,730	859	21....	1,320	4,910	488	1,110	607	1,820	1,900
7....	4,190	1,110	1,180	1,180	2,770	8,820	802	22....	1,110	2,850	451	1,040	607	1,650	1,740
8....	3,650	978	916	916	3,030	9,000	699	23....	1,110	2,590	653	916	525	1,480	3,120
9....	12,700	1,480	1,040	750	8,440	6,480	978	24....	1,040	3,290	8,340	978	525	4,640	8,630
10....	8,630	9,290	2,250	1,040	5,000	5,460	4,910	25....	2,590	4,370	13,300	859	451	7,220	7,780
11....	4,100	7,690	3,740	1,320	2,850	5,190	14,600	26....	1,110	3,120	9,290	802	384	5,740	4,460
12....	3,560	7,500	1,900	1,740	2,080	4,640	7,970	27....	1,040	3,120	3,920	653	451	4,280	2,850
13....	6,110	7,500	1,180	1,250	1,650	3,560	4,550	28....	978	1,820	2,590	566	2,510	2,940	2,590
14....	18,000	5,740	859	978	1,400	2,680	7,220	29....	750	1,110	1,650	607	6,660	2,590	2,510
15....	16,400	3,380	653	859	1,250	2,080	10,900	30....	802	1,480	1,400	699	4,550	1,990	2,250
								31....	.....	1,570	978	.....	3,120	.....	2,420

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1.....	2,510	2,770	3,470	12,900	1,250	2,850	268	859	118	25	16	32
2.....	2,420	2,680	18,100	11,500	1,490	1,820	268	418	103	25	16	32
3.....	2,080	2,770	13,000	8,250	1,740	1,400	268	296	118	22	14	32
4.....	1,900	3,380	7,590	5,740	3,030	1,480	218	268	118	20	12	36
5.....	1,990	3,830	4,820	3,470	16,700	2,510	268	268	103	20	12	40
6.....	1,850	11,200	5,740	2,940	17,300	2,680	802	243	92	20	12	50
7.....	1,740	7,970	9,480	2,420	14,100	1,570	859	218	80	20	12	56
8.....	1,740	4,640	7,970	2,510	18,300	1,110	750	384	77	18	12	80
9.....	1,400	3,030	15,300	7,870	12,100	916	607	525	66	16	12	80
10.....	1,250	2,680	11,300	8,250	16,300	699	488	323	63	16	12	63
11.....	1,320	2,250	7,690	10,300	14,700	681	384	296	60	16	16	63
12.....	8,720	3,120	4,820	13,400	8,250	625	268	296	53	18	16	118
13.....	19,800	9,290	3,830	8,820	4,100	607	296	268	50	22	16	296
14.....	11,400	12,200	3,120	4,640	3,210	488	488	268	50	22	16	354
15.....	5,370	17,900	2,850	3,290	3,120	525	488	268	45	20	18	418
16.....	4,010	20,300	2,680	3,290	2,680	978	418	243	40	20	20	525
17.....	3,470	10,300	2,680	4,370	3,470	1,110	418	218	40	20	20	418
18.....	2,940	5,090	2,590	4,820	3,290	699	607	218	32	20	20	323
19.....	2,770	4,550	8,820	4,100	4,730	566	978	218	32	18	20	296
20.....	2,080	5,550	10,000	5,000	6,480	488	1,040	195	32	16	20	384
21.....	1,820	4,370	6,660	5,190	14,100	418	653	172	32	16	22	323
22.....	2,160	3,380	4,640	3,470	9,200	384	566	172	32	16	25	354
23.....	3,240	2,940	3,380	2,510	5,830	418	978	153	32	16	25	354
24.....	3,290	2,420	3,210	2,080	4,010	525	1,320	134	32	16	25	323
25.....	2,330	2,160	2,850	1,820	3,030	488	2,080	134	32	16	25	323
26.....	2,160	3,030	2,510	1,570	3,290	451	4,820	134	32	14	32	296
27.....	6,200	4,010	2,330	1,400	2,770	418	6,200	134	32	12	32	268
28.....	7,130	3,380	2,080	1,320	2,080	384	4,100	103	32	12	32	268
29.....	5,190	2,850	2,850	2,770	1,480	354	2,770	103	28	14	32	243
30.....	3,560	.....	6,760	1,040	1,110	323	1,990	92	25	16	32	243
31.....	2,680	.....	9,480	.....	4,640	.....	1,570	80	.....	16	.....	296
1909.												
1.....	384	750	3,290	3,210	6,570	525	978	2,940	218	384	802	802
2.....	699	670	2,940	2,940	10,300	451	802	1,480	218	384	750	750
3.....	859	600	3,830	3,210	8,530	566	653	1,250	243	354	653	653
4.....	916	750	7,220	3,290	5,190	566	566	1,040	296	296	607	607
5.....	978	900	5,830	4,820	3,830	1,180	451	607	323	268	607	607
6.....	916	1,900	4,460	5,370	3,020	3,650	354	451	243	218	566	566
7.....	699	2,940	4,460	4,550	2,770	1,990	296	384	218	218	525	566
8.....	978	3,030	6,110	3,210	2,160	2,080	218	323	218	172	451	653
9.....	1,180	2,940	5,920	2,680	1,570	5,650	195	296	218	172	451	607
10.....	859	6,200	5,090	2,420	1,480	4,550	172	268	1,400	172	2,940	488
11.....	916	8,440	4,730	1,900	1,740	9,000	172	218	2,590	172	7,220	451
12.....	1,180	5,000	3,740	1,570	1,650	5,000	195	218	1,480	384	3,920	607
13.....	1,110	3,920	2,940	1,480	1,570	3,470	268	195	978	916	2,680	699
14.....	1,040	3,470	2,850	9,670	1,480	2,510	243	153	607	859	2,080	2,080
15.....	6,660	3,470	3,210	14,000	1,320	3,120	195	153	488	802	1,650	3,290

Daily discharge, in second-feet, of Tygart River at Fetterman, W. Va., for 1907–1910—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
16	10,200	9,670	3,030	6,850	1,110	3,210	243	268	418	607	1,250	3,120
17	8,910	8,530	2,590	4,370	978	2,250	323	802	4,550	451	1,040	2,080
18	6,480	6,010	2,250	2,940	699	10,700	296	1,900	1,400	653	916	1,570
19	3,380	4,640	1,740	2,510	488	5,920	268	1,320	1,040	653	916	1,180
20	2,940	3,920	1,650	3,740	525	3,290	195	802	750	1,570	750	978
21	2,590	3,470	1,570	7,590	566	2,160	172	699	451	1,990	653	.....
22	2,330	4,370	1,320	13,900	653	1,250	153	1,180	384	1,740	566	.....
23	2,080	4,550	1,250	13,000	699	1,040	134	802	323	3,210	525	.....
24	2,330	8,160	978	9,580	699	859	134	607	451	16,700	802	.....
25	2,420	11,100	1,110	7,780	653	750	243	451	1,320	13,300	1,320	.....
26	1,480	6,760	1,400	6,480	525	653	451	354	1,180	6,940	1,320	.....
27	1,250	4,820	2,850	4,280	607	607	653	296	699	4,100	1,110	.....
28	1,040	3,830	3,920	3,650	1,040	1,650	451	218	607	2,330	916	.....
29	950	.....	4,640	3,120	859	1,990	323	1,250	488	1,650	859	.....
30	900	.....	4,550	3,650	653	1,180	653	750	451	1,250	802	.....
31	820	.....	4,280	.....	566	.....	3,920	243	.....	1,110	.....	.....
1910.												
1	500	2,850	3,120	488	1,320	1,320	802	859	80	243	323	2,160
2	2,500	2,160	3,740	451	1,110	1,900	607	488	118	268	384	1,320
3	18,200	3,740	3,470	451	978	3,030	802	323	153	195	323	978
4	17,900	4,820	2,940	451	916	3,650	1,180	243	268	172	323	859
5	9,670	4,190	2,510	566	802	2,940	1,570	195	243	195	323	802
6	5,650	.....	2,080	653	802	8,160	1,400	195	243	134	323	.....
7	17,200	.....	1,910	607	750	9,480	1,250	195	488	103	323	.....
8	11,500	.....	1,740	607	699	5,090	2,330	195	525	134	323	.....
9	6,850	.....	1,400	607	916	3,920	1,740	195	451	92	323	.....
10	4,280	.....	1,250	566	1,480	3,120	1,180	195	323	80	268	.....
11	2,590	.....	1,110	525	1,740	3,380	916	172	296	80	296	.....
12	1,900	.....	1,040	525	4,010	3,650	802	103	268	80	323	.....
13	1,820	.....	978	525	8,910	4,460	859	92	296	80	323	.....
14	6,010	.....	916	525	5,650	4,190	2,250	80	916	72	268	.....
15	7,690	.....	859	699	3,380	3,560	2,590	72	653	72	218	.....
16	5,370	.....	750	750	2,420	8,340	1,820	118	607	92	218	.....
17	3,740	10,400	699	699	1,820	20,800	1,320	103	451	80	218	.....
18	9,670	9,960	699	859	1,570	13,700	1,110	80	354	80	195	.....
19	19,100	7,690	653	859	1,320	14,300	916	63	296	80	172	.....
20	11,100	6,110	607	978	1,180	16,600	859	50	243	80	172	.....
21	8,910	4,730	607	1,250	1,110	7,690	802	56	218	63	172	.....
22	10,900	8,910	607	1,740	1,040	4,730	607	50	195	63	172	.....
23	6,850	11,300	653	2,770	916	3,920	451	50	172	63	172	.....
24	4,460	6,480	607	3,290	859	3,030	384	45	172	63	172	.....
25	3,290	4,280	566	5,190	1,400	2,250	268	63	134	63	172	8,720
26	2,770	3,120	525	4,460	2,770	1,650	218	134	172	63	195	6,380
27	6,760	2,510	525	3,380	2,680	1,320	195	92	103	72	218	5,190
28	9,100	2,510	525	2,770	2,080	1,040	172	80	92	80	916	3,920
29	6,110	.....	525	2,160	1,650	859	153	72	72	80	3,380	3,030
30	4,460	.....	525	1,650	1,480	802	218	63	134	103	3,030	6,760
31	3,470	.....	525	.....	1,180	.....	653	63	.....	218	.....	9,380

NOTE.—Daily discharge determined by means of a discharge rating curve that is fairly well defined below discharge 50 second-feet (gage height 2.9 feet), well defined between discharges 63 and 5,370 second-feet (gage heights 3.0 and 7.0 feet), and fairly well defined above discharge 5,550 second-feet (gage height 7.1 feet). Above discharge 24,300 second-feet (gage height 16 feet) the rating curve is extended on a tangent. No notes in regard to ice were kept by the gage observer during 1907 and 1908. From a study of climatologic data for the winter periods it appears that the relation of gage height to discharge was not affected by ice during 1907 and 1908.

Daily discharge Jan. 29 to Feb. 5, 1909, and Dec. 21 to 31, 1909, estimated because of ice, from climatologic records, run-off in adjacent drainage areas, and observer's notes.

Mean discharge Dec. 21 to 31, 1909, estimated about 446 second-feet, varying from about 150 to 750 second-feet.

Daily discharge Jan. 1 and 2, Feb. 6 to 15, and Dec. 6 to 24, 1910, estimated, because of ice, on basis of climatologic records, discharge of adjacent drainage areas, and gage observer's notes. Mean discharge Feb. 6 to 16, 1910, estimated about 2,240 second-feet, varying from about 1,400 to 4,000 second-feet. Mean discharge Dec. 6 to 24, 1910, estimated about 463 second-feet, varying from about 250 to 1,800 second-feet.

Monthly discharge of Tygart River at Fetterman, W. Va., for 1907–1910.

[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.						
June 3–30	18,000	750	4,370	3.26	3.40	B.
July	33,600	978	5,690	4.25	4.90	B.
August	13,300	451	2,100	1.57	1.81	A.
September	1,900	566	999	.746	.83	A.
October	8,440	384	2,110	1.57	1.81	A.
November	9,000	1,180	3,940	2.94	3.28	A.
December	14,600	699	4,010	2.99	3.45	A.
1908.						
January	19,800	1,250	3,860	2.88	3.32	A.
February	20,300	2,160	5,660	4.22	4.55	A.
March	18,100	2,080	6,210	4.63	5.34	B.
April	13,400	1,040	5,040	3.76	4.20	A.
May	18,300	1,110	6,700	5.00	5.76	B.
June	2,850	323	932	.696	.78	A.
July	6,200	218	1,200	.896	1.03	A.
August	859	80	248	.185	.21	B.
September	118	25	56.0	.042	.05	C.
October	25	12	18.0	.013	.01	D.
November	32	12	19.8	.015	.02	D.
December	525	32	225	.168	.19	C.
The year	20,300	12	2,510	1.87	25.46	
1909.						
January	10,200	384	2,240	1.67	1.92	B.
February	11,100	[a] 600	4,460	3.33	3.47	B.
March	7,220	978	3,410	2.54	2.93	A.
April	14,000	1,480	5,260	3.93	4.38	A.
May	10,300	488	2,080	1.55	1.79	A.
June	10,700	451	2,730	2.04	2.28	A.
July	3,920	134	464	.346	.40	A.
August	2,940	153	707	.528	.61	A.
September	4,550	218	808	.603	.67	A.
October	16,700	172	2,070	1.54	1.78	A.
November	7,220	451	1,320	.985	1.10	A.
December	3,290	.....	880	.657	.76	B.
The year	16,700	.....	2,180	1.63	22.09	
1910.						
January	18,200	[b] 500	7,430	5.54	6.39	B.
February	11,300	.....	4,300	3.21	3.34	B.
March	3,740	525	1,250	.933	1.08	A.
April	5,190	451	1,370	1.02	1.14	A.
May	8,910	699	1,900	1.42	1.64	A.
June	20,800	802	5,430	4.05	4.52	A.
July	2,590	153	981	.732	.84	A.
August	859	45	154	.115	.13	A.
September	916	72	291	.217	.24	A.
October	268	63	108	.081	.09	A.
November	3,380	172	475	.354	.40	A.
December	9,380	.....	1,820	1.36	1.57	C.
The year	20,800	45	2,110	1.57	21.38	

[a] February, 1909, minimum discharge estimated.
[b] January, 1910, minimum discharge estimated.

NOTE.—See footnotes to table of daily discharge for notes relative to estimated periods.

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.

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

Winters are mild and ice exists only for short periods, 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 chain gage, attached to the bridge, has remained unchanged. The records are reliable and accurate.

Discharge measurements of West Fork River at Enterprise, W. Va., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 18	C. T. Bailey	168	1,060	6.35	3,850
19	do	164	808	4.90	2,240
19	do	164	794	4.83	1,990
22	do	205	1,360	7.92	5,720
22	do	207	1,570	8.90	7,170
Aug. 17	do	67	47.9	0.65	11.2
Oct. 8	do	52	36.7	0.80	22.0

Daily gage height, in feet, of West Fork River at Enterprise, W. Va., for 1910.

[Charles M. Tetrick, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.8	4.9	1.5	1.9	2.2	1.5	1.4	1.1	1.1	2.0	3.3
2	.....	3.3	4.5	1.5	1.8	2.3	1.5	1.2	1.0	1.0	2.0	2.7
3	9.4	4.0	4.1	1.5	1.7	2.5	2.0	1.1	2.6	0.9	1.8	2.3
4	8.8	5.5	3.7	1.6	1.6	2.4	3.5	1.1	2.4	.9	1.7	2.3
5	5.2	5.4	3.2	1.7	1.6	2.2	2.2	1.0	2.9	.9	1.6	2.2
6	5.0	5.0	3.0	1.6	1.5	6.0	2.0	1.0	2.6	.9	1.4	2.8
7	11.8	3.7	2.8	1.6	1.5	6.0	3.3	0.9	2.8	.8	1.3	2.7
8	7.2	3.7	2.6	1.6	1.5	4.6	3.3	0.9	2.6	.8	1.3	2.6
9	5.0	3.1	2.4	1.6	1.6	3.5	3.2	0.8	2.2	.8	1.2	2.9
10	3.6	3.6	2.3	1.5	1.5	3.0	2.6	1.0	1.9	.8	1.1	3.2
11	4.2	4.3	2.2	1.4	2.4	2.6	2.0	1.0	1.8	.8	1.3	2.2
12	3.7	5.0	2.2	1.4	2.8	4.0	2.2	.9	2.6	.8	1.7	3.2
13	3.0	.....	2.1	1.4	7.5	2.9	2.6	.9	2.4	.8	1.7	3.1
14	9.7	5.8	2.0	1.4	3.8	2.4	4.0	.8	6.5	.8	1.7	3.0
15	8.0	5.7	2.0	1.4	3.0	2.5	3.3	.7	5.0	.8	1.7	2.8
16	6.1	7.8	1.9	1.4	2.4	2.6	2.6	.7	3.7	.8	1.6	2.8
17	4.1	9.1	1.9	1.4	2.3	3.7	2.2	.7	2.5	.8	1.6	2.7
18	9.6	6.8	1.9	1.5	2.8	3.0	2.1	.7	2.2	.8	1.5	2.6
19	13.6	4.8	1.8	1.5	2.4	5.0	2.0	.8	2.0	.8	1.5	3.0
20	6.9	4.0	1.8	1.5	2.3	4.0	2.0	.8	1.9	.8	1.3	5.6
21	6.7	4.6	1.7	1.5	2.2	3.9	1.8	.7	1.7	1.8	1.3	5.0
22	10.4	7.7	1.7	1.8	2.1	2.7	1.6	.7	1.5	1.0	1.2	4.0
23	6.4	8.6	1.7	2.1	2.4	2.3	1.5	.8	1.4	1.8	1.3	3.5
24	4.6	5.5	1.7	2.0	2.2	2.0	1.4	1.0	1.3	1.6	1.2	7.0
25	4.0	3.9	1.7	1.8	2.1	1.7	1.3	1.0	1.2	1.5	1.7	8.0
26	4.0	3.4	1.6	2.6	3.6	1.6	1.3	1.0	1.1	1.7	1.6	4.7
27	8.2	3.3	1.6	2.3	3.2	1.5	1.1	.9	1.0	1.5	1.5	3.7
28	9.2	3.2	1.6	2.2	2.9	1.7	1.0	.9	1.0	1.5	1.9	3.2
29	5.9	.....	1.5	2.1	2.6	1.5	1.3	.8	1.9	1.6	5.8	4.5
30	4.8	.....	1.5	2.0	2.4	1.5	1.3	.7	1.5	1.5	4.7	6.8
31	4.0	.....	1.5	.....	2.3	.....	1.3	.7	.....	1.4	.....	6.5

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 and 2, Feb. 10 to 15, and Dec. 6 to 19.

Daily discharge, in second-feet, of West Fork River at Enterprise, W. Va., for 1907–1910.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.								1907.							
1....	.....	99	266	227	227	1,090	489	16....	1,760	649	227	441	266	307	4,200
2....	2,090	707	227	190	227	5,740	395	17....	1,030	441	190	266	227	226	3,460
3....	2,010	1,300	227	155	266	3,460	350	18....	649	7,060	155	227	190	395	2,270
4....	1,230	1,090	190	540	307	2,650	307	19....	489	5,860	227	707	190	1,090	1,380
5....	829	767	190	441	1,920	2,180	266	20....	395	2,090	350	767	155	1,030	1,230
6....	1,090	227	190	350	1,380	1,840	227	21....	350	1,530	266	489	155	893	1,030
7....	1,030	1,030	350	227	1,030	1,530	227	22....	307	767	227	395	124	707	707
8....	829	1,030	307	190	1,600	1,380	190	23....	227	1,840	767	307	99	593	593
9....	2,010	5,740	227	155	1,090	1,160	266	24....	155	1,280	5,510	266	79	8,280	2,010
10....	1,760	2,180	1,530	124	829	1,030	489	25....	99	1,080	3,990	227	64	5,860	1,380
11....	893	7,180	1,090	1,760	707	767	7,300	26....	124	1,230	2,750	227	64	2,550	1,280
12....	649	4,740	649	3,670	593	593	4,740	27....	124	767	1,530	227	79	1,760	1,030
13....	2,270	2,010	441	1,760	489	395	3,150	28....	124	540	1,030	155	1,090	829	767
14....	6,940	829	266	707	350	350	5,860	29....	155	350	489	190	2,550	707	649
15....	3,560	707	227	593	266	307	6,460	30....	99	307	395	227	1,760	540	707
								31....	.....	227	266	.....	893	.....	489

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1.....	395	1,230	6,460	6,080	227	395	99	190	30	20	20	20
2.....	350	1,090	12,800	8,160	707	307	64	155	25	16	20	20
3.....	307	959	5,290	5,290	489	227	52	441	20	20	20	20
4.....	227	893	3,670	3,560	2,180	190	43	227	16	20	20	20
5.....	707	14,100	2,180	1,680	16,000	155	36	99	20	20	20	20
6.....	593	4,960	3,150	1,030	9,400	124	36	489	20	25	20	20
7.....	540	2,650	2,550	959	8,280	99	36	266	20	20	20	20
8.....	489	1,840	2,180	829	5,510	79	155	227	20	20	20	20
9.....	1,530	1,530	12,100	3,990	7,670	79	99	190	16	20	20	52
10.....	1,380	1,380	7,180	3,460	7,060	64	64	155	12	16	20	36
11.....	1,530	1,160	3,460	3,670	4,310	52	52	99	25	20	20	30
12.....	1,840	893	1,920	2,650	2,360	43	43	64	20	20	20	30
13.....	7,550	767	1,450	1,760	1,380	30	36	52	16	20	20	36
14.....	4,850	707	1,160	1,380	829	30	99	52	12	20	20	30
15.....	2,360	5,620	1,030	1,160	767	767	64	43	16	20	20	43
16.....	2,010	5,290	893	893	593	489	79	36	16	20	20	36
17.....	1,760	3,560	767	829	829	307	52	52	25	20	20	30
18.....	1,450	1,600	707	829	1,300	227	593	36	25	20	20	25
19.....	1,230	1,380	9,900	707	2,460	190	227	30	25	20	20	43
20.....	959	3,250	4,850	649	2,270	124	649	30	20	20	20	36
21.....	767	2,180	2,270	767	8,400	79	307	25	20	20	20	36
22	707	1,760	1,760	540	2,750	64	227	30	25	20	20	43
23	649	1,380	1,300	441	1,920	52	155	36	20	25	20	36
24.....	593	1,230	959	395	1,380	43	79	30	16	25	20	36
25.....	593	1,090	767	350	1,160	52	64	25	12	25	20	30
26.....	1,030	2,850	959	307	1,090	43	99	25	20	25	20	30
27.....	3,880	2,360	829	307	1,030	36	441	20	25	25	20	99
28.....	2,180	2,010	707	266	707	36	350	20	20	25	20	52
29.....	1,840	1,760	3,670	227	593	190	266	20	16	20	20	43
30.....	1,530	.....	4,200	190	441	124	227	20	20	20	20	36
31.....	1,380	.....	4,200	.....	350	.....	227	16	.....	20	.....	30
1909.												
1.....	52	400	2,010	1,230	6,320	190	489	99	52	43	99	79
2.....	36	380	1,680	959	4,200	155	350	79	43	43	79	79
3.....	99	350	1,030	707	2,360	155	190	64	43	36	79	79
4.....	155	700	1,090	893	1,760	155	52	52	43	30	79	79
5.....	155	1,200	3,360	1,230	1,230	395	79	43	43	30	99	79
6.....	190	1,380	1,530	959	829	350	79	64	36	25	79	64
7.....	155	1,300	1,380	707	993	441	64	52	36	25	79	79
8.....	124	1,230	1,230	540	441	395	52	43	36	30	64	99
9.....	124	1,600	1,160	441	350	6,580	43	36	36	25	64	124
10.....	99	5,620	1,030	350	307	2,010	36	30	190	25	79	227
11.....	79	3,990	1,680	307	266	2,460	36	25	1,600	25	1,600	155
12.....	350	2,360	1,230	266	227	2,010	30	20	829	43	893	3,560
11.....	155	2,010	1,090	266	190	1,760	79	20	307	79	441	1,840
14.....	124	1,600	959	3,880	190	893	124	20	155	64	307	1,030
15.....	5,860	1,300	649	2,750	124	1,600	155	43	99	64	227	767

Daily discharge, in second-feet, of West Fork River at Enterprise, W. Va., for 1907–1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
16	3,560	8,780	489	1,680	124	1,030	227	227	79	64	190	649
17	2,010	5,620	1,600	893	124	593	190	441	64	64	155	593
18	3,560	1,230	1,380	707	99	4,310	124	227	52	79	124	500
19	1,450	1,600	1,160	593	79	3,780	155	190	43	64	99	390
20	893	2,010	829	893	79	2,650	124	124	43	64	99	280
21	593	1,230	649	6,940	190	707	79	959	43	64	79	200
22	540	2,180	1,680	8,040	489	489	64	540	36	64	79	150
23	395	1,600	1,230	6,820	307	540	52	350	36	99	79	120
24	1,600	7,670	1,030	4,310	227	489	43	155	36	4,420	79	110
25	1,300	5,180	829	2,550	155	489	79	99	79	3,560	99	110
26	959	3,050	707	1,840	124	441	124	64	43	1,230	155	100
27	707	2,010	649	1,380	227	1,530	99	52	36	593	124	100
28	593	2,460	593	1,030	441	6,820	79	43	64	350	99	80
29	520	.....	1,600	707	350	1,680	64	36	43	307	99	80
30	460	.....	1,300	593	307	893	99	52	52	155	99	80
31	420	.....	1,090	.....	266	.....	124	52	.....	155	.....	80
1910.												
1	300	1,230	2,090	79	190	307	79	64	36	36	227	893
2	1,000	893	1,760	79	155	350	79	43	30	30	227	540
3	6,940	1,380	1,450	79	124	441	227	36	489	25	155	350
4	6,200	2,650	1,160	99	99	395	1,030	36	395	25	124	350
5	2,360	2,550	829	124	99	307	307	30	649	25	99	307
6	2,180	2,180	707	99	79	3,150	227	30	489	25	64	270
7	9,900	1,160	593	99	79	3,150	893	25	593	20	52	250
8	4,420	1,160	489	99	79	1,840	893	25	489	20	52	230
9	2,180	767	395	99	99	1,030	829	20	307	20	43	230
10	1,090	950	350	79	79	707	489	30	190	20	36	220
11	1,530	1,200	307	64	395	489	227	30	155	20	52	220
12	1,160	1,000	307	64	593	1,380	307	25	489	20	124	210
13	707	800	266	64	4,740	649	489	25	395	20	124	210
14	7,300	800	227	64	1,230	395	1,380	20	3,670	20	124	200
15	5,290	1,500	227	64	707	441	893	16	2,180	20	124	200
16	3,250	5,070	190	64	395	489	489	16	1,160	20	99	200
17	1,450	6,580	190	64	350	1,160	307	16	441	20	99	150
18	7,180	3,990	190	79	593	707	266	16	307	20	79	150
19	12,200	2,010	155	79	395	2,180	227	20	227	20	79	200
20	4,090	1,380	155	79	350	1,380	227	20	190	20	52	2,750
21	3,880	1,840	124	79	307	1,300	155	16	124	155	52	2,180
22	8,160	4,960	124	155	266	540	99	16	79	30	43	1,380
23	3,560	5,970	124	266	395	350	79	20	64	155	52	1,030
24	1,840	2,650	124	227	307	227	64	30	52	99	43	4,200
25	1,380	1,300	124	155	266	124	52	30	43	79	124	5,290
26	1,380	959	99	489	1,090	99	52	30	36	124	99	1,920
27	5,510	893	99	350	829	79	36	25	30	79	79	1,160
28	6,700	829	99	307	649	124	30	25	30	79	190	829
29	3,050	.....	79	266	489	79	52	20	190	99	2,950	1,760
30	2,010	.....	79	227	395	79	52	16	79	79	1,920	3,990
31	1,380	.....	79	.....	350	.....	52	16	.....	64	.....	3,670

NOTE.—Daily discharge determined by means of a discharge rating curve that is fairly well defined below 649 second-feet (gage height 2.9 feet), well defined between 707 and 2,180 second-feet (gage heights 3.0 and 5.0 feet), fairly well defined between 2,270 and 6,460 second-feet (gage heights 5.1 and 9.0 feet), and is an extension above 6,460 second-feet (gage height 9.0 feet). No notes in regard to ice were kept by the gage observer during 1907 and 1908. From a study of climatologic data for the winter periods it appears that the relation of gage height to discharge was not affected by ice during 1907 and 1908. Daily discharge Jan. 29 to Feb. 5, 1909, and Dec. 18 to 31, 1909, estimated, because of ice, from climatologic records, run-off in adjacent drainage areas, and gage observer's notes. Mean discharge Dec. 18 to 31, 1909, estimated about 170 second-feet, varying from about 80 to 500 second-feet. Daily discharge Jan. 1 and Feb. 2, 10 to 15, and Dec. 6 to 19, 1910, estimated, because of ice, from climatologic records, discharge of adjacent drainage areas, and observer's notes. Mean discharge Dec. 6 to 19, 1910, estimated about 210 second-feet, varying from about 150 to 270 second-feet.

Monthly discharge of West Fork River at Enterprise, W. Va., for 1907–1910.

[Drainage area, 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 2-30	6,940	99	1,150	1.53	1.65	A.
July	7,180	99	1,790	2.39	2.76	B.
August	5,510	155	796	1.06	1.22	A.
September	3,670	124	540	.720	.81	A.
October	2,550	64	621	.828	.95	A.
November	8,280	226	1,670	2.23	2.49	A.
December	7,300	190	1,740	2.32	2.68	A.
1908.						
January	7,550	227	1,520	2.03	2.34	A.
February	14,100	707	2,460	3.28	3.54	B.
March	12,800	707	3,400	4.53	5.22	B.
April	8,160	190	1,780	2.37	2.64	A.
May	16,000	227	3,050	4.07	4.69	B.
June	767	30	157	.209	.23	A.
July	649	36	162	.216	.25	A.
August	489	16	103	.137	.16	B.
September	30	12	19.8	.026	.03	C.
October	25	16	20.9	.028	.03	D.
November	20	20	20.0	.027	.03	D.
December	99	20	34.1	.046	.05	C.
The year	16,000	12	1,060	1.41	19.21	
1909.						
January	5,860	36	881	1.17	1.35	B.
February	8,780	[a]350	2,500	3.33	3.47	B.
March	3,360	489	1,220	1.63	1.88	A.
April	8,040	266	1,820	2.43	2.71	B.
May	6,320	79	741	.988	1.14	A.
June	6,820	155	1,530	2.04	2.28	A.
July	489	30	116	.155	.18	A.
August	959	20	139	.185	.21	A.
September	1,600	36	143	.191	.21	A.
October	4,420	25	384	.512	.59	A.
November	1,600	64	198	.264	.29	A.
December	3,560	64	386	.515	.59	C.
The year	8,780	20	824	1.10	14.90	
1910.						
January	12,200	[a]300	3,860	5.15	5.94	B.
February	6,580	767	2,090	2.79	2.90	B.
March	2,090	79	426	.568	.65	A.
April	489	64	138	.184	.21	A.
May	4,740	79	522	.696	.80	A.
June	3,150	79	798	1.06	1.18	A.
July	1,380	30	342	.456	.53	A.
August	64	16	25.4	.034	.04	B.
September	3,670	30	454	.605	.68	A.
October	155	20	48.0	.064	.07	A.
November	2,950	36	253	.337	.38	A.
December	5,290	.....	1,150	1.53	1.76	C.
The year	12,200	16	836	1,11	15.14	

[a] Estimated.

NOTE.—See footnotes to tables of daily discharge for notes relative to periods for which discharge was estimated.

50017°—WSP 283—12——4

CHEAT RIVER NEAR MORGANTOWN, W. VA.

This station, which was maintained from July 8 to December 30, 1899, July 1 to December 29, 1900, and August 21, 1902, to December 31, 1905, was reestablished November 18, 1908, by F. W. Scheidenhelm, through whose courtesy the 1910 gage heights have been furnished to the United States Geological Survey for publication.

The staff gage for this station was originally located about 100 feet above the present location of Ice's ferry bridge at Uneva, W. Va., about 6 miles northeast of Morgantown and 10 miles above the mouth of Cheat River. The 1899 measurement was made from a cable which was located at the gage. During 1900 the cable was moved downstream about 1 mile and all subsequent measurements were made at the new cable location except those stated to have been made at wading sections or at Ice's ferry bridge. The first four measurements made during 1899 to 1901 were referred to the staff gage immediately above the present location of Ice's ferry bridge.

On August 20, 1902, a new inclined and vertical staff gage was installed about 275 feet below the new cable section. The readings were made on the inclined section below 6.5 feet. The new gage was set to read the same as the original gage at 1.8 feet. On September 28, 1904, the inclined portion of this staff gage was found to be 0.35 foot too high and the vertical section 0.15 foot too high. Both sections were accordingly lowered. On September 28, 1904, a chain gage was established on Ice's ferry bridge to read the same as the second staff gage at 1.85 feet. The length of chain is 41.01 feet. Both gages were maintained from September 28, 1904, to December 31, 1905. The staff gage was maintained from November 18, 1908, to May 8, 1909, and the chain gage had been maintained from January 21, 1909, to date. From these simultaneous gage readings the following gage relation has been determined:

Relation of gages on Cheat River.

Chain gage.	Staff gage.	Chain gage.	Staff gage.
Feet.	*Feet.*	*Feet.*	*Feet.*
1.5	1.52	6.5	7.69
2.0	2.00	7.0	8.28
2.5	2.52	7.5	8.87
3.0	3.11	8.0	9.43
3.5	3.78	8.5	9.98
4.0	4.46	9.0	10.53
4.5	5.15	9.5	11.06
5.0	5.82	10.0	11.59
5.5	6.47	10.5	12.11
6.0	7.09	11.0	12.65

All discharge measurements and gage heights from 1902 to 1909, as published in Water-Supply Paper 263, are referred to the second staff gage. All gage heights from 1902 to September 28, 1904, have

been reduced to the gage zero established September 28, 1904. Gage heights previously published for 1899–1900 are referred to the original staff gage and are correct as originally published.

The original staff gage and the chain gage are located in a deep pool, with large islands about one-fourth mile above and below the station. The second staff gage is also located in a deep pool of somewhat smaller dimensions than at the original location. It is situated nearly one-fourth mile below a large island and a short distance above a small island. Both pools are controlled by permanent rock reefs. Water was diverted around the lower gage for milling prior to 1908 The quantity thus diverted was relatively small (see table of discharge measurements) except at low stages, and has been disregarded in the following computations of discharge, but should, however, be taken into consideration in making use of the tables to determine the run-off in the Cheat River drainage basin. No important tributaries enter Cheat River near the gaging station.

Large ice jams sometimes occur at this station. In January, 1904, the ice piled up from 8 to 10 feet above normal low-water stage, thus greatly affecting the relation of gage height to discharge. For the occurrence of other periods of ice effect, as determined by observer's records and climatologic reports, see footnotes to gage-height table.

The discharge for these periods has been estimated, and it is assumed that the open-channel rating applies for all other winter periods.

The curves developed are very satisfactory and the figures showing daily and monthly discharge given in Water-Supply Paper 263 are considered very good, with the possible exception of those for 1902–3, for which period there is some doubt about the elevation of the inclined gage. However, as the two measurements made during 1902–3 plot practically on the 1904–1909 discharge curve, when their gage heights are increased 0.35 foot, it is evident either that the inclined gage was set incorrectly at the time of its installation by the amount of the error in the gage (0.35 foot) discovered during 1904 or else that conditions of flow were different in these two years from what they have been since. In either event the correction of all gage heights for 1902–3 in accordance with the discrepancies found September 28, 1904, will yield essentially correct results for these years, and these corrections have accordingly been made.

The discharge for low stages during 1899–1900 is also somewhat open to question. It has been impossible as yet to determine the period when Ice's ferry bridge was erected. The somewhat conflicting statements obtained seem to indicate that the bridge was built during 1900 or 1901. In any event it is probable that both the measurements made during 1901 were affected by the backwater from the bridge. This backwater effect is, however, very slight at low stages, owing to the deep, wide pool in which the gage is located

The two rating curves probably converge to a common curve at some point above the stage of zero flow. Hence at low stages the 1899–1900 discharges may be too high.

The gage at this station was checked April 28, 1909, and the last discharge measurement in 1909 was made August 19. No discharge measurements were made during 1910. This station was visited October 7, 1911 (previous to the publication of this report), by H. P. Drake, an engineer of the Pittsburgh Hydro-Electric Co. From Mr. Drake's report the observed gage heights on the chain gage from April 28 to December 31, 1909, are in error to an extent ranging from 0.02 to 0.06 foot for gage heights below 10 feet, and 0.02 to 0.03 above 10 feet. The gage heights for 1910 in the following table are correct.

The accuracy of the daily and monthly discharges given in the following tables depends upon the permanency of the conditions of flow since August 19, 1909.

Daily gage height, in feet, of Cheat River near Morgantown, W. Va., for 1910.

[C. F. Baker, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.47	3.71	6.30	2.93	3.64	3.96	3.17	2.55	2.26	2.34	2.38	3.57
2	2.82	3.48	6.02	2.93	3.43	4.98	3.00	2.54	2.34	2.23	2.31	3.17
3	10.07	3.62	5.41	2.93	3.34	5.10	2.95	2.39	2.42	2.14	2.25	3.06
4	8.02	3.77	4.89	2.92	3.26	4.97	3.76	2.33	3.32	2.10	2.22	3.01
5	5.82	3.84	4.55	3.10	3.04	4.57	4.26	2.31	2.91	2.08	2.32	2.90
6	5.68	3.71	4.33	3.11	3.04	6.18	4.23	2.23	2.92	2.06	2.30	2.67
7	7.50	3.30	4.27	3.08	2.98	5.64	3.75	2.43	3.35	2.01	2.25	3.03
8	6.28	3.52	4.21	3.04	3.01	4.84	3.88	2.38	2.99	1.98	2.21	2.79
9	5.24	3.37	3.85	3.04	3.14	4.41	3.84	2.27	2.73	2.05	2.17	2.49
10	4.45	3.73	3.67	2.94	3.20	4.57	3.54	2.23	2.64	1.93	2.16	2.59
11	3.90	4.16	3.47	2.89	3.32	5.06	3.45	2.21	2.51	1.90	2.11	2.57
12	3.80	3.78	3.38	2.81	4.23	5.23	3.31	2.19	2.48	2.12	2.13	2.50
13	3.70	3.43	3.35	2.77	5.06	5.30	3.29	2.18	2.40	2.20	2.15	2.49
14	5.42	3.26	3.27	2.74	4.42	4.92	3.84	2.12	2.51	2.12	2.15	2.47
15	5.10	3.10	3.13	2.95	3.96	4.60	3.76	2.07	2.52	2.06	2.15	2.42
16	4.86	3.61	3.13	2.89	3.74	4.70	3.51	2.12	2.53	2.00	2.13	2.41
17	4.00	6.78	3.05	2.93	3.54	8.84	3.31	2.13	2.52	1.94	2.11	2.38
18	6.61	6.80	3.13	3.08	3.44	6.43	3.17	2.11	2.44	1.91	2.09	2.64
19	8.36	5.78	3.06	3.37	3.38	11.79	3.35	2.09	2.30	1.91	2.09	.....
20	5.88	4.98	3.01	3.47	3.26	7.71	3.15	2.07	2.22	1.87	2.05	2.78
21	5.52	4.95	3.00	3.71	3.26	5.68	2.99	2.06	2.16	1.88	2.03	2.88
22	6.07	7.04	3.19	4.19	3.24	5.47	2.87	1.97	2.13	1.89	2.04	2.63
23	5.30	6.63	3.23	4.27	3.16	4.71	2.77	1.94	2.13	1.92	2.09	2.68
24	4.50	5.28	3.15	4.45	3.14	4.21	2.63	2.13	2.12	1.92	2.13	4.28
25	4.20	4.59	3.13	4.82	3.38	3.95	2.59	2.07	2.10	1.95	2.22	3.88
26	3.87	4.14	3.15	4.80	4.04	3.74	2.53	2.04	2.04	2.33	2.73	3.48
27	4.48	4.07	3.17	4.67	3.79	3.45	2.48	2.06	1.98	2.23	3.19	3.28
28	4.96	4.95	3.07	4.52	3.54	3.38	2.43	2.04	1.97	2.20	3.05	3.03
29	4.50	.....	3.03	4.04	3.36	3.39	2.48	1.98	2.42	2.21	4.53	4.48
30	3.77	.....	3.00	3.86	3.24	3.39	2.49	1.94	2.36	2.37	4.17	7.38
31	3.83	.....	2.97	.....	3.22	.....	2.62	1.93	.....	2.47	.....	6.09

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 and 2, Feb. 8 to 15, and Dec. 7 to 29. Ice reported 7½ inches thick Jan. 1. Ice went out Jan. 2. Gage heights Dec. 12 to 29 read to top of ice, thickness of ice ranging from 4 to 7 inches. Ice went out at 4 p. m. Dec. 29.

Daily discharge, in second-feet, of Cheat River near Morgantown, W. Va., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	250	2,220	11,500	838	2,050	2,880	1,140	512	357	395	415	1,890
2	350	1,690	10,400	838	1,580	6,410	915	506	395	344	380	1,140
3	26,700	2,000	8,050	838	1,410	6,870	860	420	436	306	352	993
4	18,800	2,380	6,070	827	1,280	6,380	2,350	390	1,380	294	339	928
5	9,650	2,550	4,820	1,040	967	4,890	3,820	380	816	283	385	805
6	9,100	2,220	4,050	1,060	967	11,100	3,720	344	827	276	375	601
7	16,300	1,340	3,850	1,020	893	8,950	2,320	442	1,430	258	352	.....
8	11,400	1,200	3,650	967	928	5,890	2,660	415	904	248	334	.....
9	7,400	1,200	2,580	967	1,100	4,320	2,550	362	650	272	318	.....
10	4,460	1,600	2,130	849	1,180	4,890	1,820	344	577	230	314	.....
11	2,710	1,400	1,670	796	1,380	6,720	1,620	334	486	220	294	.....
12	2,450	1,200	1,480	720	3,720	7,400	1,360	326	469	298	302	.....
13	2,200	1,000	1,430	684	6,720	7,630	1,320	322	425	330	310	.....
14	8,090	1,000	1,290	659	4,360	6,190	2,550	298	486	298	310	.....
15	6,870	1,200	1,090	860	2,880	5,000	2,350	280	493	276	310	.....
16	5,960	1,980	1,090	796	2,300	5,370	1,750	298	500	255	302	.....
17	3,000	13,400	980	838	1,820	21,700	1,360	302	493	234	294	.....
18	12,700	13,500	1,090	1,020	1,600	12,000	1,140	294	447	224	286	.....
19	19,800	9,490	993	1,470	1,480	33,700	1,430	286	375	224	286	.....
20	9,880	6,410	928	1,670	1,280	17,100	1,120	280	339	211	272	.....
21	8,480	6,300	915	2,220	1,280	9,100	904	276	314	214	266	.....
22	10,600	14,500	1,170	3,590	1,250	8,280	776	244	302	217	269	.....
23	7,630	12,800	1,230	3,850	1,130	5,410	684	234	302	227	286	.....
24	4,640	7,550	1,120	4,460	1,100	3,650	569	302	298	227	302	.....
25	3,620	4,960	1,090	5,810	1,480	2,860	538	280	290	238	339	.....
26	2,630	3,430	1,120	5,740	3,120	2,300	500	269	269	390	650	.....
27	4,570	3,210	1,140	5,260	2,420	1,620	469	276	248	344	1,170	.....
28	6,340	6,300	1,010	4,710	1,820	1,480	442	269	244	330	980	.....
29	4,640	.....	954	3,120	1,450	1,500	469	248	436	334	4,750	.....
30	2,380	.....	915	2,610	1,250	1,500	474	234	405	410	3,520	15,800
31	2,530	.....	882	.....	1,220	.....	561	230	.....	464	.....	10,700

NOTE.—Daily discharge determined by means of a discharge rating curve that is well defined between 115 and 12,300 second-feet (gage heights 1.5 and 6.5 feet). Daily discharge Jan. 1 and 2, Feb. 8 to 15, and Dec. 7 to 29, estimated, because of ice, from climatologic records, discharge of adjacent drainage areas, and gage observer's notes. Mean discharge Dec. 7 to 29 estimated about 628 second-feet, varying from about 250 to 3,000 second-feet.

Monthly discharge of Cheat River near Morgantown, W. Va., for 1910.

[Drainage area, 1,380 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	26,700	[a]250	7,620	5.52	6.36	B.
February	14,500	[a]1,000	4,570	3.31	3.45	C.
March	11,500	882	2,600	1.88	2.17	A.
April	5,810	659	2,000	1.45	1.62	A.
May	6,720	893	1,820	1.32	1.52	A.
June	33,700	1,480	7,440	5.39	6.01	A.
July	3,820	442	1,440	1.04	1.20	A.
August	512	230	322	.233	.27	B.
September	1,430	244	513	.372	.42	A.
October	464	211	286	.207	.24	B.
November	4,750	266	635	.460	.51	B.
December	15,800	.....	1,530	1.11	1.28	D.
The year	33,700	.....	2,550	1.85	25.05	

[a] January and February minimum discharge estimated.

NOTE.—See footnotes to table of daily discharge for notes relative to periods during which discharge was estimated.

YOUGHIOGHENY RIVER AT CONFLUENCE, PA.

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

The gaging station, which is located at a highway bridge about half a mile from the railroad station at Confluence, Pa., was established by the United States Geological Survey September 15, 1904. It is now maintained by the Water Supply Commission of Pennsylvania, by which records of gage height and discharge measurements are furnished.

No important tributaries enter above the station. Casselman River, draining an area approximately equal in size to that drained by the Youghiogheny, enters from the right about half a mile below the station, and a short distance farther downstream Laurel Hill Creek enters, also from the right. The drainage area of this creek is about one-fourth that of 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. From general conditions backwater is believed to occur occasionally at the Youghiogheny station, particularly at very high stages, although much less than at the Casselman and Laurel Hill stations. The relation of gage height to discharge is occasionally affected by ice.

The datum of the chain gage attached to the bridge has remained constant since the establishment of the station.

No discharge measurements were made at this station during 1910. The station was last inspected June 12, 1909, by F. W. Scheidenhelm. The accuracy of published estimates of daily and monthly discharge depends upon the permanency of the conditions of flow since that date.

Daily gage height, in feet, of Youghiogheny River at Confluence, Pa., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.25	2.95	7.05	1.95	2.7	3.0	2.25	1.6	1.6	1.35	1.4	1.8
2	3.35	2.85	6.4	1.95	2.55	3.9	2.25	1.6	1.7	1.35	1.45	1.8
3	10.8	2.9	5.4	1.9	2.45	3.9	2.2	1.55	1.7	1.35	1.45	1.8
4	7.35	2.85	4.85	1.9	2.35	3.6	2.15	1.55	2.15	1.3	1.45	1.8
5	4.65	2.55	4.55	1.95	2.3	3.85	2.1	1.5	2.15	1.3	1.45	1.8
6	4.85	2.2	4.4	1.95	2.3	4.6	2.1	1.5	1.8	1.3	1.4	1.9
7	5.3	2.0	3.9	1.9	2.25	3.95	2.05	1.5	1.75	1.3	1.4	1.9
8	4.95	2.0	3.5	1.9	2.2	3.35	2.0	1.5	1.7	1.35	1.4	1.9
9	3.9	2.5	3.2	1.9	2.3	3.25	2.1	1.5	1.65	1.35	1.4	1.9
10	3.35	3.6	2.9	1.9	2.3	3.95	2.15	1.5	1.6	1.35	1.4	2.1
11	3.0	3.35	2.75	1.9	2.35	4.3	2.1	1.5	1.6	1.35	1.4	2.15
12	2.95	3.15	2.65	1.9	3.05	4.1	2.05	1.5	1.6	1.35	1.4	2.2
13	2.85	3.0	2.55	1.9	2.9	3.8	2.2	1.5	1.6	1.3	1.4	2.4
14	2.8	2.85	2.5	1.85	2.95	3.6	2.2	1.5	1.6	1.3	1.4	2.4
15	2.8	2.75	2.45	1.85	2.75	3.45	2.1	1.5	1.6	1.3	1.4	2.5
16	2.8	4.85	2.4	1.85	2.55	3.4	2.0	1.5	1.55	1.3	1.4	2.6
17	2.8	5.8	2.35	1.85	2.4	4.1	1.9	1.5	1.55	1.3	1.4	2.6
18	10.7	5.2	2.3	1.8	2.3	3.95	1.85	1.45	1.55	1.3	1.4	2.6
19	7.9	4.0	2.3	1.8	2.4	12.2	1.8	1.45	1.55	1.3	1.5	2.6
20	5.15	3.45	2.5	1.8	2.4	6.7	1.75	1.45	1.5	1.3	1.5	2.6
21	6.8	3.9	2.4	1.85	2.35	4.3	1.7	1.45	1.5	1.3	1.5	2.6
22	5.35	7.25	2.3	3.1	2.3	3.9	1.65	1.45	1.5	1.3	1.5	2.6
23	4.15	5.6	2.2	3.25	2.25	3.55	1.65	1.45	1.45	1.4	1.5	2.6
24	3.65	4.45	2.15	3.05	2.3	3.3	1.6	1.45	1.45	1.4	1.5	2.7
25	3.35	3.7	2.15	5.55	2.85	3.2	1.6	1.45	1.45	1.4	1.6	2.7
26	3.25	3.6	2.1	4.45	2.9	3.0	1.6	1.45	1.45	1.4	1.6	2.7
27	4.35	3.7	2.1	3.75	2.7	2.8	1.55	1.4	1.4	1.4	1.6	2.7
28	3.9	6.2	2.0	3.6	2.6	2.7	1.5	1.4	1.4	1.4	1.75	2.7
29	3.5	.....	2.0	3.4	2.55	2.5	1.5	1.4	1.4	1.4	1.8	2.9
30	3.3	.....	1.95	3.1	2.5	2.35	1.75	1.4	1.35	1.4	1.8	6.8
31	3.05	.....	1.95	.....	2.5	.....	1.65	1.4	.....	1.4	.....	5.85

NOTE.—Relation of gage height to discharge probably affected by ice about Feb. 8 to 15 and Dec. 6 to 29.

Daily discharge, in second-feet, of Youghiogheny River at Confluence, Pa., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	432	935	6,000	244	746	974	432	93	93	40	47	168
2	1,270	858	5,090	244	638	1,800	432	93	127	40	57	168
3	11,200	896	3,690	217	568	1,800	399	80	127	40	57	168
4	6,420	858	2,930	217	499	1,500	366	80	366	33	57	168
5	2,660	638	2,530	244	465	1,750	334	67	366	33	57	168
6	2,930	399	2,350	244	465	2,600	334	67	168	33	47	.....
7	3,550	271	1,800	217	432	1,850	302	67	148	33	47	.....
8	3,060	200	1,410	217	399	1,270	271	67	127	40	47	.....
9	1,800	350	1,140	217	465	1,180	334	67	110	40	47	.....
10	1,270	900	896	217	465	1,850	366	67	93	40	47	.....
11	974	800	783	217	499	2,240	334	67	93	40	47	.....
12	935	700	710	217	1,010	2,020	302	67	93	40	47	.....
13	858	600	638	217	896	1,700	399	67	93	33	47	.....
14	820	500	603	192	935	1,500	399	67	93	33	47	.....
15	820	700	568	192	783	1,360	334	67	93	33	47	.....
16	820	2,930	533	192	638	1,320	271	67	80	33	47	.....
17	820	4,250	499	192	533	2,020	217	67	80	33	47	.....
18	11,100	3,410	465	168	465	1,850	192	57	80	33	47	.....
19	7,190	1,910	465	168	533	13,200	168	57	80	33	67	.....
20	3,340	1,360	603	168	533	5,510	148	57	67	33	67	.....
21	5,650	1,800	533	192	499	2,240	127	57	67	33	67	.....
22	3,620	6,280	465	1,060	465	1,800	110	57	67	33	67	.....
23	2,070	3,970	399	1,180	432	1,450	110	57	57	47	67	.....
24	1,550	2,410	366	1,010	465	1,230	93	57	57	47	67	.....
25	1,270	1,600	366	3,900	858	1,140	93	57	57	47	93	.....
26	1,180	1,500	334	2,410	896	974	93	57	57	47	93	.....
27	2,290	1,600	334	1,650	746	820	80	47	47	47	93	.....
28	1,800	4,810	271	1,500	674	746	67	47	47	47	148	.....
29	1,410	.....	271	1,320	638	603	67	47	47	47	168	700
30	1,230	.....	244	1,060	603	499	148	47	40	47	168	5,650
31	1,010	.....	244	.....	603	.....	110	47	.....	47	.....	4,320

NOTE.—Daily discharge determined by means of a discharge rating curve that is well defined between 750 and 3,800 second-feet (gage heights about 2.7 and 5.5 feet) and fairly well defined throughout the remaining portions of the range of stage covered by the 1910 gage heights. Daily discharge Feb. 8 to 15 and Dec. 6 to 29 estimated; because of ice, from climatologic records and run-off in adjacent drainage areas. Mean discharge Dec. 6 to 28 estimated 150 second-feet.

Monthly discharge of Youghiogheny River at Confluence, Pa., for 1910.

[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.		
January	11,200	432	2,750	6.32	7.29	B.
February	6,280	[a] 200	1,690	3.89	4.05	C.
March	6,000	244	1,210	2.78	3.20	B.
April	3,900	168	649	1.49	1.66	B.
May	1,010	399	608	1.40	1.61	B.
June	13,200	499	2,030	4.67	5.21	B.
July	432	67	240	.552	.64	B.
August	93	47	63.4	.146	.17	C.
September	366	40	104	.239	.27	C.
October	47	33	38.9	.089	.10	C.
November	168	47	68.4	.157	.18	C.
December	5,650	.....	483	1.11	1.28	D.
The year	13,200	.....	822	1.89	25.66	

[a] February minimum discharge estimated.

NOTE.—See footnotes to table of daily discharge for periods of estimated discharge.

CASSELMAN RIVER AT CONFLUENCE, PA.

This station, which is located at Confluence, Pa., at a highway bridge about 500 yards from the railroad station, was established by the United States Geological Survey September 15, 1904. It is now maintained by the Water Supply Commission of Pennsylvania, by which the records of gage height and discharge measurements are furnished.

No important tributary enters near the station, but it is located only a few hundred yards above the junction of Casselman and Youghiogheny rivers, and as a result backwater usually occurs at high stages. The relation of gage height to discharge is more or less affected by ice during the winter periods.

No discharge measurements were made at this station during 1910. The station was last inspected June 12, 1909, by F. W. Scheidenhelm. Estimates of daily and monthly discharge for 1910 are withheld for the present.

Daily gage height, in feet, of Casselman River at Confluence, Pa., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.30	2.75	6.95	2.05	2.75	2.70	2.20	1.56	1.71	1.36	1.46	1.66
2	3.20	2.75	6.25	2.05	2.65	3.30	2.20	1.56	1.76	1.36	1.46	1.66
3	10.15	2.80	5.25	1.95	2.50	3.15	2.15	1.51	1.76	1.36	1.46	1.66
4	6.05	2.75	4.80	2.00	2.45	3.00	2.15	1.51	2.01	1.31	1.41	1.66
5	3.70	2.45	4.55	2.05	2.40	3.15	2.20	1.46	2.01	1.31	1.41	1.66
6	4.50	2.20	4.45	2.00	2.30	4.05	2.10	1.46	1.86	1.31	1.41	1.86
7	4.60	2.10	4.00	2.00	2.30	3.35	2.05	1.46	1.76	1.31	1.41	1.86
8	3.80	1.95	3.60	1.95	2.20	2.95	2.00	1.46	1.66	1.46	1.41	1.86
9	3.20	2.55	3.40	2.00	2.40	2.90	2.05	1.46	1.61	1.46	1.41	1.86
10	2.75	2.85	3.10	1.95	2.35	3.70	2.10	1.46	1.56	1.41	1.41	.....
11	2.55	2.65	2.90	1.95	2.40	3.85	2.05	1.46	1.56	1.41	1.41	.....
12	2.70	2.55	2.85	1.92	2.95	3.65	2.00	1.46	1.56	1.41	1.41	.....
13	2.45	2.40	2.70	1.92	2.80	3.30	1.95	1.46	1.56	1.41	1.41	.....
14	2.40	2.40	2.70	1.87	2.95	3.10	2.15	1.46	1.56	1.36	1.41	.....
15	2.35	2.35	2.55	1.87	2.70	2.85	2.10	1.56	1.56	1.36	1.41	.....
16	2.35	4.45	2.50	1.87	2.55	2.75	1.96	1.56	1.51	1.36	1.41	.....
17	2.40	5.15	2.50	1.87	2.45	3.35	1.86	1.51	1.51	1.36	1.41	.....
18	9.85	4.40	2.35	1.82	2.30	3.00	1.81	1.51	1.51	1.36	1.41	.....
19	7.00	3.45	2.35	1.82	2.40	12.60	1.76	1.66	1.51	1.36	1.51	.....
20	4.15	3.00	2.55	1.82	2.30	6.35	1.71	1.61	1.46	1.36	1.51	.....
21	6.85	3.35	2.50	1.87	2.30	4.15	1.61	1.61	1.46	1.36	1.51	.....
22	5.10	6.80	2.50	3.10	2.30	3.75	1.56	1.61	1.46	1.36	1.51	.....
23	3.70	4.65	2.45	3.10	2.20	3.15	1.56	1.56	1.41	1.46	1.51	1.86
24	3.30	3.55	2.45	2.90	2.35	2.90	1.56	1.56	1.41	1.46	1.51	1.86
25	3.05	3.15	2.35	6.05	2.05	2.85	1.56	1.56	1.41	1.46	1.66	1.96
26	2.95	3.15	2.35	4.45	2.80	2.75	1.56	1.51	1.41	1.46	1.66	1.96
27	4.00	3.60	2.35	3.70	2.65	2.70	1.56	1.51	1.41	1.46	1.66	2.00
28	3.25	6.35	2.25	3.55	2.55	2.60	1.56	1.46	1.41	1.46	1.66	1.95
29	3.05	.....	2.25	3.45	2.55	2.45	1.51	1.46	1.41	1.46	1.66	2.35
30	2.90	.....	2.15	3.10	2.45	2.25	1.66	1.46	1.36	1.46	1.66	5.55
31	2.85	.....	2.15	.....	2.50	.....	1.56	1.46	.....	1.46	.....	3.45

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 1 and 2, Feb. 6 to 20, and Dec. 6 to 29.

LAUREL HILL CREEK AT CONFLUENCE, PA.

This station, which is located at Confluence, Pa., at a highway bridge about one-fourth mile from the railroad station, was established by the United States Geological Survey September 15, 1904. It is now maintained by the Water Supply Commission of Pennsylvania, by which the records of gage height and discharge measurements are furnished.

No important tributary enters near the station. It is located, however, only a few hundred yards above the junction of the creek with Youghiogheny River, and as a result backwater almost invariably occurs at high stages. The effect of backwater at medium and low stages is not definitely known as it varies with each flood. At low stages 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. The relation of gage height to discharge is affected by ice during the winter periods.

The datum of the chain gage attached to the bridge has remained constant during the period of maintenance of the station.

No discharge measurements were made at this station during 1910. The station was last inspected June 12, 1909, by F. W. Scheidenhelm. Estimates of daily and monthly discharge for 1910 are withheld for the present.

Daily gage height, in feet, of Laurel Hill Creek at Confluence, Pa., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.40	2.50	5.46	2.11	2.51	2.96	2.21	1.56	1.76	1.41	1.51	1.66
2	4.15	2.45	4.86	2.06	2.46	3.56	2.16	1.56	1.76	1.41	1.51	1.66
2	8.00	2.65	4.41	2.01	2.41	3.26	2.11	1.51	1.76	1.41	1.51	1.66
4	4.30	2.55	4.11	1.96	2.36	2.96	2.06	1.51	2.06	1.41	1.46	1.66
5	3.35	2.45	4.11	2.11	2.31	3.21	2.01	1.51	2.06	1.41	1.46	1.66
6	4.30	2.35	4.16	2.06	2.31	3.61	2.01	1.46	1.91	1.41	1.41	1.76
7	4.40	2.30	3.66	2.01	2.26	3.16	1.96	1.46	1.86	1.41	1.41	1.76
8	3.50	2.30	3.41	1.96	2.26	2.91	1.96	1.46	1.81	1.51	1.41	1.76
9	3.15	2.45	3.16	2.01	2.41	2.91	2.06	1.46	1.76	1.51	1.41	1.76
10	2.85	3.00	2.91	2.01	2.51	3.46	2.06	1.46	1.71	1.46	1.41	.....
11	2.65	2.80	2.76	2.01	3.06	3.66	2.01	1.46	1.66	1.46	1.41	.....
12	2.55	2.60	2.71	1.96	3.06	3.26	1.96	1.46	1.66	1.46	1.41	.....
13	2.45	2.50	2.71	1.96	2.96	2.96	1.96	1.46	1.61	1.46	1.41	.....
14	2.40	2.45	2.66	1.91	3.06	2.76	1.96	1.46	1.61	1.46	1.41	.....
15	2.35	2.45	2.61	1.91	2.86	2.61	1.91	1.51	1.61	1.41	1.41	.....
16	2.35	3.80	2.56	1.91	2.71	2.46	1.91	1.51	1.56	1.41	1.41	.....
17	2.30	3.80	2.46	1.91	2.56	2.66	2.31	1.46	1.56	1.41	1.41	.....
18	8.05	3.40	2.36	1.86	2.46	2.46	2.16	1.46	1.56	1.41	1.41	.....
19	5.21	3.15	2.31	1.86	2.56	9.81	2.06	1.61	1.56	1.41	1.56	.....
20	3.55	2.90	2.61	1.86	2.56	3.96	1.96	1.56	1.51	1.41	1.56	.....
21	4.70	3.20	2.51	1.96	2.51	3.16	1.91	1.56	1.51	1.41	1.56	.....
22	3.85	4.55	2.46	2.66	2.46	2.86	1.86	1.56	1.51	1.41	1.56	.....
23	3.35	3.45	2.41	2.96	2.46	2.66	1.86	1.56	1.51	1.51	1.56	1.86
24	3.00	3.16	2.41	2.86	2.46	2.51	1.81	1.51	1.51	1.51	1.56	1.86
25	2.85	2.91	2.36	4.06	2.46	2.36	1.76	1.51	1.46	1.51	1.66	1.86
26	2.75	2.86	2.36	3.51	2.41	2.36	1.66	1.51	1.46	1.51	1.66	1.86
27	3.05	3.06	2.41	3.11	2.31	2.31	1.61	1.51	1.46	1.51	1.66	1.86
28	2.80	4.56	2.36	2.96	2.31	2.51	1.56	1.46	1.46	1.51	1.66	1.86
29	2.70	.....	2.26	2.76	2.31	2.36	1.56	1.46	1.46	1.51	1.66	1.96
30	2.60	.....	2.21	2.66	2.31	2.26	1.66	1.46	1.41	1.51	1.66	4.36
31	2.50	.....	2.16	.....	2.56	.....	1.56	1.46	.....	1.51	.....	3.36

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 1 and 2, Feb. 6 to 20, and Dec. 6 to 29. River reported "frozen" Dec. 10 to 22.

MUSKINGUM RIVER BASIN.

GENERAL FEATURES.

The drainage basin of Muskingum River lies in the eastern part of the State of Ohio.

The river is formed by the junction of Mohican and Tuscarawas rivers at Coshocton, near the central part of Coshocton County, from which it flows in a slightly southwesterly direction to Zanesville, thence southeastward to its junction with 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. The length of the river below the junction of the Mohican and Tuscarawas is about 100 miles (map measurement), and its drainage area comprises about 8,000 square miles.

Tuscarawas River rises in the northwestern part of Ashland County, flows in a general southerly direction to the northeastern part of Tuscarawas County and thence 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.

Muskingum River has only two important tributaries—Licking River from the west near Zanesville and Wills Creek from the east near the southern line of Coshocton County.

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 it is 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 swampy areas still exist. Springs are common in the glaciated region.

The elevation of the sources of 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 winters in the northern part are comparatively severe. Ice forms about 1 foot thick on the streams. In the lower part of the basin the winters are milder, but ice generally forms on the river.

The basin affords sites 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 reservoir construction.

Both the main stream and tributaries present favorable sites for the development of water power.

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. 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.

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 to obtain data for the study of water power, water supply, pollution, and navigation problems.

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

The winters are comparatively severe and ice generally causes some trouble. The operation of several power plants located above the station may modify the low-season flow 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. Estimates of flow are being withheld at present for further studies.

Daily gage height, in feet, of Muskingum River at Zanesville, Ohio, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.0	11.3	31.6	8.8	9.9	9.0	8.3	8.0	7.7	8.0	7.8	8.0
2	8.3	11.0	31.4	8.7	9.4	9.0	8.2	7.9	7.7	7.9	7.8	8.1
3	9.2	10.7	32.5	8.7	9.4	9.2	8.1	7.8	7.7	7.9	7.8	8.1
4	9.8	12.1	30.3	8.7	10.2	9.5	8.0	7.8	7.7	7.9	7.7	8.0
5	9.7	12.5	27.0	8.6	11.5	9.7	8.0	7.8	7.8	7.8	7.7	8.0
6	10.8	12.1	23.5	8.9	11.3	9.5	8.0	7.8	7.8	7.9	7.7	8.0
7	10.3	10.8	21.2	9.5	10.9	9.2	8.3	7.8	7.8	9.5	7.7	7.9
8	10.2	10.2	18.5	9.4	10.4	9.0	8.0	7.7	7.8	11.8	7.7	7.9
9	10.2	10.2	16.1	9.0	10.0	8.9	8.0	7.7	7.7	10.8	7.7	7.7
10	10.1	10.0	14.2	8.9	9.7	8.9	8.6	7.7	7.9	10.1	7.6	7.7
11	9.8	9.5	13.0	8.7	9.4	10.0	8.3	7.8	7.8	9.8	7.6	7.7
12	9.5	9.4	12.0	8.6	9.7	13.3	8.1	7.7	7.8	9.4	7.6	7.7
13	9.2	10.5	11.4	8.5	9.8	13.4	8.2	7.7	7.8	9.0	7.6	7.7
14	15.9	10.1	10.9	8.4	9.9	11.9	8.2	7.7	7.8	8.5	7.6	7.6
15	19.9	10.0	10.6	8.4	9.4	10.8	8.7	7.7	7.8	8.4	7.8	7.6
16	19.1	10.2	10.2	8.4	9.0	10.0	8.6	7.7	7.8	8.3	7.8	7.6
17	18.4	17.7	10.0	8.4	8.9	9.5	8.3	7.5	7.7	8.2	7.8	7.6
18	17.3	14.7	9.9	8.7	8.4	9.2	8.2	7.6	7.7	8.2	7.7	7.6
19	28.8	14.0	9.8	9.0	9.2	9.0	8.7	7.7	7.7	8.1	7.7	7.6
20	25.8	13.2	9.6	9.3	9.2	8.9	8.4	7.7	7.7	8.1	7.7	7.6
21	24.2	13.1	9.5	10.2	9.4	8.7	8.2	7.8	7.7	8.0	7.7	7.6
22	25.3	13.8	9.7	11.3	10.3	8.6	8.1	7.8	7.6	8.1	7.7	7.6
23	22.8	14.0	9.6	11.3	10.2	8.5	8.0	7.8	7.7	8.2	7.7	7.6
24	19.5	13.3	9.5	10.8	10.3	8.4	7.9	7.7	7.6	8.2	7.7	7.6
25	17.0	12.7	9.4	10.3	10.5	8.3	7.9	7.7	7.7	8.2	7.7	7.6
26	15.3	12.0	9.3	9.9	10.7	8.2	7.8	7.7	7.7	8.2	7.7	8.0
27	14.7	13.7	9.1	10.0	10.6	8.2	7.8	7.7	8.1	8.1	7.7	8.0
28	15.5	27.2	9.0	10.5	10.0	8.2	7.9	7.7	8.4	8.0	7.7	8.1
29	15.2	.....	8.9	10.5	9.5	8.2	7.8	7.7	8.2	7.9	8.0	11.0
30	14.5	.....	8.9	10.0	9.2	8.2	7.8	7.7	8.1	7.9	8.0	13.3
31	13.0	.....	8.8	.....	9.0	.....	8.0	7.7	.....	7.9	.....	14.4

MOHICAN RIVER AT POMERENE, OHIO.

This station which is located at the highway bridge just above the Pennsylvania Railroad bridge at Pomerene, Ohio, about 4 miles from Walhonding, was established December 1, 1910, in cooperation with the Ohio State Experiment Station.

Owl Creek enters 5 miles above the station. A feeder for the Ohio Canal formerly took water from Mohican River near Cavallo, some distance above Pomerene. This feeder has not been used for some time.

Discharge measurements are made from the upstream side of the highway bridge. A standard chain gage is attached to the bridge. The relation of gage height to discharge may be affected by ice during January, February, and December. Sufficient data have not been obtained to permit estimates of flow to be made.

The following discharge measurement was made by C. T. Bailey:

December 1, 1910: Width, 335 feet; area, 1,210 square feet; gage height, 3.76 feet; discharge, 697 second-feet.

Daily gage height, in feet, of Mohican River at Pomerene, Ohio, for 1910.

[F. L. Rodehaver, observer.]

Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.
1	3.77	7	3.34	12	3.32	17	3.24	22	3.20	27	3.30
2	3.55	8	3.34	13	3.32	18	3.24	23	3.20	28	4.00
3	3.48	9	3.33	14	3.32	19	3.24	24	3.31	29	7.10
4	3.42	10	3.33	15	3.25	20	3.24	25	3.30	30	6.90
5	3.37	11	3.32	16	3.24	21	3.24	26	3.30	31	6.25
6	3.36										

NOTE.—Relation of gage height to discharge affected by ice during December.

KANAWHA RIVER BASIN.

GENERAL FEATURES.

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. The lower part of the river, below the mouth of the Gauley, is called the Kanawha; above this point it is called the New.

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 as determined and adjusted from topographic maps 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 New lie in the Appalachian Mountains among the high ridges that separate this basin from the basins of Peedee 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 & Ohio Railway, 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.

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:

Slope of Kanawha 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 readily accessible material for their construction. Reservoirs would be of use for flood control, as an aid to navigation, and for waterpower 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 10 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 1 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 water of the tributaries is clear, and some of the larger streams afford excellent trout and bass fishing. The water of the main stream is rarely, if ever, clear, being of a reddish-brown color due to the hydraulic mining of iron ore carried on in Virginia.

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

This station, which is located about 1½ miles above the confluence of the North and South forks of New River, about 4 miles from Crumpler, N. C., was established August 12, 1908.

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

Discharge measurements are made by means of a boat or by wading.

The chain gage is attached to a tree on the left bank about one-half mile above the measuring section. The datum of the gage has remained unchanged; the records are reliable and accurate. The relation of gage height to discharge may be affected by ice for short periods in winter.

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

The following discharge measurement was made by C. T. Bailey:

November 1, 1910: Width, 173 feet; area, 393 feet square; gage height, 1.33 feet; discharge, 420 second-feet.

Daily gage height, in feet, of South Fork of New River near Crumpler, N. C., for 1910.

[J. J. Garvey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.10	1.53	2.12	1.28	1.28	1.18	1.43	1.30	3.38	1.40	1.33	1.22
2	2.09	1.37	2.14	1.30	1.24	1.17	1.42	1.32	2.32	1.35	1.33	1.45
3	1.80	1.50	1.91	1.33	1.22	1.15	1.38	1.30	1.86	1.30	1.34	1.34
4	1.67	1.44	1.75	1.30	1.30	1.14	1.60	1.46	1.76	1.30	1.30	1.42
5	1.58	1.56	1.68	1.76	1.18	1.28	1.92	1.32	1.76	1.32	1.30	1.44
6	1.44	1.52	1.68	1.22	1.15	1.46	1.75	1.26	1.77	1.68	1.30	2.07
7	2.20	1.28	1.64	1.21	1.23	1.38	1.78	1.28	1.59	2.82	1.30	1.98
8	1.97	1.41	1.54	1.21	1.66	1.22	1.69	1.30	1.50	2.82	1.28	1.64
9	1.76	1.38	1.50	1.20	1.80	1.26	1.64	1.30	1.49	2.52	1.26	1.54
10	1.74	1.32	1.50	1.20	1.57	1.55	1.60	1.32	1.44	2.04	1.25	1.56
11	1.52	1.46	1.52	1.20	1.43	1.40	1.56	1.22	1.41	1.79	1.24	1.34
12	1.53	1.26	1.51	1.26	1.34	2.96	2.12	1.15	1.48	1.68	1.24	1.52
13	1.48	1.42	1.46	1.48	1.40	2.56	1.78	1.20	1.42	1.62	1.24	1.30
14	1.46	1.66	1.48	1.38	1.36	2.52	1.64	1.20	1.39	1.54	1.30	1.16
15	1.39	1.74	1.42	1.33	1.30	2.74	1.54	1.22	1.38	1.50	1.28	1.36
16	1.42	1.65	1.39	1.44	1.30	2.18	1.46	1.22	1.35	1.48	1.28	1.32
17	1.32	1.95	1.40	1.48	1.30	1.92	1.96	1.20	1.30	1.44	1.20	1.27
18	1.40	2.96	1.38	1.48	1.34	1.79	1.78	1.17	1.28	1.42	1.23	1.38
19	1.38	2.06	1.38	1.42	1.32	1.68	1.56	1.20	1.26	1.43	1.20	1.43
20	1.35	1.88	1.38	1.36	1.31	1.57	1.44	1.20	1.25	1.74	1.20	1.34
21	1.88	1.79	1.43	1.34	1.33	1.60	1.41	1.24	1.26	1.70	1.19	1.23
22	1.94	1.76	1.39	1.32	1.56	1.63	1.38	1.34	1.22	1.50	1.20	1.16
23	1.66	1.70	1.34	1.28	1.34	1.52	1.36	1.30	1.20	1.45	1.20	1.42
24	1.48	1.64	1.32	1.33	1.42	1.62	1.32	1.28	1.20	1.35	1.20	1.70
25	1.52	1.58	1.31	1.36	1.60	1.73	1.33	1.22	1.30	1.32	1.28	1.54
26	1.40	1.48	1.31	1.47	1.61	1.69	1.32	1.26	1.64	1.34	1.24	1.51
27	1.46	1.46	1.32	1.44	1.44	1.54	1.30	1.30	1.50	1.33	1.23	1.38
28	1.42	1.94	1.31	1.38	1.33	1.50	1.38	1.23	1.64	1.38	1.30	1.38
29	1.36	.....	1.30	1.34	1.30	1.56	1.46	1.18	1.42	1.40	1.28	1.44
30	1.36	.....	1.31	1.31	1.22	1.54	1.39	1.30	1.44	1.34	1.24	1.63
31	1.38	.....	1.28	.....	1.20	.....	1.32	2.10	.....	1.33	.....	1.60

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 1 to 11 and during December.

NEW RIVER NEAR GRAYSON, VA.

This station, which is located at the Norfolk & Western Railway bridge at Fries Junction, about 1 mile from Grayson, Va., was established August 7, 1908.

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

The datum of the chain gage attached to the railroad bridge has remained unchanged.

About 4 miles above the gaging section is a large cotton mill which is run by water power. The flow of the river during periods of low water is affected by the operation of this power plant. The relation of gage height is affected little if at all by ice.

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 New River near Grayson, Va., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 17	C. T. Bailey	629	1,180	3.96	1,480
Oct. 22	do	632	1,180	4.00	1,470

NOTE.—See table of miscellaneous discharge measurements on page 149 for results of discharge measurement made about 1 mile below this station.

Daily gage height, in feet, of New River near Grayson, Va., for 1910.

[Oscar Williams, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.98	3.80	4.92	3.80	3.90	3.80	4.10	3.85	5.79	3.88	3.81	3.72
2	4.08	3.82	5.05	3.79	3.86	3.77	4.00	3.80	5.16	3.81	3.80	3.70
3	4.54	3.99	4.85	3.84	3.85	3.78	4.02	3.96	4.87	3.77	3.82	3.69
4	4.46	4.16	4.60	3.88	3.84	3.73	3.62	3.92	4.63	3.75	3.80	3.72
5	4.20	4.02	4.46	3.84	3.84	3.82	4.30	4.08	4.50	3.72	3.78	3.86
6	4.08	3.88	4.40	3.79	3.81	4.11	4.62	3.95	4.29	3.82	3.78	4.20
7	4.55	3.89	4.40	3.79	3.76	4.14	4.52	3.85	4.12	4.44	3.76	4.50
8	4.85	3.86	4.22	3.73	4.00	3.88	4.54	3.93	4.05	5.32	3.75	4.48
9	4.40	3.99	4.17	3.72	4.40	3.86	4.98	3.92	4.01	5.31	3.75	4.26
10	4.10	3.96	4.14	3.66	4.34	3.96	4.42	3.83	3.99	4.65	3.74	4.12
11	3.99	4.04	4.13	3.68	4.12	4.82	4.26	3.78	3.99	4.27	3.74	4.00
12	3.92	3.80	4.14	3.70	4.08	6.08	4.40	3.76	3.92	4.11	3.70	3.90
13	4.10	3.80	4.11	4.01	4.08	6.50	4.75	3.80	3.92	4.01	3.70	3.73
14	4.10	3.91	4.01	4.05	4.04	6.09	4.50	3.87	3.89	3.97	3.72	3.63
15	4.04	4.02	3.98	3.93	3.94	5.93	4.22	3.80	3.87	3.93	3.76	3.65
16	3.98	4.34	3.92	3.88	3.90	5.46	4.15	3.75	3.82	3.89	3.78	3.79
17	3.92	4.80	3.91	3.98	3.88	5.04	4.36	3.87	3.79	3.87	3.78	3.70
18	3.98	6.06	3.90	4.11	3.90	4.70	4.40	3.70	3.75	3.85	3.71	3.81
19	3.95	5.33	3.89	4.08	3.95	4.52	4.26	3.72	3.73	3.86	3.72	3.92
20	3.98	4.67	3.90	3.96	3.92	4.42	4.14	3.76	3.72	3.97	3.71	3.89
21	4.10	4.58	3.98	3.93	3.90	4.62	4.01	3.78	3.73	4.12	3.70	3.72
22	4.82	4.54	3.92	3.90	3.90	4.68	3.98	3.88	3.75	4.02	3.70	3.35
23	4.36	4.45	3.91	3.89	4.14	4.54	3.94	3.88	3.70	3.88	3.68	3.80
24	4.25	4.32	3.85	3.88	4.14	4.22	3.90	3.80	3.69	3.85	3.69	4.00
25	4.18	4.26	3.86	3.98	4.28	4.61	3.86	3.76	3.71	3.81	3.72	4.22
26	4.06	4.18	3.85	4.04	4.45	4.46	3.86	3.75	3.75	3.80	3.72	4.08
27	3.97	4.12	3.84	4.12	4.20	4.32	3.84	3.76	3.87	3.80	3.71	4.06
28	4.00	4.30	3.86	4.11	4.06	4.20	3.84	3.74	3.99	3.86	3.75	4.04
29	3.99	.....	3.81	4.06	3.96	4.12	3.90	3.74	3.97	3.84	3.77	4.13
30	4.00	.....	3.81	3.94	3.90	4.12	3.96	3.75	3.93	3.83	3.92	4.25
31	3.97	.....	3.79	.....	3.85	.....	3.88	4.23	.....	3.82	.....	4.36

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 1 to 4, and during December.

NEW RIVER AT RADFORD, VA.

This station, which is located at the toll highway bridge about 1½ miles below the Norfolk & Western Railway bridge near the Norfolk & Western Railway station at Radford, Va., was established August 1, 1898, discontinued July 15, 1906, and reestablished May 6, 1907.

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. Many 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. 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 the 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 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 15	C. T. Bailey	540	1,780	3.85	2,730
Oct. 20	.....do	539	1,660	3.62	2,120

Daily gage height, in feet, of New River at Radford, Va., for 1910.

[Wm. T. Linkous, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.4	3.8	4.1	3.6	3.8	3.4	4.0	3.4	5.2	3.5	3.45	3.4
2	3.4	3.9	4.1	3.7	3.7	3.4	4.0	3.35	5.25	3.5	3.5	3.25
3	3.9	3.7	4.9	3.6	3.7	3.5	3.9	3.4	4.25	3.4	3.5	3.15
4	4.8	3.7	5.8	3.95	3.65	3.4	4.15	3.5	4.3	3.4	3.4	3.2
5	4.1	3.8	5.2	3.85	3.6	3.45	4.15	3.7	4.3	3.55	3.4	3.4
6	4.2	3.8	4.5	3.8	3.55	3.6	3.95	3.6	4.2	3.4	3.5	3.6
7	4.2	3.6	4.5	3.6	3.5	4.0	4.35	3.7	4.1	3.55	3.4	4.6
8	4.4	3.8	4.4	3.5	3.55	3.8	4.55	3.6	4.1	4.9	3.45	4.3
9	4.4	3.8	4.3	3.5	3.75	3.8	4.5	3.6	3.8	6.05	3.4	3.8
10	3.6	3.9	4.2	3.4	4.25	3.95	4.6	3.5	3.75	5.0	3.4	3.75
11	3.4	3.9	4.1	3.45	3.95	5.05	4.25	3.6	3.65	4.2	3.4	3.65
12	3.7	3.9	4.1	3.45	3.9	7.9	4.0	3.45	3.5	3.9	3.4	3.35
13	3.8	3.1	3.8	4.05	3.8	9.1	4.55	3.4	3.5	2.9	3.3	3.3
14	3.9	3.2	3.8	4.2	3.75	9.7	4.85	3.4	3.5	2.95	3.35	3.15
15	3.9	3.5	3.7	4.05	3.7	7.05	4.5	3.5	3.55	3.0	3.3	2.95
16	3.7	4.7	3.8	3.85	3.6	6.55	4.05	3.4	3.55	2.9	3.35	3.3
17	3.6	4.8	3.75	3.9	3.7	5.85	4.3	3.5	3.3	2.9	3.45	3.45
18	3.6	8.4	3.8	4.7	3.7	5.1	4.95	3.4	3.3	3.4	3.5	3.45
19	3.7	7.2	3.75	4.15	3.8	4.95	4.55	3.5	3.3	3.5	3.4	3.5
20	3.8	5.1	3.75	3.95	3.8	4.75	4.0	3.4	3.4	3.6	3.4	3.5
21	4.1	5.4	3.8	3.85	3.6	4.5	4.0	3.5	3.4	3.5	3.4	3.35
22	4.2	4.8	3.8	3.85	3.7	4.55	3.75	3.5	3.25	3.65	3.35	3.3
23	4.6	4.6	3.8	3.75	3.9	4.55	3.75	3.6	3.3	3.6	3.4	3.2
24	4.4	4.5	3.75	3.7	4.2	4.45	3.7	3.5	3.2	3.5	3.25	3.2
25	4.2	4.3	3.7	3.75	4.3	5.05	3.6	3.55	3.2	3.45	3.2	3.3
26	4.1	4.1	3.7	3.9	4.5	4.75	3.55	3.5	3.3	3.4	3.3	3.5
27	3.9	4.1	3.7	4.2	4.45	4.1	3.5	3.7	3.5	3.45	3.3	3.7
28	3.8	4.1	3.6	4.0	4.15	4.1	3.5	3.6	3.5	3.5	3.45	3.7
29	3.4	.....	3.6	3.95	3.8	4.05	3.4	3.6	3.6	3.4	3.5	3.8
30	3.8	.....	3.6	3.8	3.75	3.85	3.4	3.5	3.55	3.4	3.45	3.85
31	3.9	.....	3.55	.....	3.5	.....	3.2	3.3	.....	3.4	.....	4.0

NOTE.—Ice reported along banks Jan. 1; relation of gage height to discharge probably not affected by ice.

Daily discharge, in second-feet, of New River at Radford, Va., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,580	2,630	3,560	2,080	2,630	1,580	3,240	1,580	7,560	1,820	1,700	1,580
2	1,580	2,930	3,560	2,350	2,350	1,580	3,240	1,470	7,760	1,820	1,820	1,260
3	2,930	2,350	6,400	2,080	2,350	1,820	2,930	1,580	4,060	1,580	1,820	1,060
4	6,020	2,350	9,970	3,080	2,220	1,580	3,720	1,820	4,230	1,580	1,580	1,150
5	3,560	2,630	7,560	2,780	2,080	1,700	3,720	2,350	4,230	1,950	1,580	1,580
6	3,890	2,630	4,930	2,630	1,950	2,080	3,080	2,080	3,890	1,580	1,820	2,080
7	3,890	2,080	4,930	2,080	1,820	3,240	4,400	2,350	3,560	1,950	1,580	5,290
8	4,580	2,630	4,580	1,820	1,950	2,630	5,110	2,080	3,560	6,400	1,700	4,230
9	4,580	2,630	4,230	1,820	2,490	2,630	4,930	2,080	2,630	11,000	1,580	2,780
10	2,080	2,930	3,890	1,580	4,060	3,080	5,290	1,820	2,490	6,780	1,580	2,350
11	1,580	2,930	3,560	1,700	3,080	6,980	4,060	2,080	2,220	3,890	1,580	2,220
12	2,350	2,930	3,560	1,700	2,930	19,200	3,240	1,700	1,820	2,930	1,580	1,470
13	2,630	960	2,630	3,400	2,630	24,900	5,110	1,580	1,820	620	1,360	1,360
14	2,930	1,150	2,630	3,890	2,490	27,800	6,210	1,580	1,820	700	1,470	1,060
15	2,930	1,820	2,350	3,400	2,350	15,300	4,930	1,820	1,950	780	1,360	700
16	2,350	5,650	2,630	2,780	2,080	13,100	3,400	1,580	1,950	620	1,470	1,360
17	2,080	6,020	2,490	2,930	2,350	10,200	4,230	1,820	1,360	620	1,700	1,700
18	2,080	21,500	2,630	5,650	2,350	7,170	6,590	1,580	1,360	1,580	1,820	1,700
19	2,350	16,000	2,490	3,720	2,630	6,590	5,110	1,820	1,360	1,820	1,580	1,820
20	2,630	7,170	2,490	3,080	2,630	5,840	3,240	1,580	1,580	2,080	1,580	1,820
21	3,560	8,350	2,630	2,780	2,080	4,930	3,240	1,820	1,580	1,820	1,580	1,470
22	3,890	6,020	2,630	2,780	2,350	5,110	2,490	1,820	1,260	2,220	1,470	1,360
23	5,290	5,290	2,630	2,490	2,930	5,110	2,490	2,080	1,360	2,080	1,580	1,150
24	4,580	4,930	2,490	2,350	3,890	4,760	2,350	1,820	1,150	1,820	1,260	1,150
25	3,890	4,230	2,350	2,490	4,230	6,980	2,080	1,950	1,150	1,700	1,150	1,360
26	3,560	3,560	2,350	2,930	4,930	5,840	1,950	1,820	1,360	1,580	1,360	1,820
27	2,930	3,560	2,350	3,890	4,760	3,560	1,820	2,350	1,820	1,700	1,360	2,350
28	2,630	3,560	2,080	3,240	3,720	3,560	1,820	2,080	1,820	1,820	1,700	2,350
29	1,580	.....	2,080	3,080	2,630	3,400	1,580	2,080	2,080	1,580	1,820	2,630
30	2,630	.....	2,080	2,630	2,490	2,780	1,580	1,820	1,950	1,580	1,700	2,780
31	2,930	.....	1,950	.....	1,820	.....	1,150	1,360	.....	1,580	.....	3,240

NOTE.—Daily discharge determined by means of a discharge rating curve that is well defined between 780 and 17,400 second-feet (gage heights 3.0 and 7.5 feet); fairly well defined between 17,800 and 24,400 second-feet (gage heights 7.6 and 9.0 feet), and above 24,400 second-feet (gage height 9.0 feet), is based on comparisons with record of flood discharge at Hinton, Kanawha Falls, and Charleston, W. Va., and is poorly defined.

Monthly discharge of New River at Radford, Va., for 1910.

[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.		
January	6,020	1,580	3,100	1.14	1.31	A.
February	21,500	960	4,690	1.72	1.79	A.
March	9,970	1,950	3,440	1.26	1.45	A.
April	5,650	1,580	2,770	1.02	1.14	A.
May	4,930	1,820	2,750	1.01	1.16	A.
June	27,800	1,580	6,830	2.51	2.80	A.
July	6,590	1,150	3,490	1.28	1.48	A.
August	2,350	1,360	1,850	.680	.78	A.
September	7,760	1,150	2,560	.941	1.05	A.
October	11,000	620	2,310	.849	.98	A.
November	1,820	1,150	1,570	.577	.64	A.
December	5,290	700	1,940	.713	.82	A.
The year	27,800	620	3,090	1.14	15.40	

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.

Wolf Creek enters on the left bank about 850 feet below 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 causes eddies and boils at high stages. The bottom has been carefully sounded, 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 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 making accurate measurements at Fayette, all estimates of discharge heretofore published are only fair.

Estimates of the discharge are withheld for the present.

Discharge measurements of New River at Fayette, W. Va., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 7	Horton and Bailey	228	3,730	6.88	13,000
7	do	228	3,730	6.90	12,900
28	C. T. Bailey	182	2,820	2.68	4,340
June 18	H. J. Jackson	300	6,360	16.02	46,700
18	do	295	5,900	14.68	40,900
19	do	281	4,940	11.17	26,800
19	do	278	4,800	10.72	25,200
20	do	273	4,480	9.62	21,500
20	do	273	4,320	9.05	19,300
Oct. 12	C. T. Bailey	200	3,060	3.72	5,420

Daily gage height, in feet, of New River at Fayette, W. Va., for 1910.

[A. E. Pierson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.45	3.80	7.95	2.35	5.42	3.60	3.68	2.10	1.45	2.08	1.11	2.38
2	1.68	3.45	12.32	2.25	4.90	3.05	3.39	2.00	2.42	1.68	1.22	2.00
3	3.32	3.42	11.45	2.22	4.35	2.75	3.14	1.92	5.76	1.48	1.19	1.85
4	5.32	4.55	9.70	2.85	3.95	2.48	4.42	1.75	4.90	1.22	1.11	1.28
5	7.05	5.62	8.15	3.77	3.60	2.70	5.66	1.82	4.50	1.08	1.09	1.08
6	5.95	5.42	7.12	4.28	3.34	7.35	5.70	1.94	4.32	.94	1.00	1.86
7	8.38	4.96	6.85	3.65	3.15	8.25	5.78	2.10	4.12	.84	1.04	2.90
8	10.20	3.52	6.78	3.15	3.24	6.95	5.86	2.04	3.50	.96	1.05	3.82
9	9.15	3.60	6.35	2.85	3.69	5.55	5.69	1.80	2.98	2.88	.90	4.00
10	6.95	4.22	5.78	2.58	4.20	4.78	5.99	1.73	2.55	5.85	.76	3.00
11	5.05	4.30	5.48	2.38	4.84	5.70	5.82	1.82	2.20	4.90	.74	2.50
12	4.12	4.10	5.25	2.48	4.98	9.40	4.64	1.54	2.00	3.62	.80	2.18
13	3.55	3.25	5.18	3.58	4.72	14.15	4.18	1.38	1.92	2.72	.76	2.20
14	3.78	3.08	5.38	5.35	4.62	19.00	5.08	1.19	1.94	2·25	.72	1.80
15	3.98	3.28	5.28	6.12	4.82	16.35	6.32	1.15	1.84	1.92	.72	1.30
16	3.55	4.30	4.95	5.39	4.39	14.95	5.68	1.22	1.76	1.64	.62	1.02
17	3.20	7.32	4.70	4.61	3.90	21.95	4.95	1.35	1.55	1.43	.72	.55
18	3.25	11.20	4.08	5.02	3.62	15.94	7.82	1.26	1.36	1.28	.85	.30
19	7.18	15.30	3.82	6.15	3.72	11.16	9.48	1.24	1.19	1.10	.94	1.60
20	7.80	10.92	3.58	6.30	3.82	9.19	7.70	1.12	1.06	1.10	.84	1.78
21	8.28	8.45	3.42	6.42	3.85	8.90	5.75	.92	.92	1.08	.89	1.50
22	13.32	7.50	3.26	7.08	3.80	7.64	4.58	.92	.90	1.38	.78	1.25
23	11.72	7.90	3.18	6.52	3.84	7.44	3.86	1.26	.88	1.78	.62	.70
24	8.55	7.95	3.15	7.16	3.95	7.06	3.40	1.18	.81	1.81	.66	2.00
25	6.90	6.98	2.95	7.10	4.30	7.02	3.19	1.32	.72	1.54	.66	2.00
26	6.02	6.05	2.75	6.85	4.82	6.22	2.94	1.60	.82	1.31	.62	2.62
27	5.48	5.40	2.78	6.40	5.22	6.02	2.52	1.42	.71	1.24	.60	2.68
28	5.48	5.08	2.66	6.60	4.90	5.04	2.32	1.80	1.48	1.18	1.28	3.65
29	5.15	.....	2.55	6.46	4.22	4.42	2.18	1.40	1.98	1.18	1.90	3.58
30	4.48	.....	2.46	6.20	4.00	4.08	2.04	1.35	2.34	1.11	2.25	5.00
31	4.08	.....	2.39	.....	4.10	.....	2.00	1.22	.....	1.16	.....	9.62

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

This station, which 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., was established August 13, 1908.

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

The chain gage is attached to posts on the right bank about one-fourth mile below the ford. The datum of the gage has remained unchanged.

Discharge measurements are made by means of a boat at the ford or by wading.

The relation of gage height to discharge may be affected, to a small extent, by ice for short periods in winter. 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 by C. T. Bailey:

November 1, 1910: Width, 201 feet; area, 195 square feet; gage height, 1.64 feet; discharge, 216 second-feet.

Daily gage height, in feet, of North Fork of New River near Crumpler, N. C., for 1910.

[J. J. Garvey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.53	1.93	3.19	1.66	1.95	1.77	1.91	1.79	2.97	1.73	1.66	2.15
2	2.93	2.00	2.98	1.66	1.90	1.76	1.85	1.95	2.38	1.63	1.70	2.36
3	2.98	2.23	2.78	1.68	1.84	1.72	1.99	1.79	2.81	1.57	1.70	2.32
4	2.48	2.60	2.61	1.70	1.92	1.69	2.09	2.33	2.59	1.57	1.66	2.27
5	2.15	2.12	2.48	1.64	1.88	2.09	2.16	2.22	2.69	1.60	1.60	2.16
6	2.10	2.19	2.49	1.59	1.78	2.48	2.93	1.97	2.28	1.63	1.60	4.10
7	3.82	1.96	2.38	1.58	1.82	1.99	2.74	1.89	2.09	1.99	1.59	2.78
8	2.72	2.30	2.23	1.54	2.70	1.90	3.85	1.97	2.02	2.24	1.56	2.32
9	2.57	2.11	2.13	1.56	2.70	1.87	3.05	1.97	2.03	2.33	1.56	2.22
10	2.26	2.18	2.16	1.51	2.47	2.35	2.65	1.81	2.11	1.91	1.53	2.08
11	2.17	1.96	2.28	1.48	2.30	2.86	2.50	1.76	1.95	1.77	1.53	2.14
12	2.20	1.56	2.16	1.57	2.22	3.63	2.73	1.65	2.14	1.71	1.52	1.82
13	2.04	3.06	2.05	2.18	2.36	3.98	2.53	1.85	1.82	1.63	1.60	1.68
14	2.00	3.32	1.98	1.87	2.12	3.72	2.37	1.82	1.78	1.63	1.53	1.74
15	1.96	2.79	1.93	1.70	2.06	3.63	2.17	1.68	1.77	1.59	1.80	1.82
16	1.69	2.57	1.87	1.94	2.00	3.37	2.07	1.71	1.72	1.58	1.62	1.78
17	2.00	3.22	1.92	1.88	1.98	3.10	2.61	1.63	1.65	1.57	1.52	1.65
18	1.99	4.36	1.86	2.16	2.11	2.78	2.29	1.57	1.59	1.56	1.53	1.91
19	2.54	3.10	1.82	1.94	2.04	2.54	2.12	1.73	1.61	1.59	1.52	1.93
20	2.13	2.80	1.92	1.92	1.96	2.42	2.01	1.84	1.63	2.05	1.52	1.88
21	2.98	2.67	1.87	1.96	2.00	3.20	1.95	2.03	1.70	1.81	1.50	1.31
22	2.75	2.72	1.82	1.96	2.32	3.03	1.93	1.87	1.63	1.68	1.49	1.65
23	2.48	2.56	1.79	1.92	2.19	2.77	1.89	1.79	1.55	1.70	1.48	2.08
24	2.42	2.39	1.78	2.22	2.09	2.98	1.83	1.69	1.59	1.57	1.51	2.67
25	2.20	2.36	1.76	2.13	2.57	2.58	1.81	1.61	1.61	1.57	1.80	2.16
26	2.09	2.31	1.70	2.34	2.34	2.29	1.77	1.59	1.77	1.53	1.78	2.14
27	2.16	2.28	1.69	3.31	2.19	2.16	1.81	1.68	1.69	1.49	1.60	2.08
28	2.13	2.40	1.70	2.22	2.04	2.09	2.26	1.59	1.82	1.81	1.77	2.04
29	2.10	.....	1.70	2.12	1.96	2.07	2.09	1.52	1.70	1.73	2.18	2.26
30	1.95	.....	1.69	2.02	1.88	2.04	1.87	1.64	1.67	1.69	1.88	2.56
31	2.24	.....	1.68	.....	1.83	.....	1.84	3.09	.....	1.68	.....	2.46

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 1 to 11 and during December.

REED CREEK AT GRAHAMS FORGE, VA.

This station, which is located at the highway bridge at Grahams Forge, Va., was established July 29, 1908.

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 chain gage attached to the bridge 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 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 18	C. T. Bailey	125	218	2.41	192
Oct. 21	.....do	124	184	2.09	95.1

Daily gage height, in feet, of Reed Creek at Grahams Forge, Va., for 1910.

[Munsey Runion, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.16	2.42	2.62	2.24	2.54	2.23	2.30	2.22	2.08	2.08	2.04	2.08
2	2.15	2.40	2.88	2.24	2.48	2.22	2.34	2.25	2.17	2.07	2.00	2.05
3	2.50	2.42	2.84	2.24	2.42	2.20	2.36	2.26	2.20	2.06	2.02	2.06
4	2.52	2.48	2.78	2.38	2.41	2.21	2.36	2.42	2.14	2.08	2.02	2.07
5	2.40	2.46	2.73	2.34	2.36	2.28	2.38	2.39	2.10	2.06	2.03	2.06
6	2.40	2.58	2.75	2.32	2.34	2.68	2.49	2.31	2.14	2.06	2.04	2.52
7	3.20	2.52	2.91	2.31	2.33	2.56	2.56	2.26	2.14	2.08	2.02	2.48
8	3.00	2.46	2.76	2.20	2.40	2.42	2.51	2.23	2.15	2.19	2.00	2.25
9	2.62	2.44	2.66	2.22	2.44	2.36	2.47	2.28	2.16	2.21	2.00	2.19
10	2.50	2.40	2.60	2.16	2.40	2.40	2.46	2.26	2.22	2.09	2.04	2.10
11	2.53	2.36	2.60	2.31	2.38	3.44	2.38	2.27	2.24	2.09	2.04	2.16
12	2.46	2.31	2.55	2.31	2.34	3.44	2.36	2.21	2.13	2.07	2.04	2.12
13	2.40	2.32	2.46	3.22	2.32	4.80	2.38	2.20	2.14	2.08	2.02	2.08
14	2.36	2.38	2.41	2.90	2.31	4.40	2.35	2.20	2.16	2.08	2.04	2.14
15	2.34	2.48	2.41	2.64	2.32	3.74	2.33	2.14	2.14	2.05	2.06	2.10
16	2.31	2.64	2.35	2.58	2.35	3.32	2.30	2.17	2.10	2.01	2.04	2.12
17	2.28	3.11	2.39	2.65	2.35	3.40	2.42	2.04	2.10	2.02	2.04	2.10
18	2.30	4.25	2.34	2.80	2.35	3.16	2.64	2.08	2.10	2.01	2.06	2.08
19	2.32	3.14	2.33	2.76	2.46	2.84	2.55	2.18	2.04	2.05	2.04	2.05
20	2.45	2.91	2.30	2.64	2.49	2.95	2.47	2.14	2.10	2.11	2.03	2.00
21	2.58	2.86	2.51	2.64	2.51	2.78	2.34	2.09	2.08	2.48	2.00	2.00
22	2.55	2.80	2.48	2.69	2.49	2.69	2.34	2.16	2.10	2.10	2.02	2.06
23	2.88	2.72	2.32	2.67	2.54	2.63	2.26	2.02	2.11	2.10	2.02	2.14
24	2.74	2.60	2.29	2.66	2.47	2.60	2.29	2.09	2.11	2.05	2.03	2.11
25	2.59	2.56	2.31	2.75	2.64	2.58	2.28	2.10	2.07	2.07	2.03	2.17
26	2.51	2.50	2.28	2.84	2.74	2.54	2.31	2.02	2.05	2.04	2.05	2.20
27	2.47	2.50	2.28	2.86	2.54	2.46	2.28	2.10	2.12	2.06	2.04	2.17
28	2.48	2.50	2.28	2.74	2.48	2.41	2.28	2.15	2.32	2.07	2.04	2.21
29	2.47	.....	2.30	2.64	2.38	2.40	2.26	2.08	2.06	2.06	2.10	2.19
30	2.44	.....	2.26	2.54	2.28	2.34	2.20	2.10	2.06	2.02	2.13	2.28
31	2.48	.....	2.26	.....	2.25	.....	2.26	2.09	.....	2.02	.....	2.38

NOTE.—Relation of gage height to discharge affected by ice about Dec. 8 to 23.

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.

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.

Discharge measurements are made from a suspension footbridge at Thomas's farm.

A vertical staff gage is fastened to a tree on the left bank about 1,200 feet above the bridge. 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 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 16	C. T. Bailey	203	276	0.69	344
Oct. 24	do	201	263	0.52	254

Daily gage height, in feet, of Big Reed Island Creek near Allisonia, Va., for 1910.

[Arie Lilly, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.65	2.1	0.60	0.6	0.6	0.7	0.6	1.0	0.4	0.5	0.5
2	1.0	.75	1.35	.5	.6	.6	.6	.6	0.95	.4	.5	.5
3	1.05	.85	.85	.65	.6	.6	.75	.5	.85	.4	.5	.5
4	.8	.7	.75	.95	.6	.6	.8	.5	1.2	.4	.5	.6
5	.65	.75	.7	.75	.6	.7	.65	.6	.85	.4	.5	.6
6	.65	.95	.8	.7	.6	.9	.6	.6	.65	.4	.5	1.25
7	2.0	.95	.8	.6	.6	.75	1.1	.6	.6	2.15	.5	.8
8	1.0	.95	.8	.6	.6	.65	1.1	.5	.65	1.4	.5	.6
9	.85	.85	.8	.6	.6	.65	.95	.5	.7	1.65	.5	.6
10	.65	.8	.8	.6	.6	1.05	.75	.5	.55	.85	.5	.6
11	.65	.85	.8	.6	.6	1.35	.6	.5	.5	.7	.45	.5
12	.6	.65	.7	.6	.65	2.85	1.3	.5	.5	.7	.4	.5
13	.65	.95	.7	.95	.6	3.4	1.3	.5	.5	.6	.4	.5
14	.65	.85	.7	.75	.6	2.65	1.25	.5	.5	.5	.45	.5
15	.6	.9	.7	.7	.6	1.85	.95	.5	.5	.5	.5	.6
16	.6	.95	.7	.6	.6	1.55	.8	.5	.5	.5	.5	.7
17	.6	1.45	.7	.9	.6	1.25	1.2	.5	.5	.5	.4	.6
18	.6	2.65	.7	1.1	.7	1.15	1.1	.5	.5	.5	.4	.7
19	.65	1.3	.7	.8	.6	1.1	.95	.5	.4	.55	.5	.5
20	.6	.95	.7	.8	.6	1.1	.75	.5	.4	.75	.5	.5
21	1.7	1.1	.7	.8	.7	1.2	.7	.5	.4	.6	.5	.5
22	1.3	.95	.7	.75	.7	.95	.7	.5	.4	.6	.5	.5
23	.85	.95	.6	.7	1.2	.95	.7	.5	.4	.6	.5	.6
24	.75	.95	.6	.6	1.0	1.05	.65	.5	.4	.5	.5	.....
25	.7	1.0	.6	.7	1.15	.95	.6	.8	.4	.5	.5	.....
26	.7	.85	.6	.8	1.2	.85	.55	.8	.4	.5	.5	.....
27	.65	.85	.6	.7	.85	.8	.6	.85	.4	.5	.5	.....
28	.65	1.3	.6	.7	.8	.8	.6	.6	.5	.6	.55	.....
29	.65	.....	.6	.6	.7	.7	.6	.5	.45	.5	.55	.....
30	.65	.....	.6	.6	.7	.7	.6	.65	.4	.5	.5	.....
31	.6	.....	.6	.....	.7	.....	.65	.75	.....	.5	.....	.....

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to 25, Feb. 7 to 13, and Dec. 13 to 24. On Dec. 24 the gage was torn away by the ice going out.

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.

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

The datum of the chain gage, attached to the bridge, 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 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 14	C. T. Bailey	153	300	3.60	228
Oct. 19	.....do	148	274	3.41	155

Daily gage height, in feet, of Little River near Copper Valley, Va., for 1910.

[Thos. A. De Hart, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.54	3.47	4.78	3.39	3.44	3.28	3.52	3.42	4.14	3.44	3.35	3.22
2	3.72	3.73	4.54	3.49	3.43	3.28	3.47	3.41	3.78	3.35	3.37	3.22
3	3.92	3.74	4.10	3.54	3.46	3.25	3.45	3.43	3.55	3.30	3.40	3.34
4	3.78	3.93	3.90	3.80	3.46	3.22	3.67	3.43	4.01	3.27	3.38	3.32
5	3.62	3.80	3.80	3.59	3.42	3.37	3.66	3.46	3.76	3.25	3.35	3.45
6	3.52	3.74	3.93	3.50	3.38	3.69	3.65	3.42	3.54	3.28	3.28	3.71
7	4.61	3.48	4.00	3.44	3.40	3.45	3.69	3.38	3.42	4.30	3.32	3.64
8	3.71	3.84	3.79	3.37	3.59	3.32	3.85	3.39	3.42	4.31	3.35	3.66
9	3.44	3.70	3.72	3.36	3.74	3.30	3.81	3.41	3.38	4.76	3.32	3.66
10	3.65	3.76	3.69	3.30	3.59	3.51	3.62	3.37	3.40	3.76	3.34	3.64
11	3.60	3.83	3.69	3.34	3.49	3.92	3.55	3.37	3.36	3.56	3.32	3.58
12	3.60	3.78	3.68	3.42	3.41	5.19	3.53	3.36	3.38	3.54	3.31	3.36
13	3.65	3.78	3.62	3.84	3.43	5.77	3.81	3.32	3.41	3.44	3.27	3.25
14	3.55	3.83	3.54	3.66	3.41	5.82	4.09	3.35	3.36	3.42	3.30	3.31
15	3.52	3.80	3.49	3.48	3.41	4.75	4.07	3.37	3.38	3.42	3.44	3.43
16	3.55	3.90	3.47	3.47	3.37	4.65	3.69	3.45	3.36	3.38	3.41	3.50
17	3.50	4.73	3.49	4.06	3.36	4.27	4.68	3.43	3.32	3.38	3.32	3.34
18	3.49	6.00	3.48	4.14	3.41	4.02	4.82	3.43	3.30	3.38	3.32	3.35
19	3.51	4.12	3.47	3.80	3.55	3.85	4.09	3.43	3.28	3.34	3.35	3.40
20	3.40	4.00	3.48	3.69	3.42	3.73	3.80	3.41	3.31	3.85	3.28	3.31
21	4.58	4.14	3.48	3.64	3.41	3.85	3.65	3.38	3.30	3.56	3.28	3.33
22	4.23	4.10	3.48	3.59	3.47	3.85	3.59	3.39	3.31	3.47	3.31	3.40
23	3.82	3.96	3.46	3.56	3.43	3.91	3.57	3.41	3.26	3.44	3.35	3.29
24	3.66	3.79	3.44	3.54	3.59	3.89	3.75	3.36	3.26	3.37	3.30	3.59
25	3.50	3.66	3.43	3.52	3.71	4.45	3.55	3.45	3.25	3.36	3.30	3.65
26	3.73	3.68	3.39	3.67	3.65	3.81	3.49	3.53	3.33	3.38	3.32	3.70
27	3.46	3.66	3.40	3.69	3.53	3.69	3.45	3.52	3.48	3.38	3.30	3.63
28	3.48	3.97	3.39	3.60	3.37	3.59	3.47	3.47	3.32	3.42	3.34	3.47
29	3.43	.....	3.42	3.53	3.33	3.57	3.46	3.38	3.30	3.40	3.52	3.53
30	3.63	.....	3.42	3.48	3.37	3.55	3.45	3.38	3.36	3.36	3.41	3.73
31	4.13	.....	3.48	.....	3.36	.....	3.47	4.35	.....	3.37	.....	3.89

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1–25, Feb. 7–17, and Dec. 1–24.

WALKER CREEK AT STAFFORDSVILLE, VA.

This station, which is located at the highway bridge at Staffordsville, Va., was established July 24, 1908.

Whitley Creek enters 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 datum of the chain gage attached to the bridge 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 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 12	C. T. Bailey	110	188	410	358
Apr. 29	do	111	224	430	476
Oct. 18	do	80	84.5	296	56.6

Daily gage height, in feet, of Walker Creek at Staffordsville, Va., for 1910.

[W. E. Durham, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.18	3.64	4.62	3.30	4.02	3.36	3.44	3.08	3.08	2.94	2.92	3.06
2	3.29	3.68	4.84	3.31	3.87	3.33	3.38	3.08	3.12	2.93	2.99	2.94
3	3.66	3.86	4.66	3.37	3.76	3.27	3.39	3.02	3.40	2.92	2.92	2.90
4	3.81	4.28	4.46	3.50	3.74	3.26	3.46	3.15	3.40	2.90	2.96	2.99
5	3.60	4.25	4.37	3.52	3.70	3.41	3.54	3.16	3.36	2.92	2.92	3.02
6	3.68	4.14	3.51	3.42	3.60	4.00	3.56	3.10	3.22	2.86	2.86	3.14
7	5.65	3.70	4.94	3.34	3.61	3.99	3.64	3.12	3.16	2.92	2.85	3.39
8	5.08	3.95	4.65	3.30	3.78	3.73	3.86	3.11	3.04	3.04	2.86	3.22
9	4.46	3.90	4.54	3.30	3.79	3.62	3.58	3.16	3.04	3.16	2.95	3.13
10	4.06	3.81	4.36	3.30	3.77	3.82	3.51	3.10	3.00	3.12	2.90	3.10
11	3.86	3.71	4.17	3.24	3.70	5.34	3.40	3.00	2.99	3.03	2.88	3.10
12	3.92	3.52	4.06	3.36	3.68	5.50	3.70	3.00	3.00	3.00	2.94	3.05
13	3.78	3.74	3.96	5.00	3.68	8.25	3.74	2.92	3.01	2.95	2.90	2.98
14	3.70	3.61	3.86	4.54	3.64	7.71	3.60	2.90	2.99	2.94	2.82	2.89
15	3.65	3.72	3.82	4.20	3.59	6.42	3.50	2.91	2.96	2.88	2.90	2.96
16	3.52	3.92	3.74	4.03	3.55	5.77	3.42	2.92	3.00	2.90	2.91	2.99
17	3.56	5.28	3.72	4.19	3.52	5.82	3.54	2.90	2.92	2.84	2.94	2.90
18	3.61	6.52	3.63	4.64	3.54	5.30	3.76	2.88	2.86	2.88	2.94	3.02
19	3.98	5.30	3.62	4.52	3.61	4.80	3.70	2.80	2.92	2.90	2.88	3.05
20	4.03	4.82	3.60	4.35	3.59	4.62	3.64	2.86	2.96	2.98	2.91	3.05
21	6.08	4.66	3.60	4.21	3.60	4.42	3.46	3.01	2.95	2.97	2.86	2.91
22	6.15	4.56	3.56	4.08	3.57	4.27	3.38	2.96	2.84	3.00	2.89	2.90
23	5.10	4.31	3.51	3.99	3.50	4.04	3.32	2.94	2.72	2.97	2.92	3.14
24	4.62	4.16	3.48	4.03	3.48	3.93	3.26	2.89	2.92	2.89	2.83	3.29
25	4.36	4.04	3.46	4.04	3.74	3.86	3.24	2.89	2.85	2.96	2.87	3.41
26	4.16	4.00	3.40	4.28	3.82	3.78	3.20	2.98	2.90	2.98	2.90	3.36
27	4.05	3.94	3.36	4.32	3.74	3.68	3.18	3.00	2.94	2.97	2.97	3.34
28	3.98	3.97	3.39	4.32	3.60	3.62	3.14	3.06	2.95	2.94	3.00	3.31
29	4.00	.....	3.40	4.22	3.50	3.56	3.14	3.02	2.90	2.96	3.05	3.32
30	3.76	.....	3.38	4.14	3.50	3.51	3.11	3.00	2.99	2.90	3.10	3.60
31	3.92	.....	3.34	.....	3.46	.....	3.10	3.12	.....	2.93	.....	3.80

NOTE.—No ice reported by observer; relation of gage height to discharge probably not affected by ice.

WOLF CREEK NEAR NARROWS, VA.

This station, which is located at a highway bridge about 3 miles above Narrows, Va., was established July 22, 1908.

Mill Creek is the most important tributary below the station.

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

The datum of the chain gage attached to the highway bridge 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 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 11	C. T. Bailey	85	210	3.71	345
21	do	78	158	3.22	194
Apr. 28	do	85	223	4.00	508
Oct. 18	do	76	96.6	2.42	33.3

Daily gage height, in feet, of Wolf Creek near Narrows, Va., for 1910.

[John A. Hale, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.74	3.38	4.06	2.96	3.66	3.25	3.19	2.75	2.64	2.55	2.47	2.78
2	2.85	3.18	4.14	2.94	3.53	3.18	3.11	2.71	2.70	2.53	2.47	2.66
3	3.70	3.52	4.06	3.00	3.46	3.12	3.12	2.72	2.78	2.51	2.46	2.64
4	3.65	4.06	3.92	3.12	3.48	3.06	3.06	2.71	2.80	2.51	2.46	2.71
5	3.46	3.92	3.80	3.16	3.42	3.36	3.11	2.98	2.70	2.47	2.44	2.71
6	3.36	3.80	3.95	3.08	3.35	4.40	3.38	2.86	2.72	2.45	2.44	2.98
7	5.05	3.44	4.14	3.04	3.32	4.08	3.32	2.76	2.73	2.55	2.44	3.32
8	4.35	3.54	4.02	3.02	3.50	3.81	3.32	2.76	2.67	2.63	2.43	2.98
9	3.86	3.49	3.86	2.98	3.46	3.61	3.35	2.94	2.69	2.63	2.43	2.92
10	3.59	3.56	3.74	2.96	3.48	3.62	3.24	2.76	2.70	2.59	2.42	2.89
11	3.40	3.42	3.71	2.92	3.44	3.90	3.18	2.74	2.73	2.55	2.44	2.90
12	3.34	3.31	3.62	2.96	3.42	4.42	3.14	2.70	2.73	2.51	2.44	2.88
13	3.30	3.34	3.58	3.38	3.56	5.08	3.03	2.68	2.71	2.50	2.44	2.87
14	3.28	3.28	3.54	3.62	3.54	5.35	3.10	2.66	2.63	2.47	2.44	2.72
15	3.21	3.33	3.48	3.50	3.48	4.75	3.04	2.64	2.59	2.47	2.42	2.74
16	3.12	3.52	3.40	3.42	3.40	4.62	3.00	2.64	2.60	2.48	2.46	2.76
17	3.12	4.38	3.32	3.52	3.36	5.40	3.03	2.66	2.56	2.48	2.45	2.66
18	3.35	4.98	3.30	3.82	3.43	4.75	3.42	2.60	2.51	2.43	2.44	2.60
19	4.36	4.40	3.28	3.74	3.46	4.28	3.50	2.65	2.54	2.44	2.44	2.76
20	4.02	4.10	3.26	3.72	3.38	4.06	3.32	2.67	2.53	2.50	2.46	2.80
21	5.35	3.96	3.26	3.68	3.36	3.88	3.18	2.66	2.53	2.48	2.48	2.66
22	5.20	3.90	3.22	3.80	3.30	4.22	3.07	2.60	2.51	2.54	2.46	2.60
23	4.45	3.78	3.18	3.75	3.24	4.25	3.00	2.60	2.51	2.54	2.45	2.78
24	4.04	3.68	3.11	4.04	3.20	3.94	3.02	2.58	2.50	2.54	2.44	3.14
25	3.83	3.56	3.08	4.22	4.04	3.98	2.90	2.58	2.49	2.50	2.46	3.42
26	3.72	3.48	3.06	4.20	4.20	3.83	2.85	2.63	2.55	2.52	2.44	3.22
27	3.62	3.42	3.05	4.10	3.81	3.62	2.81	2.62	2.53	2.47	2.48	3.12
28	3.66	3.44	3.02	4.02	3.64	3.48	2.80	2.62	2.57	2.44	2.60	3.06
29	3.62	.....	3.01	3.90	3.49	3.36	2.78	2.62	2.63	2.46	3.18	3.02
30	3.44	.....	3.00	3.78	3.42	3.28	2.76	2.60	2.57	2.52	3.00	3.70
31	3.52	.....	2.98	.....	3.28	.....	2.80	2.60	.....	2.49	.....	4.10

NOTE.—Mush ice is reported Dec. 15; relation of gage height to discharge probably not affected by ice.

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.

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

Discharge measurements are made by means of a boat or by wading. A staff gage in two sections is fastened to trees on the left bank below the measuring section. 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 Bluestone River at Lilly, W. Va., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 9	Horton and Bailey	153	540	2.66	570
Aug. 24	Bailey and Dort	43	75.2	1.23	[a]71.9

[a] Measurement made by wading, not at regular section.

Daily gage height, in feet, of Bluestone River at Lilly, W. Va., for 1910.

[W. H. Lilly, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.45	4.70	1.58	2.48	2.00	1.73	1.41	1.57	1.14	1.09	1.65
2	.....	2.90	4.38	1.54	2.32	1.92	1.58	1.46	1.65	1.10	1.04	1.45
3	3.10	2.68	3.62	1.59	2.21	1 92	1.45	1.42	1.82	1.10	1.06	1.35
4	2.70	3.35	3.22	2.20	2.13	1.84	2.15	1.40	1.91	1.04	1.02	1.44
5	2.45	3.42	2.82	2.54	2.05	2.68	3.35	1.36	1.92	.99	1.04	1.38
6	2.38	2.95	2.76	2.28	1.98	4.40	3.05	1.30	1.80	.96	1.02	2.30
7	3.95	2.85	3.30	2.10	1.92	3.45	2.65	1.35	1.44	.98	1.02	2.75
8	3.55	2.55	2.92	1.98	2.14	2.78	3.05	1.29	1.34	1.02	1.00	2.15
9	2.72	2.45	2.62	1.88	2.46	2.48	2.88	1.20	1.34	1.06	.98	1.90
10	2.55	2.45	2.50	1.82	2.64	2.46	2.62	1.20	1.26	1.02	.94	1.90
11	2.45	2.50	2.48	1.74	2.47	2.82	2.45	1.16	1.26	1.02	.98	1.78
12	2.31	2.32	2.48	1.72	2.40	3.45	2.27	1.11	1.22	1.04	.98	1.82
13	2.01	2.22	2.71	2.57	2.54	4.00	2.25	1.14	1.16	1.04	.90	1.65
14	2.05	2.30	2.72	2.86	2.68	3.66	2.48	1.10	1.23	1.02	.99	1.50
15	1.95	2.28	2.58	2.60	2.45	3.70	2.70	1.07	1.14	.94	.96	1.45
16	2.12	3.35	2.38	2.46	2.32	5.15	2.30	1.14	1.07	.96	.96	1.38
17	1.82	4.25	2.28	2.36	2.18	6.10	2.60	1.00	1.12	.98	.92	1.40
18	2.65	4.02	2.18	2.46	2.36	4.20	6.75	1.00	1.07	.94	.92	1.35
19	4.75	3.25	2.02	2.60	2.80	3.29	4.65	1.02	.99	.84	.99	1.38
20	3.70	2.76	1.99	2.59	2.50	2.95	4.40	1.07	.99	.83	.94	1.42
21	4.40	2.70	1.92	2.86	2.53	2.95	3.10	1.11	.98	.86	.88	1.38
22	4.60	2.75	1.92	3.34	2.40	2.70	2.32	1.26	.92	.98	.88	1.32
23	3.45	2.81	1.86	3.18	2.26	2.75	2.15	1.24	.97	.99	.79	1.15
24	2.95	2.72	1.82	3.62	2.16	2.68	1.99	1.16	.96	.98	.79	1.45
25	2.65	2.50	1.68	4.02	2.22	2.85	1.88	1.10	.98	1.04	.80	1.62
26	2.50	2.36	1.68	3.45	2.27	2.40	1.76	1.16	1.00	1.04	.85	2.00
27	2.60	2.30	1.70	3.12	2.18	2.29	1.70	1.19	1.35	1.02	.98	1.98
28	2.90	2.54	1.68	2.94	2.05	2.48	1.48	1.20	1.20	1.00	1.05	1.95
29	2.80	.....	1.62	2.82	1.92	1.88	1.40	1.18	1.15	1.02	2.05	2.04
30	2.50	.....	1.61	2.68	2.18	1.79	1.44	1.10	1.24	1.04	2.00	2.79
31	2.45	.....	1.60	.....	2.65	.....	1.41	1.06	.....	1.04	.....	3.00

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to 3 and Dec. 18 to 26.

GREENBRIER RIVER NEAR MARLINTON, W. VA.

This station, which is located at the Chesapeake & Ohio Railway bridge on the spur that runs to Campbell's lumber mill near Marlinton, W. Va., was established July 9, 1908.

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

The datum of the chain gage attached to the railroad bridge 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 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 22	J. C. Dort	183	318	3.88	264
Oct. 10	C. T. Bailey	183	319	3.77	233

Daily gage height, in feet, of Greenbrier River near Marlinton, W. Va., for 1910.

[Paris G. Johnston, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	(a)	4.12	7.25	3.76	4.44	4.02	3.83	3.44	3.68	3.59	3.38	3.84
2	.....	4.10	6.32	3.76	4.26	4.02	3.79	3.42	4.12	3.49	3.44	3.96
3	.....	4.09	5.15	3.74	4.12	4.06	3.83	3.40	3.96	3.37	3.46	3.86
4	.....	4.07	5.35	3.76	4.06	4.08	3.86	3.36	4.22	3.30	3.42	(b)
5	.....	4.05	5.05	3.81	3.98	5.48	3.90	3.44	4.65	3.34	3.40	.....
6	.....	4.05	5.00	3.82	3.85	6.15	3.96	3.41	4.50	3.40	3.38	.....
7	.....	4.04	4.95	3.80	3.82	5.81	3.99	3.38	4.18	3.36	3.36	.....
8	.....	4.04	4.79	3.80	3.88	5.19	4.04	3.37	3.86	3.48	3.35	.....
9	4.71	4.12	4.49	3.76	3.92	4.38	4.01	3.36	3.73	3.86	3.34	.....
10	4.59	4.10	4.40	3.72	3.90	4.92	3.98	3.35	3.67	3.79	3.34	.....
11	4.30	4.10	4.45	3.70	3.86	6.26	3.92	3.36	3.60	3.71	3.32	.....
12	4.25	4.09	4.40	3.74	3.84	6.48	3.86	3.42	3.52	3.62	3.31	.....
13	4.20	4.08	4.36	4.10	4.12	6.79	3.81	3.54	3.51	3.52	3.30	.....
14	4.05	4.15	4.34	4.21	4.64	6.80	3.91	3.48	3.60	3.46	3.30	.....
15	4.04	4.19	4.31	4.12	4.58	6.15	4.16	3.44	3.56	3.42	3.28	.....
16	4.02	4.30	4.28	4.05	4.38	10.30	4.38	3.38	3.50	3.38	3.28	.....
17	4.00	6.00	4.21	4.10	4.25	8.62	4.54	3.38	3.46	3.38	3.27	3.85
18	4.12	7.89	4.13	4.24	4.17	6.39	4.42	3.48	3.40	3.36	3.26	.....
19	5.55	5.72	4.00	4.38	4.10	5.78	4.30	3.46	3.41	3.35	3.26	.....
20	4.95	5.40	3.96	4.46	4.08	5.46	4.18	3.42	3.42	3.34	3.24	.....
21	6.24	5.19	3.92	4.48	4.30	5.24	4.04	3.45	3.36	3.32	3.24	.....
22	6.34	5.50	3.91	4.45	4.30	5.04	3.92	3.86	3.34	3.32	3.23	.....
23	5.52	5.58	3.90	4.44	4.24	4.86	3.86	3.74	3.32	3.30	3.25	.....
24	4.84	5.10	3.90	4.65	4.19	4.70	3.82	3.55	3.30	3.42	3.77	.....
25	4.53	4.75	3.90	4.80	4.38	4.47	3.73	3.46	3.58	3.46	3.92	.....
26	4.30	4.50	3.90	4.78	4.36	4.29	3.64	3.41	3.90	3.39	3.82	.....
27	4.34	4.26	3.88	4.76	4.24	4.16	3.58	3.37	4.04	3.34	3.74	.....
28	4.29	5.17	3.86	4.85	4.15	4.05	3.56	3.34	3.90	3.32	3.59	.....
29	4.20	.....	3.84	4.75	4.14	3.96	3.53	3.32	3.78	3.46	3.78	.....
30	4.17	.....	3.82	4.61	4.08	3.88	3.50	3.30	3.68	3.46	3.93	.....
31	4.15	.....	3.80	.....	4.06	.....	3.46	3.32	.....	3.42	.....	.....

a Jan. 1 to 8, gage not read because of illness of observer.
b Dec. 4 to 31, gage record lost by observer.

NOTE.—Relation of gage height to discharge affected by ice about Dec. 10 to 26.

GREENBRIER RIVER AT ALDERSON, W. VA.

This station, which is located at the highway bridge at Alderson, W. Va., was established August 1, 1895, discontinued July 15, 1906, and reestablished May 10, 1907.

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

The drainage area above the station is about 1,340 square miles.

The accuracy of the records is little affected by ice. The datum of the chain gage attached to the bridge 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 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 23	J. C. Dort	305	279	1.78	163
Oct. 11	C. T. Bailey	367	499	2.30	572

Daily gage height, in feet, of Greenbrier River at Alderson, W. Va., for 1910.

[W. J. Hancock, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.20	2.60	4.50	2.35	3.30	2.50	2.52	2.00	1.90	2.22	1.92	2.40
2	2.20	2.50	6.50	2.30	3.05	2.48	2.42	1.98	1.90	2.08	1.92	2.28
3	2.45	2.60	4.80	3.32	2.88	2.45	2.38	1.95	2.25	2.05	1.90	2.15
4	4.55	2.80	4.60	2.52	2.78	2.42	2.35	1.90	2.75	2.00	1.90	2.10
5	4.00	3.00	4.10	2.75	2.72	2.55	2.45	2.02	3.05	1.90	1.82	2.15
6	3.40	2.90	3.80	2.70	2.58	3.90	2.52	2.08	3.00	1.82	1.80	2.15
7	4.40	2.70	3.70	2.70	2.50	4.65	2.65	2.00	2.80	1.90	1.80	2.10
8	5.55	2.50	3.60	2.58	2.55	3.75	2.62	1.98	2.55	1.90	1.80	2.02
9	4.20	2.50	3.40	2.52	2.72	3.30	2.75	1.90	2.35	1.82	1.80	2.00
10	3.70	2.70	3.20	2.48	2.75	3.32	2.72	1.90	2.22	2.32	1.80	2.12
11	3.50	2.70	3.10	2.40	2.72	4.90	2.55	1.85	2.15	2.32	1.78	2.10
12	2.80	2.40	3.00	2.45	2.70	5.75	2.42	1.82	2.08	2.18	1.72	2.05
13	2.70	2.50	3.00	3.08	2.90	6.40	2.95	1.85	2.10	2.05	1.75	2.05
14	2.80	2.50	3.10	3.20	3.25	7.28	3.40	1.78	2.22	1.98	1.75	2.08
15	2.70	2.60	3.18	3.12	3.10	5.70	3.18	1.90	2.20	1.88	1.75	1.82
16	2.60	2.80	3.10	2.95	2.95	7.32	3.10	1.95	2.08	1.85	1.75	2.00
17	2.50	4.00	2.98	2.90	2.78	12.75	2.92	1.90	2.00	1.85	1.75	2.00
18	2.50	7.40	2.85	3.08	2.75	6.60	3.52	1.78	1.92	1.80	1.80	1.92
19	3.60	6.40	2.78	3.20	2.72	4.80	4.30	1.80	1.90	1.80	1.80	2.05
20	4.50	4.50	2.68	3.25	2.70	5.32	3.38	1.80	1.82	1.82	1.75	2.00
21	4.00	3.90	2.60	3.30	2.70	4.40	2.95	1.78	1.80	1.78	1.75	2.15
22	7.45	3.90	2.60	3.30	2.95	3.95	2.72	1.85	1.80	1.78	1.72	2.20
23	5.10	4.70	2.55	3.25	2.92	3.92	2.55	1.78	1.78	1.80	1.72	2.10
24	4.10	4.20	2.55	3.35	2.88	4.15	2.45	2.38	1.78	1.90	1.78	2.25
25	3.60	3.80	2.50	3.75	2.88	3.50	2.30	2.15	1.75	1.88	1.72	2.82
26	3.20	3.50	2.50	3.62	2.88	3.10	2.20	2.10	1.92	1.90	1.75	2.85
27	3.10	3.50	2.50	3.50	2.80	2.85	2.20	1.98	2.85	1.92	2.02	2.75
28	3.00	3.60	2.50	3.65	2.72	2.80	2.20	1.90	2.45	1.90	2.10	2.62
29	3.00	.....	2.38	3.65	2.58	2.72	2.12	1.82	2.80	1.85	2.30	2.70
30	2.80	.....	2.40	3.48	2.52	2.62	2.10	1.78	2.42	1.90	2.45	5.05
31	2.70	.....	2.40	.....	2.50	.....	2.08	1.80	.....	1.90	.....	5.65

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	490	1,000	5,420	659	2,380	855	884	315	246	512	260	720
2	490	855	11,300	598	1,820	828	747	301	246	380	260	576
3	788	1,000	6,240	2,400	1,480	788	696	280	544	356	246	443
4	5,560	1,330	5,690	884	1,300	747	659	246	1,240	315	246	396
5	4,100	1,720	4,360	1,240	1,190	928	788	331	1,820	246	200	443
6	2,620	1,520	3,600	1,160	971	3,850	884	380	1,720	200	188	443
7	5,150	1,160	3,350	1,160	855	5,820	1,080	315	1,330	246	188	396
8	8,380	855	3,100	971	928	3,480	1,030	301	928	246	188	331
9	4,620	855	2,620	884	1,190	2,380	1,240	246	659	200	188	315
10	3,350	1,160	2,140	828	1,240	2,420	1,190	246	512	622	188	415
11	2,860	1,160	1,920	720	1,190	6,520	928	217	443	622	178	396
12	1,330	720	1,720	788	1,160	8,960	747	200	380	471	150	356
13	1,160	855	1,720	1,880	1,520	10,900	1,620	217	396	356	164	356
14	1,330	855	1,920	2,140	2,260	13,900	2,620	178	512	301	164	380
15	1,160	1,000	2,100	1,970	1,920	8,810	2,100	246	490	234	164	200
16	1,000	1,330	1,920	1,620	1,620	14,000	1,920	280	380	217	164	315
17	855	4,100	1,680	1,520	1,300	34,500	1,560	246	315	217	164	315
18	855	14,300	1,420	1,880	1,240	11,600	2,900	178	260	188	188	260
19	3,100	10,900	1,300	2,140	1,190	6,240	4,880	188	246	188	188	356
20	5,420	5,420	1,130	2,260	1,160	7,710	2,570	188	200	200	164	315
21	4,100	3,850	1,000	2,380	1,160	5,150	1,620	178	188	178	164	443
22	14,500	3,850	1,000	2,380	1,620	3,980	1,190	217	188	178	150	490
23	7,080	5,960	928	2,260	1,540	3,900	928	178	178	188	150	396
24	4,360	4,620	928	2,500	1,480	4,490	788	696	178	246	178	544
25	3,100	3,600	855	3,480	1,480	2,860	598	443	164	234	150	1,370
26	2,140	2,860	855	3,150	1,480	1,920	490	396	260	246	164	1,420
27	1,920	2,860	855	2,860	1,330	1,420	490	301	1,420	260	331	1,240
28	1,720	3,100	855	3,220	1,190	1,330	490	246	788	246	396	1,030
29	1,720	.....	696	3,220	971	1,190	415	200	1,330	217	598	1,160
30	1,330	.....	720	2,810	884	1,030	396	178	747	246	788	6,940
31	1,160	.....	720	.....	855	.....	380	188	.....	246	.....	8,660

NOTE.—Daily discharge determined by means of a discharge rating curve that is well defined between 46 and 8,230 second-feet (gage heights 1.4 and 5.5 feet) fairly well defined between 8,520 and 16,400 second-feet (gage heights 5.6 and 8.0 feet) and poorly defined above discharge 16,400 second-feet (gage height 8.0 feet). Relation of gage height to discharge probably not affected by ice. Observer reported river open at station all season. Observer reported ice 8 inches thick above and below station Jan. 1.

Monthly discharge of Greenbrier River at Alderson, W. Va., for 1910.

[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.		
January	14,500	490	3,150	2.35	2.71	A.
February	14,300	720	2,960	2.21	2.30	A.
March	11,300	696	2,390	1.78	2.05	A.
April	3,480	598	1,870	1.40	1.56	A.
May	2,380	855	1,350	1.01	1.16	A.
June	34,500	747	5,750	4.29	4.79	A.
July	4,880	380	1,250	.933	1.08	A.
August	696	178	268	.200	.23	B.
September	1,820	164	610	.455	.51	A.
October	622	178	284	.212	.24	B.
November	788	150	230	.172	.19	B.
December	8,660	200	1,010	.754	.87	A.
The year	34,500	150	1,750	1.31	17.69	

GAULEY RIVER AT ALLINGDALE, W. VA.

This station, which is located at the Baltimore & Ohio Railroad bridge about one-fourth mile south of the depot at Allingdale, W. Va., was established July 3, 1908.

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 made. The datum of the chain gage, attached to the railroad bridge, 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 Allingdale, W. Va., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 12	A. H. Horton	156	506	5.48	[a] 371
12	do	154	694	5.47	406
Aug. 15	Bailey and Dort	109	109	4.43	[b] 77.4

[a] Above regular section. [b] Measurement not at regular section.

Daily gage height, in feet, of Gauley River at Allingdale, W. Va., for 1910.

[J. L. Cogar, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug	Sept.	Oct.	Nov.	Dec.
1	4.85	5.50	8.95	5.03	5.52	5.45	5.20	4.65	4.64	5.20	5.03	5.70
2	5.96	5.80	7.58	5.00	5.41	6.30	5.05	4.62	4.40	5.10	5.07	5.61
3	8.85	5.50	7.12	4.99	5.30	5.96	4.94	4.59	4.97	5.02	5.10	5.45
4	8.55	5.80	6.68	5.03	5.30	5.94	4.92	4.55	5.15	4.95	5.25	5.43
5	6.99	5.80	6.32	5.55	5.25	5.90	6.49	4.70	5.36	4.80	5.20	5.45
6	6.48	5.68	6.23	5.35	5.15	8.70	6.41	4.65	6.17	4.73	5.12	5.60
7	10.45	5.60	6.25	5.36	5.11	7.18	5.60	4.50	5.37	4.70	5.05	5.52
8	7.33	5.25	6.90	5.30	5.09	6.40	6.80	4.45	5.20	4.75	5.00	5.48
9	7.10	5.35	5.73	5.23	5.61	6.20	6.00	4.41	5.12	5.40	4.90	5.55
10	6.11	5.62	5.62	5.20	5.80	6.60	5.65	4.40	5.10	5.33	4.89	5.22
11	6.20	5.65	5.50	5.18	5.65	7.10	5.30	4.39	4.92	5.10	4.90	5.20
12	5.80	5.52	5.49	5.15	8.35	7.25	5.20	4.40	4.85	4.95	4.88	5.22
13	5.61	5.20	5.34	6.00	7.50	7.35	6.75	4.41	4.74	4.85	4.85	5.10
14	5.90	5.30	5.32	5.90	6.60	7.15	6.65	4.38	6.60	4.75	4.75	4.85
15	6.05	5.32	5.30	5.61	6.00	7.05	6.25	4.45	5.75	4.72	4.71	4.95
16	5.50	5.50	5.35	5.52	5.94	11.32	6.10	4.32	5.71	4.67	4.85	5.05
17	5.65	7.68	5.40	5.60	5.55	9.50	5.85	4.34	5.18	4.65	4.77	4.95
18	5.61	8.50	5.25	5.65	5.60	8.10	5.90	4.31	5.04	4.62	4.74	5.11
19	8.85	7.12	5.20	5.69	5.80	7.49	5.72	4.29	4.90	4.59	4.70	5.17
20	7.10	6.58	5.20	6.00	5.70	6.98	5.45	4.31	4.86	4.53	4.61	5.72
21	6.60	6.24	5.21	6.49	5.65	6.35	5.29	4.10	4.89	4.50	4.50	5.64
22	7.35	6.82	5.36	6.60	5.62	6.10	5.11	4.20	4.70	4.64	4.70	5.30
23	6.59	6.56	5.34	7.00	5.70	5.80	5.00	4.75	4.69	4.73	4.68	5.35
24	6.20	6.50	5.30	7.20	5.52	5.70	5.02	4.70	4.61	4.95	4.70	6.10
25	5.85	6.05	5.30	7.01	5.60	5.50	4.88	4.50	5.44	4.90	4.85	6.05
26	5.65	5.90	5.28	6.55	5.70	5.36	4.86	4.41	7.78	4.71	5.50	5.70
27	5.98	5.75	5.20	6.20	5.62	5.25	5.10	4.35	5.75	4.70	5.47	5.68
28	6.10	6.26	5.18	6.00	5.45	5.20	4.90	4.32	6.05	4.90	5.40	5.40
29	5.95	.....	5.10	5.81	5.42	5.60	4.80	4.30	5.70	5.30	6.85	5.95
30	5.70	.....	5.05	5.70	5.40	5.40	4.72	4.22	5.36	5.15	5.85	10.14
31	5.60	.....	5.04	.....	5.48	.....	4.70	4.21	.....	5.05	.....	7.95

NOTE.—No ice reported by observer; relation of gage height to discharge probably not affected by ice.

GAULEY RIVER NEAR SUMMERSVILLE, W. VA.

This station, which is located at the highway bridge known as Brock's bridge, about 2½ miles southeast of Summersville, W. Va., 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 datum of the chain gage attached to the bridge 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 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 25	C. T. Bailey	200	715	5.68	702
Oct. 14	.....do	182	545	4.88	337

Daily gage height, in feet, of Gauley River near Summersville, W. Va., for 1910.

[J. W. Dermody, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.38	6.00	10.86	.....	5.95	5.53	4.83	4.47	3.41	5.15	5.15	6.35
2	5.60	5.90	9.72	.....	5.70	6.28	4.83	4.37	4.26	5.35	5.30	5.70
3	11.32	6.32	8.90	.....	5.50	6.33	5.30	3.92	5.81	5.10	5.55	5.95
4	11.10	7.00	8.20	.....	5.30	5.93	5.48	4.32	6.66	4.35	5.55	5.30
5	9.01	6.74	7.66	.....	5.38	6.33	7.72	3.37	6.16	4.30	5.45	5.85
6	8.20	6.63	7.50	5.10	5.10	10.58	6.62	4.32	6.96	4.60	5.25	6.40
7	12.41	5.60	7.42	5.20	4.80	8.98	7.07	3.52	5.96	4.20	5.15	6.30
8	10.31	5.82	6.98	5.46	5.10	7.48	8.42	3.61	5.21	4.75	5.05	6.00
9	8.30	6.09	6.54	5.30	6.60	6.53	7.12	3.31	4.96	5.50	5.10	5.60
10	7.47	6.65	6.28	5.15	7.00	7.23	6.32	3.61	5.46	5.75	5.00	5.80
11	6.45	6.88	6.12	4.95	6.14	7.88	5.97	3.76	4.90	5.45	4.80	5.20
12	6.38	7.00	6.00	5.30	9.18	8.03	5.07	3.36	5.17	5.00	4.75	4.95
13	6.29	6.94	6.00	6.20	9.86	8.93	8.12	3.31	4.75	5.05	4.25	5.25
14	7.34	6.75	5.92	6.15	8.65	8.78	8.27	3.51	7.65	4.85	4.55	5.15
15	7.10	6.47	5.84	6.50	6.75	8.68	7.52	3.86	5.75	4.70	4.70	5.35
16	6.76	6.88	5.79	5.75	6.50	10.68	6.42	3.81	5.60	4.35	4.75	5.50
17	6.53	9.68	5.74	6.00	5.90	10.98	6.07	3.66	5.30	4.45	4.65	5.35
18	7.84	11.39	5.60	6.25	5.95	9.48	6.12	3.26	5.00	4.45	4.50	5.80
19	11.22	9.64	5.40	6.65	6.55	8.68	5.77	3.16	4.70	4.30	4.50	6.15
20	9.24	8.46	5.33	6.85	6.05	8.53	5.57	3.61	4.75	4.20	4.25	7.05
21	9.08	7.66	5.36	7.80	6.26	8.03	5.17	3.66	4.70	4.25	4.50	6.95
22	9.80	8.28	5.80	8.65	6.40	7.88	4.62	3.11	4.50	4.40	4.40	6.75
23	8.48	9.06	5.50	9.48	6.10	6.98	4.47	3.36	4.25	5.40	4.45	6.55
24	7.68	8.19	5.48	9.54	6.21	5.98	4.62	4.01	4.35	5.15	4.55	7.25
25	7.06	7.42	5.62	8.80	6.55	5.98	4.32	4.06	6.15	4.85	4.55	7.88
26	6.70	6.72	5.55	8.10	6.20	5.48	5.12	4.36	7.00	4.40	5.54	7.10
27	7.20	6.67	5.46	7.45	6.30	5.68	5.77	3.61	6.40	4.50	6.05	6.55
28	7.56	7.78	5.34	7.15	6.05	6.58	4.72	3.31	6.25	5.15	6.70	6.30
29	7.12	.....	4.80	6.80	5.60	6.53	5.17	3.06	6.10	5.80	8.50	7.80
30	6.68	.....	4.70	6.50	5.45	5.93	4.67	3.71	5.65	5.25	7.35	14.00
31	6.46	.....	.....	.....	5.60	.....	5.17	3.26	.....	5.05	.....	10.50

NOTE.—No ice reported by observer; relation of gage height to discharge probably not affected by ice.

GAULEY RIVER AT BELVA, W. VA.

This station is located about half a mile below Belva, W. Va. It was established August 25, 1908.

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.

Discharge measurements are made by means of a boat or by wading. A staff gage is fastened to a tree on the right bank about 1,000 feet below the gaging section. 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 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 8	Horton and Bailey	251	1,320	4.40	3,350
Aug. 26	C. T. Bailey	90	107	1.95	[a] 328

[a] Measurement not at regular section.

Daily gage height, in feet, of Gauley River at Belva, W. Va., for 1910.

[C. L. Davis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.62	3.88	6.85	2.68	4.12	3.28	3.56	2.56	1.65	3.00	2.58	4.45
2	2.86	3.55	7.16	2.61	3.82	3.34	3.22	2.38	1.76	2.88	2.54	3.90
3	5.55	3.75	6.55	2.60	3.58	3.74	3.08	2.26	2.38	2.76	2.59	3.52
4	8.60	4.80	5.75	2.62	3.41	3.53	4.12	2.34	3.14	2.52	2.78	3.41
5	6.60	4.82	5.15	2.85	3.30	3.65	5.20	2.18	3.65	2.35	2.62	3.35
6	5.54	4.48	4.80	3.39	3.16	7.22	4.58	2.11	4.12	2.22	2.71	4.12
7	8.72	3.85	4.58	3.18	3.04	7.30	4.28	2.05	3.70	2.14	2.64	4.38
8	7.80	3.62	4.38	3.10	3.06	5.92	5.26	2.02	3.19	2.12	2.59	3.86
9	6.00	3.60	4.00	3.02	3.58	4.95	5.04	1.96	3.85	2.62	2.54	3.50
10	5.18	3.88	3.76	2.92	4.88	4.82	4.18	1.94	3.32	3.51	2.48	3.28
11	4.38	4.22	3.74	2.84	4.56	5.26	3.66	1.92	2.82	3.12	2.38	3.27
12	3.95	4.12	3.68	2.89	6.28	5.69	3.38	1.88	2.62	2.88	2.35	3.26
13	3.71	3.92	3.62	3.40	7.85	6.60	5.90	1.80	2.68	2.57	2.31	3.00
14	3.94	3.68	3.73	4.63	6.19	6.56	6.02	1.75	4.00	2.42	2.26	2.90
15	4.52	3.65	3.90	4.27	5.18	6.36	5.62	1.98	4.00	2.26	2.24	2.85
16	4.24	4.20	3.71	4.03	4.51	9.50	4.52	2.00	3.34	2.20	2.22	2.80
17	3.92	6.40	3.54	3.82	4.00	12.95	4.20	1.90	2.92	2.12	2.25	3.08
18	4.50	8.30	3.48	4.26	3.86	8.18	3.94	1.78	2.65	2.08	2.21	3.05
19	8.75	7.21	3.29	4.85	4.02	6.50	4.11	1.74	2.52	2.01	2.18	2.82
20	7.12	6.11	3.11	5.01	3.88	6.25	4.01	1.71	2.38	1.96	2.08	3.40
21	6.82	5.38	3.08	6.00	3.84	5.15	3.60	1.70	2.29	1.90	2.04	4.08
22	8.15	4.88	3.14	7.22	4.10	5.30	3.24	1.65	2.25	1.90	2.01	3.90
23	6.42	6.48	3.18	6.95	4.13	4.80	2.95	1.60	2.18	1.98	2.05	3.50
24	5.55	5.90	3.02	7.58	4.00	4.32	2.75	1.60	2.08	2.61	2.04	4.30
25	4.92	5.24	3.06	7.07	4.75	3.88	2.56	2.05	2.01	2.45	2.09	5.45
26	4.45	4.58	2.99	6.12	4.55	3.52	2.50	2.00	3.78	2.26	2.49	4.65
27	4.58	4.20	2.98	5.38	4.15	4.11	3.25	1.81	3.98	2.18	3.12	4.18
28	5.26	4.08	2.90	5.00	3.77	5.15	3.12	1.72	3.90	2.29	3.20	3.82
29	5.08	.....	2.84	4.72	3.50	4.75	3.10	1.64	3.89	2.62	5.38	4.05
30	4.45	.....	2.79	4.49	3.31	4.02	2.86	1.60	3.32	2.82	5.26	10.08
31	4.15	.....	2.74	.....	3.29	.....	2.62	1.61	.....	2.66	.....	8.65

NOTE.—Relation of gage height to discharge affected by ice about Dec. 16 to 23. Jan. 12, Feb. 8, and Dec. 17, observer reported ice along shores.

CHERRY RIVER AT RICHWOOD, W. VA.

This station, which is located at the highway bridge in the town of Richwood, W. Va., was established July 3, 1908.

The datum of the chain gage attached to the bridge has not been changed. During August, 1909, stones were removed from the river bed below the gage, thereby changing the relation of gage height to discharge by a slight amount.

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 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 12	A. H. Horton	109	185	2.67	138
Aug. 16	J. C. Dort	105	128	2.27	41.4

Daily gage height, in feet, of Cherry River at Richwood, W. Va., for 1910.

[Floyd Artrip, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.62	4.55	2.50	2.78	2.60	2.62	2.28	2.48	2.70	2.60	3.05
2	3.40	2.62	3.98	2.50	2.68	2.62	2.52	2.27	2.70	2.72	2.65	2.95
3	4.58	2.60	3.65	2.50	2.65	2.65	2.50	2.25	2.90	2.58	2.70	2.80
4	4.10	2.68	3.40	2.70	2.60	2.62	2.88	2.27	3.22	2.52	2.68	2.72
5	3.35	2.62	3.22	2.70	2.55	3.32	2.92	2.27	3.52	2.45	2.60	2.68
6	3.15	2.60	3.18	2.65	2.50	3.98	2.70	2.19	3.22	2.40	2.60	2.70
7	4.60	.....	3.12	2.65	2.50	3.38	2.78	2.17	3.00	2.45	2.52	2.65
8	3.68	.....	2.95	2.65	2.65	3.10	3.10	2.22	2.78	2.95	2.50	2.60
9	3.20	2.60	2.85	2.60	2.68	2.95	2.82	2.32	2.90	3.25	2.50	2.58
10	2.95	2.75	2.78	2.60	2.70	3.10	2.60	2.27	2.82	2.90	2.45	2.50
11	2.90	2.70	2.70	2.55	2.65	3.35	2.58	2.25	2.68	2.72	2.45	2.50
12	2.80	.....	2.62	2.62	3.38	3.60	2.50	2.17	2.58	2.68	2.40	2.50
13	2.70	.....	2.60	3.08	3.30	3.70	2.92	2.75	2.88	2.58	2.40	2.50
14	2.75	.....	2.65	2.88	3.05	3.55	2.82	2.29	2.95	2.50	2.40	.....
15	2.70	.....	2.65	2.80	2.88	3.58	2.65	2.22	2.72	2.45	2.40	.....
16	2.70	2.85	2.60	2.78	2.78	5.55	2.52	2.27	2.60	2.40	2.38	.....
17	2.65	3.65	2.60	2.98	2.70	4.50	2.52	2.20	2.50	2.40	2.35	.....
18	2.88	4.20	2.55	3.25	2.85	3.60	2.65	2.15	2.45	2.38	2.35	.....
19	3.80	3.60	2.50	3.05	2.78	3.50	2.70	2.15	2.40	2.32	2.30	2.78
20	3.25	3.15	2.50	3.00	2.70	3.20	2.52	2.22	2.40	2.30	2.30	2.72
21	4.40	3.05	4.65	3.10	2.92	3.18	2.45	2.15	2.35	2.30	2.28	.....
22	3.60	3.50	2.60	3.18	2.88	3.38	2.42	2.50	2.30	2.72	2.25	.....
23	3.25	3.30	2.60	3.82	2.80	3.05	2.32	2.28	2.28	2.65	2.20	.....
24	3.05	3.05	2.60	3.68	2.75	2.85	2.30	2.20	2.22	2.50	2.30	2.75
25	2.88	3.05	2.60	3.42	2.80	2.68	2.22	2.15	4.00	2.40	3.10	3.10
26	2.78	2.90	2.60	3.25	2.72	2.58	2.80	2.15	3.40	2.40	2.78	2.80
27	2.85	2.85	2.55	3.10	2.62	2.68	2.58	2.15	2.95	2.42	2.68	2.78
28	2.80	4.00	2.55	3.05	2.58	3.22	2.50	2.15	3.20	2.85	3.35	2.78
29	2.72	.....	2.55	2.95	2.52	2.95	2.40	2.10	2.88	2.68	3.50	4.00
30	2.72	.....	2.50	2.85	2.50	2.75	2.40	2.08	2.80	2.62	3.15	5.45
31	2.68	.....	2.50	.....	2.50	.....	2.38	2.05	.....	2.60	.....	3.85

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to 3, Feb. 6 to 17, and Dec. 10 to 24.

MEADOW RIVER NEAR RUSSELLVILLE, W. VA.

This station, which is located at Bays Ferry, about 3 miles below Russellville, W. Va., was established July 17, 1908.

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

Discharge measurements are made by means of a cable and boat; low-water measurements are made by wading.

The chain gage is attached to trees on the left bank above the ferry. The datum of the gage has remained unchanged.

In autumn backwater is sometimes caused by leaves lodging at the rapids below the station. For short periods during January, February, and December the relation of gage height to discharge is affected by ice.

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 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 24	C. T. Bailey	115	350	4.51	233
26	do	115	339	4.35	216
Oct. 14	do	102	243	3.61	62.9
15	do	99	226	3.46	47.1

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for 1910.

[J. R. Bays, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.86	a 6.48	8.27	4.02	5.62	4.59	4.42	3.62	3.24	4.37	3.62	5.40
2	4.11	6.42	8.25	3.98	5.30	4.59	4.20	3.49	3.68	4.17	3.68	a 5.59
3	.....	6.26	7.63	4.02	5.00	4.52	4.14	3.47	4.25	3.89	3.71	6.34
4	8.20	6.20	6.91	4.12	4.93	4.44	4.34	3.45	4.08	3.58	3.77	5.61
5	7.31	5.73	6.33	4.89	4.78	4.71	4.27	3.43	4.95	3.46	3.82	5.16
6	6.60	a 6.11	5.90	4.83	4.64	8.89	4.53	3.39	4.91	3.36	3.83	4.92
7	8.66	6.44	5.63	4.72	4.50	8.92	4.97	3.35	4.46	3.35	3.80	4.73
8	7.93	6.08	5.37	4.56	4.66	7.46	5.23	3.34	4.12	3.49	3.76	4.79
9	7.02	5.89	5.13	4.38	5.40	7.36	4.59	3.32	3.94	4.17	3.70	4.71
10	6.59	5.76	5.01	4.25	5.82	5.99	4.69	3.29	3.89	4.35	3.69	4.61
11	a 8.18	5.62	4.93	4.18	5.73	6.62	4.48	3.20	3.79	4.03	3.68	4.52
12	7.52	5.47	4.84	4.38	6.06	7.16	4.26	3.22	3.67	3.81	3.66	4.34
13	7.20	5.36	4.83	5.85	6.74	7.94	4.48	3.38	3.91	3.66	3.64	4.31
14	6.90	5.28	5.59	6.22	6.28	7.64	4.71	3.42	4.29	3.52	3.62	4.22
15	6.54	5.15	5.75	5.90	5.79	7.52	4.63	3.34	4.60	3.45	3.62	4.16
16	6.07	5.47	5.45	5.57	5.40	9.04	4.47	3.72	4.21	3.39	3.62	4.14
17	6.02	8.61	5.23	5.37	5.12	9.83	4.41	3.60	3.89	3.33	3.64	4.04
18	6.10	8.85	5.04	6.54	5.08	8.60	4.63	3.34	3.61	3.30	3.57	4.03
19	8.08	8.28	4.81	6.82	5.20	7.52	5.39	3.32	3.51	3.26	3.51	4.20
20	7.42	7.48	4.61	6.74	5.10	6.38	5.56	3.38	3.49	3.23	3.42	4.39
21	7.78	6.62	4.65	7.49	5.22	5.62	5.13	3.27	3.45	3.20	3.42	4.34
22	8.62	6.74	4.61	7.94	5.50	5.35	4.66	3.40	3.43	3.30	3.47	4.32
23	7.55	7.28	4.56	8.09	5.63	5.16	4.35	3.54	3.39	3.46	3.49	4.48
24	6.89	6.87	4.47	8.05	5.50	5.04	4.27	3.43	3.33	3.66	3.48	5.05
25	6.00	6.31	4.40	7.42	5.44	4.94	3.97	3.29	3.38	3.52	3.78	5.88
26	5.63	5.82	4.32	6.76	5.41	4.66	3.90	3.26	3.49	3.44	4.52	5.63
27	5.67	5.57	4.27	6.34	5.22	4.60	3.77	3.22	3.72	3.38	4.54	5.52
28	6.08	5.91	4.20	6.38	5.04	4.79	4.27	3.15	4.11	3.54	5.36	5.26
29	5.98	.....	4.15	6.29	4.81	4.92	4.27	3.11	4.09	3.63	6.37	5.96
30	5.70	.....	4.10	5.98	4.66	4.66	4.00	3.10	4.39	3.84	5.89	10.26
31	5.50	.....	4.08	.....	4.69	.....	3.77	3.14	.....	3.72	.....	9.35

a Ice gorge reported by observer Jan. 11, Feb. 1 and 6, and Dec. 2.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to 13, Feb. 1 to 7, and Dec. 2 to 24.

ELK RIVER AT WEBSTER SPRINGS, W. VA.

This station, which is located at the suspension bridge on the grounds of the Webster Springs Hotel at Webster Springs, W. Va., was established July 1, 1908. Back Fork Creek is tributary from the right bank one-fourth mile below the station.

A vertical staff gage is fastened to the right abutment of the bridge. 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 by Bailey and Dort:

August 13, 1910: Width, 38 feet; area, 50.4 square feet; gage height, 2.00 feet; discharge, 65.8 second-feet. The measurement was not made at the regular gaging section.

Daily gage height, in feet, of Elk River at Webster Springs, W. Va., for 1910.

[Cherry Woodzell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.55	2.62	4.35	2.26	2.72	2.85	2.40	2.32	1.70	2.22	2.18	2.92
2	3.65	2.60	3.95	2.24	2.62	3.55	2.32	2.15	2.50	2.12	2.24	2.82
3	5.30	2.70	3.68	2.24	2.52	3.42	2.28	2.02	2.32	2.02	2.36	2.72
4	4.45	3.00	3.45	2.27	2.48	3.30	2.75	2.40	2.50	1.94	2.34	2.62
5	3.90	2.92	3.25	2.45	2.42	3.95	3.10	2.48	2.62	1.88	2.25	2.52
6	3.45	2.82	3.20	2.50	2.34	4.75	2.88	2.30	2.74	1.80	2.18	2.60
7	5.10	2.80	3.25	2.52	2.30	4.50	2.88	2.12	2.75	1.80	2.12	2.52
8	3.85	2.72	3.08	2.54	2.24	3.40	3.09	2.02	2.62	1.88	2.14	2.50
9	3.35	2.78	2.88	2.51	2.60	3.10	2.89	1.98	2.50	2.14	2.06	2.48
10	3.28	3.00	2.70	2.49	2.62	3.50	2.75	1.92	2.48	2.28	2.02	2.40
11	3.22	2.80	2.62	2.44	2.58	3.90	2.55	1.89	2.35	2.20	2.00	2.40
12	3.12	2.80	2.60	2.45	4.15	3.90	2.38	1.82	2.22	2.05	2.00	2.36
13	2.95	2.84	2.58	3.11	3.84	3.90	3.10	2.05	2.80	1.95	2.00	2.28
14	3.05	2.80	2.55	2.98	3.30	3.92	3.00	1.93	2.78	1.86	1.98	2.18
15	2.85	2.82	2.50	2.90	3.01	3.72	2.90	1.82	2.55	1.82	2.00	2.10
16	2.68	3.20	2.45	2.75	2.90	6.34	2.82	1.74	2.35	1.77	2.00	2.25
17	2.60	4.35	2.45	2.70	2.75	5.18	2.72	1.68	2.29	1.76	2.00	2.18
18	3.30	4.75	2.40	2.90	2.72	4.00	2.60	1.66	2.15	1.74	1.97	2.25
19	4.55	3.95	2.40	3.00	2.75	4.25	2.51	1.66	1.99	1.71	1.95	2.70
20	4.10	3.65	2.40	2.98	2.66	3.72	2.46	1.70	1.98	1.70	1.94	3.00
21	4.30	3.35	2.42	3.15	2.66	3.80	2.32	1.69	1.97	1.68	1.92	3.00
22	4.20	4.05	2.50	3.28	2.80	3.80	2.22	1.68	1.92	1.90	1.90	2.90
23	3.50	3.80	2.44	3.60	2.82	3.40	2.12	1.69	1.82	2.32	1.88	2.90
24	3.25	3.45	2.40	4.08	2.70	2.98	2.25	1.79	1.78	2.18	1.98	3.60
25	2.95	3.25	2.39	3.85	2.70	2.88	2.25	1.78	1.96	2.02	2.25	3.48
26	3.32	3.05	2.36	3.52	2.80	2.72	1.92	1.72	2.54	1.99	2.70	2.85
27	2.80	2.85	2.31	3.25	2.72	2.60	2.10	1.66	2.68	2.05	2.69	3.05
28	2.98	3.20	2.30	3.08	2.62	2.88	2.45	1.64	2.55	2.42	2.82	2.25
29	2.90	.....	2.30	3.00	2.52	2.75	2.35	1.62	2.38	2.42	3.35	3.60
30	2.82	.....	2.30	2.85	2.58	2.58	2.55	1.68	2.31	2.28	3.05	5.50
31	2.72	.....	2.28	.....	2.70	.....	2.45	1.63	.....	2.20	.....	4.20

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to 3, Feb. 8 to 16, and Dec. 11 to 26.

ELK RIVER AT GASSAWAY, W. VA.

This station, which is located at the Coal & Coke Railroad bridge in the northeastern part of Gassaway, W. Va., was established July 1, 1908.

Little Otter Creek enters immediately above the station.

Discharge measurements are made from a footbridge attached to the upper side of the railroad bridge or by wading. The datum of the chain gage attached to the railroad bridge 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 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 11	A. H. Horton	142	501	3.01	698
Aug. 12	J. C. Dort	141	310	1.82	101

Daily gage height, in feet, of Elk River at Gassaway, W. Va., for 1910.

[Henry A. Hays, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.86	3.54	6.36	2.16	3.42	3.36	3.51	2.34	1.62	2.19	2.04	4.02
2	3.00	3.22	5.17	2.11	3.33	3.35	3.48	2.31	1.53	2.05	2.04	3.01
3	11.36	3.80	4.74	2.08	3.18	3.44	3.60	2.28	1.56	1.98	2.10	2.62
4	10.32	4.60	4.66	2.07	3.03	4.35	3.70	2.23	2.67	1.92	2.19	2.58
5	7.10	5.06	4.60	2.10	2.68	7.74	3.89	2.20	2.64	1.84	2.23	2.58
6	8.99	4.45	4.45	2.19	2.54	11.82	3.98	2.16	2.41	1.74	2.17	2.92
7	12.58	3.48	4.39	2.30	2.59	8.92	3.85	2.12	2.44	1.75	2.10	3.38
8	9.38	3.42	4.15	2.40	2.55	6.10	3.72	2.08	2.40	1.53	2.04	2.90
9	6.00	3.36	3.75	2.38	2.50	5.70	3.42	2.04	2.06	1.74	1.99	2.68
10	4.80	3.30	.....	2.36	2.45	5.65	3.36	2.12	1.98	1.76	1.94	2.63
11	3.94	3.47	.....	2.34	3.41	5.60	3.30	.....	1.96	2.00	1.90	2.55
12	3.41	3.54	2.82	2.37	6.23	5.66	3.24	1.80	1.94	1.85	1.93	2.42
13	3.05	3.59	2.78	3.84	9.36	5.79	3.21	1.71	2.04	1.80	1.92	2.37
14	4.52	3.76	2.72	4.02	8.05	5.46	3.16	1.75	3.94	1.78	1.90	2.32
15	5.26	3.82	2.67	4.08	6.50	7.45	3.40	1.78	2.94	1.73	1.84	2.30
16	5.84	4.00	2.64	4.12	5.79	12.10	3.66	1.72	2.51	1.66	1.82	2.28
17	5.70	8.42	2.60	4.16	4.98	19.65	3.71	1.68	2.21	1.65	1.89	2.24
18	7.54	9.80	2.54	4.24	4.90	13.50	3.63	1.62	2.10	1.62	1.88	2.24
19	11.88	7.26	2.47	4.18	4.85	10.84	3.56	1.58	1.96	1.61	1.81	2.34
20	8.06	5.38	2.41	4.04	4.80	8.10	3.49	1.52	1.92	1.59	1.78	2.75
21	7.76	4.98	2.48	4.94	4.86	5.30	3.34	1.50	1.87	1.42	1.76	2.69
22	6.65	6.53	2.50	6.30	4.94	4.80	3.04	1.47	1.88	1.63	1.74	2.60
23	5.20	6.40	2.48	6.48	4.98	4.18	2.90	1.45	1.85	1.70	1.72	2.58
24	4.90	6.00	2.46	6.54	5.04	4.00	2.55	1.44	1.78	1.66	1.72	3.73
25	4.42	5.92	2.44	6.48	4.62	3.81	2.19	1.46	1.77	1.91	1.81	3.68
26	4.12	5.82	2.42	5.89	4.10	3.74	2.16	1.50	1.83	1.87	1.79	3.61
27	3.98	5.72	2.40	5.04	3.88	3.66	2.14	1.49	1.94	1.82	1.98	3.40
28	3.86	5.62	2.38	4.11	3.64	3.62	2.12	1.48	2.40	1.86	2.44	2.99
29	3.74	.....	2.34	3.74	3.52	3.60	2.04	1.46	2.42	1.89	3.96	3.10
30	3.66	.....	2.28	3.50	3.44	3.56	2.35	1.45	2.29	1.97	4.44	8.88
31	3.61	.....	2.20	.....	3.40	.....	2.38	1.54	.....	2.12	.....	9.06

NOTE.—No ice reported by observer; relation of gage height to discharge probably not affected by ice.

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.

Big Sandy River enters Elk River immediately below the station.

Discharge measurements are made from the highway bridge or by wading. The datum of the chain gage attached to the bridge 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 Clendenin, W. Va., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 6	C. T. Bailey	224	930	4.81	2,200
Aug. 11	J. C. Dort	125	414	2.49	188

Daily gage height, in feet, of Elk River at Clendenin, W. Va., for 1910.

[J. W. Riley, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.98	4.72	4.74	2.96	4.42	3.84	4.25	2.95	2.14	3.15	2.86	4.73
2	3.18	4.46	6.16	2.94	4.25	3.95	3.65	3.14	2.10	2.86	2.77	4.16
3	6.08	4.25	5.85	2.90	3.88	3.74	3.44	2.96	2.38	2.68	2.70	3.73
4	10.08	6.08	5.52	2.93	3.41	4.56	4.97	2.80	2.56	2.56	2.68	3.55
5	7.78	6.56	5.12	3.44	3.79	5.22	5.75	2.70	3.72	2.53	2.62	3.40
6	7.32	5.84	4.80	3.32	3.62	9.17	5.29	2.56	4.44	2.47	2.79	3.89
7	10.50	4.94	4.54	3.28	3.48	9.66	5.07	2.54	3.45	2.42	2.84	4.65
8	10.36	4.32	4.34	3.26	3.32	6.86	5.39	2.80	3.12	2.30	2.78	4.51
9	6.86	4.22	4.22	3.25	4.68	5.58	5.15	2.66	3.22	2.42	2.65	4.06
10	5.76	4.44	4.02	3.19	5.42	5.90	4.81	2.51	3.04	2.32	2.61	3.67
11	4.93	4.54	3.92	3.13	5.30	5.69	4.38	2.48	2.82	2.25	2.56	3.67
12	4.60	4.98	3.83	3.24	11.26	5.81	4.00	2.40	2.65	2.24	2.50	3.70
13	4.07	4.85	3.74	4.04	11.06	5.79	7.35	2.35	2.56	2.38	2.43	3.67
14	5.74	4.48	3.63	4.34	7.86	6.26	7.38	2.37	3.28	2.50	2.44	3.59
15	6.50	4.64	3.64	4.74	6.14	5.99	6.08	2.27	3.54	2.42	2.42	3.51
16	5.89	8.07	3.51	4.51	5.26	8.01	6.16	2.22	3.68	2.25	2.42	3.43
17	5.50	8.06	3.54	4.26	4.80	15.19	5.05	2.18	3.24	2.27	2.34	3.31
18	7.12	9.96	3.43	4.22	4.66	10.75	4.88	2.12	3.03	2.26	2.34	2.99
19	10.36	8.61	3.40	4.39	4.46	7.21	4.82	2.21	2.82	2.20	2.39	2.97
20	8.94	6.69	3.33	5.09	4.18	8.65	4.24	2.12	2.68	2.16	2.38	3.15
21	11.02	5.98	3.28	6.78	4.36	6.45	3.82	2.12	2.66	2.08	2.36	3.95
22	10.13	7.16	3.24	7.24	4.30	5.27	3.64	2.11	2.55	2.16	2.32	4.29
23	7.56	8.01	3.22	7.29	4.11	6.11	3.26	2.06	2.44	2.18	2.26	3.91
24	5.98	7.14	3.24	4.24	4.10	5.51	3.10	2.02	2.40	2.18	2.30	5.03
25	5.66	6.08	3.23	4.26	5.30	4.61	2.90	1.98	2.43	2.23	2.28	6.09
26	5.50	5.36	3.20	4.37	6.40	4.23	2.77	1.88	2.46	2.24	2.23	5.70
27	5.62	4.82	3.17	6.16	5.46	7.67	2.68	1.86	2.38	2.40	2.23	4.80
28	6.25	4.57	3.11	5.55	4.84	5.95	2.78	1.85	2.36	2.26	2.43	4.29
29	6.07	.....	3.02	5.01	4.38	4.57	2.82	1.94	2.69	2.47	3.43	3.90
30	5.42	.....	2.96	4.64	4.19	4.27	2.96	1.89	3.07	2.44	5.11	5.67
31	4.94	.....	3.00	.....	3.90	.....	3.17	1.88	.....	2.52	.....	10.07

NOTE.—No record of ice kept by observer; relation of gage height to discharge probably affected by ice about Jan. 1 to 3 and during December.

COAL RIVER AT BRUSHTON, W. VA.

This station, which is located at the Chesapeake & Ohio Railway bridge at Brushton station, near Cobbs, W. Va., was established June 23, 1908.

The drainage area above the station is about 379 square miles. Brush Creek is tributary on the left bank, about 500 feet below the station.

The datum of the chain gage attached to the railroad bridge 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 1910.

Date	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 4	C. T. Bailey	136	292	3.12	666
4	do	136	292	3.12	668
Aug. 9	Bailey and Dort	45	40.0	1.37	[a] 40.1

[a] Measurement made by wading and not at regular section.

Daily gage height, in feet, of Coal River at Brushton, W. Va., for 1910.

[Geo. W. Fitzpatrick, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.55	2.7	2.8	1.9	2.55	2.7	2.05	1.7	1.65	1.2	1.5	2.3
2	1.75	2.6	3.45	1.8	2.45	2.45	1.9	1.6	1.55	1.15	1.4	2.05
3	3.0	2.65	3.35	1.85	2.3	2.3	2.25	1.55	2.2	1.1	1.4	1.9
4	3.1	3.35	3.1	2.0	2.25	2.15	4.95	1.5	2.4	1.1	1.4	1.8
5	2.7	3.7	2.9	1.9	2.2	2.2	5.85	1.45	2.7	1.1	1.4	1.85
6	2.9	3.35	2.75	2.1	2.1	5.2	4.5	1.4	2.45	1.1	1.4	2.45
7	5.15	2.85	2.65	2.05	2.1	4.5	4.35	1.4	2.15	1.1	1.3	3.2
8	4.15	2.75	2.55	1.95	2.25	3.3	4.25	1.4	2.0	1.15	1.3	2.65
9	3.15	2.7	2.45	1.9	2.8	2.95	3.55	1.4	1.85	1.2	1.3	2.35
10	2.55	2.8	2.35	1.8	3.95	3.15	3.05	1.4	1.9	1.2	1.3	2.15
11	2.25	3.2	2.65	1.75	3.55	3.05	2.75	1.35	2.05	1.2	1.3	2.05
12	2.3	3.1	3.0	1.95	5.7	3.05	2.45	1.3	1.9	1.2	1.3	2.0
13	2.1	2.9	3.3	2.45	4.95	3.0	2.45	1.3	1.75	1.2	1.3	1.9
14	2.6	2.7	3.35	3.2	4.05	3.1	2.4	1.3	1.65	1.2	1.3	1.8
15	3.0	2.8	3.1	3.05	3.5	3.4	2.3	1.2	1.55	1.2	1.2	1.75
16	2.9	3.75	2.85	2.8	3.1	4.3	2.2	1.2	1.5	1.15	1.2	1.7
17	2.7	4.65	2.75	2.7	2.9	5.15	2.35	1.3	1.5	1.1	1.2	1.7
18	3.05	5.25	2.55	2.65	2.75	4.35	2.75	1.25	1.4	1.1	1.2	1.6
19	6.1	4.3	2.45	2.6	2.65	3.35	3.25	1.2	1.4	1.1	1.2	1.75
20	4.35	3.7	2.4	2.6	2.5	3.45	2.9	1.2	1.4	1.1	1.15	1.7
21	5.1	3.35	2.3	3.8	2.4	3.4	2.55	1.1	1.3	1.0	1.1	1.6
22	5.5	3.35	2.25	5.15	2.4	2.8	2.35	1.1	1.3	1.1	1.1	1.6
23	4.05	3.65	2.2	4.25	2.35	2.7	2.15	1.1	1.3	1.1	1.1	[a] 1.65
24	3.45	3.6	2.1	3.75	2.4	2.7	2.2	1.1	1.2	1.1	1.1	1.95
25	3.15	3.3	2.1	3.5	3.45	2.75	2.0	1.1	1.2	1.1	1.3	2.65
26	3.05	3.0	2.1	3.4	4.1	2.25	2.15	1.0	1.2	1.1	1.3	2.45
27	3.05	2.8	2.0	3.15	3.45	2.6	2.05	1.0	1.2	1.2	1.3	2.3
28	3.25	2.7	2.0	2.95	2.95	2.45	2.0	1.0	1.2	1.3	1.6	2.15
29	3.25	.....	1.9	2.75	2.65	2.25	1.9	0.9	1.25	1.3	2.5	2.1
30	2.9	.....	1.9	2.6	2.5	2.15	1.8	1.0	1.25	1.45	2.5	3.1
31	2.75	.....	1.9	.....	2.95	.....	1.8	1.3	.....	1.5	.....	3.8

[a] Observer reported ice 0.3 foot thick above and below gage Dec. 23; river open at gage.

COAL RIVER AT TORNADO, W. VA.

This station, which is located at the highway bridge at Upper Falls station, one-fourth mile above Tornado, W. Va., was established June 24, 1908.

Smith Creek is tributary on the right bank, about 1 mile below the station.

The datum of the chain gage attached to the bridge 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 station.

Sufficient data have not been collected to enable estimates of the discharge to be made.

Discharge measurements of Coal River at Tornado, W. Va., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 3	C. T. Bailey	185	996	3.42	1,460
3	do	185	996	3.43	1,450
Aug. 8	Bailey and Dort	90	92	2.26	[a] 115

[a] Measurement made by wading and not at regular section.

Daily gage height, in feet, of Coal River at Tornado, W. Va., for 1910.

[G. C. Hoy, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.64	3.02	3.19	2.42	2.82	2.89	2.62	2.45	2.78	2.42	2.92	3.30
2	2.84	2.97	3.32	2.36	2.74	2.76	2.46	2.33	2.86	2.50	2.93	3.08
3	3.18	2.99	3.39	2.40	2.59	2.63	2.34	2.34	3.10	2.52	2.88	2.96
4	3.54	3.25	3.34	2.46	2.59	2.49	2.88	2.43	3.49	2.66	3.00	2.92
5	3.51	3.58	3.21	2.52	2.57	2.46	8.74	2.30	3.59	2.67	2.90	2.91
6	3.81	3.57	3.12	2.54	2.44	4.09	4.96	2.15	3.18	2.68	2.88	3.30
7	4.98	3.24	3.01	2.53	2.27	4.29	4.28	2.16	2.88	2.64	2.82	3.85
8	4.43	3.16	2.93	2.45	2.60	3.66	4.16	2.15	2.90	2.82	2.82	3.64
9	3.58	3.06	2.83	2.40	3.18	3.53	3.71	2.24	2.85	2.95	2.89	3.00
10	3.00	3.04	2.75	2.36	4.02	3.93	3.25	2.25	2.80	2.70	2.86	3.00
11	3.34	3.15	2.92	2.25	3.68	3.89	3.00	2.51	2.78	2.66	2.90	2.85
12	2.84	3.22	3.17	2.44	6.56	3.93	2.71	2.51	2.64	2.70	2.84	2.72
13	2.84	3.19	3.46	3.05	6.48	3.49	2.76	2.42	2.47	2.70	2.82	2.60
14	3.47	3.23	3.49	3.36	4.44	3.38	2.80	2.34	2.30	2.70	2.81	2.26
15	3.53	3.44	3.35	3.40	3.70	3.53	2.59	2.32	2.24	2.71	2.80	2.23
16	3.41	4.12	3.15	3.30	3.40	3.87	2.40	2.34	2.12	2.66	2.78	2.35
17	3.26	5.22	3.03	3.22	3.20	4.49	3.06	2.35	2.10	2.67	2.68	2.15
18	3.68	5.76	2.92	3.26	3.09	4.27	3.47	2.48	2.00	2.68	2.70	2.30
19	5.41	4.70	2.83	3.32	2.96	3.67	3.94	2.47	2.00	2.65	2.69	2.55
20	4.91	3.89	2.67	3.37	2.86	3.68	3.39	2.30	1.96	2.62	2.62	2.60
21	4.65	3.66	2.65	4.15	2.88	3.61	2.99	1.98	1.95	2.64	2.68	2.50
22	6.21	3.90	2.60	5.85	2.78	3.22	2.69	2.05	1.90	2.67	2.66	2.58
23	4.25	3.84	2.52	4.43	2.64	3.04	2.45	2.30	1.95	2.90	2.75	2.61
24	3.68	3.84	2.51	3.82	2.79	3.88	2.30	2.33	1.88	2.65	2.79	2.67
25	3.47	3.65	2.44	3.58	3.26	3.30	2.25	2.45	2.06	2.64	2.82	3.10
26	3.34	3.36	2.42	3.45	4.08	3.02	2.49	2.38	2.15	2.70	2.80	3.40
27	3.29	3.20	2.36	3.22	3.57	9.88	2.77	2.46	1.95	2.82	2.90	3.30
28	3.34	3.08	2.32	3.14	3.26	3.90	2.75	2.40	1.90	2.77	3.05	3.10
29	3.41	.....	2.45	3.02	2.97	3.18	2.75	2.46	1.88	2.82	3.28	3.08
30	3.23	.....	2.51	2.92	2.81	2.88	2.55	2.43	2.29	2.90	3.55	3.80
31	3.09	.....	2.48	.....	2.94	.....	2.45	2.43	.....	2.90	.....	4.42

NOTE.—Relation of gage height to discharge affected by ice, Jan. 1 to 5 and Dec. 18 to 28.

POCOTALIGO RIVER AT SISSONVILLE, W. VA.

This station which is located at the highway bridge near the post office at Sissonville, W. Va., was established June 26, 1908.

A dam and small power plant above the station may modify the flow in low water. The datum of the chain gage attached to the bridge 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.

The following discharge measurement was made by Bailey and Dort:

August 10, 1910: Width, 22 feet; area, 13.3 square feet; gage height, 1.87 feet; discharge, 15.0 second-feet. The measurement was not made at the regular gaging section.

Daily gage height, in feet, of Pocotaligo River at Sissonville, W. Va., for 1910.

[B. N. Sisson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.25	2.90	4.85	1.28	2.60	2.47	3.32	2.03	2.95	1.73	1.83	2.52
2	3.28	2.72	4.18	1.43	2.39	2.33	3.04	1.89	2.42	1.72	1.82	2.30
3	5.63	2.94	3.56	1.34	2.31	2.38	2.81	1.92	3.26	1.70	1.82	2.18
4	4.90	4.50	3.22	1.33	2.25	2.25	4.70	2.17	3.60	1.69	1.82	2.17
5	3.58	3.98	2.95	1.88	2.03	6.52	4.91	1.81	4.75	1.70	1.78	2.20
6	9.30	3.35	2.82	2.03	2.18	10.75	3.92	2.03	4.14	1.70	1.74	2.72
7	9.65	3.10	2.78	1.58	1.98	4.59	4.93	1.77	2.99	1.72	1.76	3.08
8	3.98	2.75	2.60	1.78	3.02	3.42	8.67	1.90	2.50	1.72	1.80	2.99
9	3.66	2.66	2.50	1.54	7.36	3.67	4.37	1.79	2.69	1.70	1.78	2.60
10	3.30	2.72	2.58	1.53	4.43	6.25	3.52	1.77	2.65	1.68	1.76	2.56
11	3.38	2.78	2.56	1.63	3.40	4.97	3.33	1.98	2.28	1.66	1.72	2.55
12	2.75	2.80	2.35	1.93	11.78	5.19	3.17	1.92	2.40	1.68	1.76	2.49
13	2.65	2.72	2.32	2.60	5.88	3.75	6.03	2.25	4.00	1.66	1.80	2.64
14	13.35	2.69	2.25	2.38	3.83	3.25	4.02	1.80	3.05	1.62	1.77	2.52
15	5.82	3.10	2.05	2.40	3.18	2.92	3.31	1.85	2.78	1.70	1.76	2.45
16	3.92	11.25	1.60	2.32	2.88	3.82	3.04	1.82	2.49	1.68	1.76	2.30
17	3.02	8.60	1.49	2.40	3.16	4.35	2.94	1.76	2.36	1.76	1.70	2.18
18	12.85	6.60	1.85	2.74	2.87	3.32	2.75	1.82	2.18	1.70	1.72	2.11
19	10.40	4.00	1.78	4.63	2.88	4.19	2.65	1.74	1.95	1.74	1.71	2.16
20	4.65	4.06	1.84	5.18	2.67	3.29	2.51	1.72	1.88	1.80	1.72	2.21
21	6.65	5.68	1.82	8.18	7.61	2.97	2.17	1.72	2.05	1.78	1.72	2.14
22	7.24	11.20	1.84	4.93	6.46	2.49	2.25	1.76	2.02	1.82	1.70	2.15
23	4.40	6.61	1.95	3.73	3.84	2.31	2.02	1.72	1.76	1.77	1.71	2.24
24	3.92	4.14	1.65	3.22	3.98	2.07	2.07	1.72	2.15	1.78	1.70	5.12
25	3.79	3.42	1.73	2 99.	8.08	1.94	2.09	1.70	1.82	1.74	1.72	4.11
26	3.82	3.15	1.55	3.43	5.08	1.83	1.92	1.65	1.78	1.76	1.72	3.35
27	5.42	3.02	1.43	3.63	3.60	25.50	2.02	1.66	1.76	1.78	1.70	2.92
28	4.20	3.54	1.42	3.18	3.10	11.35	1.82	1.66	1.71	1.82	1.81	2.85
29	3.72	.....	1.46	3.93	2.73	4.65	1.87	1.72	1.70	1.82	2.55	3.12
30	3.12	.....	1.55	2.73	2.70	3.72	2.05	1.73	1.72	1.78	2.36	8.05
31	2.92	.....	1.40	.....	2.50	.....	2.41	1.67	.....	1.84	.....	4.90

NOTE.—No ice reported by observer; relation of gage height to discharge probably affected by ice during December.

MIAMI RIVER BASIN.

GENERAL FEATURES.

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), and its drainage area comprises about 5,400 square miles.

The drainage basin is fairly regular in shape. The valleys of the headwaters as far down as Dayton are narrow and comparatively shallow. Below Dayton the valley is broad and open and is 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. The average fall of the river is 3 to 4 feet per mile.

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 the winters are mild and snowfall is light, but 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 & 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 high average slope is favorable to the development of water power, but the bed and banks of the stream 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 gravelly 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 & 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.

MIAMI RIVER AT HAMILTON, OHIO.

This station is located at High Street Bridge at Hamilton, Ohio. A gage was established at this point November 16, 1904, as a flood station, by the United States Weather Bureau. On March 1, 1910, a low-water gage was installed by the United States Geological Survey. Both gages are of the vertical staff type and both are referred to the same datum plane so that there is now, in reality, only one gage in two sections. Records of flood stages are available from November 16, 1904, to February 27, 1910, and records of daily gage height from February 28 to December 31, 1910.

The total drainage area above the gaging station is 3,580 square miles.

Discharge measurements are made from the upstream side of High Street Bridge. The records are reliable and accurate.

Discharge measurements of Miami River at Hamilton, Ohio, in 1908–1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1908.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 22	A. H. Horton	316	1,352	0.75	401
22	....do	117	206	.75	[a]287
23	....do	178	229	.83	[b]279
23	....do	117	217	.83	[a]284
1909.					
Feb. 26	....do	360	3,730	7.82	19,400
1910.					
Feb. 4	A. H. Horton and assistants	325	2,020	2.92	3,840
4	....do	325	2,050	2.98	4,080
Mar. 1	Horton and Bailey	425	7,900	17.38	66,500
2	....do	425	6,540	14.22	48,300
3	A. H. Horton	382	4,510	9.25	26,800

[a] Measurement made at lower bridge.
[b] Measurement made by wading between bridges.

Daily gage height, in feet, of Miami River at Hamilton, Ohio, for 1910.

[C. A. Huber, observer. See note.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	(a)	.....	17.20	2.15	2.00	1.90	1.35	1.35	0.75	1.65	2.00	2.45
2	4.5	.....	13.25	2.11	1.95	1.80	1.28	1.30	.75	1.30	2.00	2.40
3	4.0	.....	8.90	2.12	1.98	1.80	1.20	1.28	1.70	1.40	2.00	2.30
4	(a)	2.9	6.80	2.10	2.80	1.78	1.20	1.22	1.40	1.30	2.00	2.30
5	(a)	.....	5.95	2.12	3.08	1.72	1.20	1.20	1.30	3.40	2.00	2.28
6	(a)	.....	5.45	2.15	2.60	1.70	1.75	1.15	1.50	13.55	2.00	2.20
7	(a)	.....	4.92	2.15	2.40	1.65	1.65	1.00	2.50	14.40	2.00	2.10
8	(a)	.....	4.45	2.15	2.50	1.65	1.70	1.00	2.00	13.95	2.00	2.00
9	(a)	.....	4.05	2.15	2.38	1.65	1.65	1.08	1.75	8.30	2.00	2.00
10	(a)	.....	3.70	2.12	2.25	1.65	1.80	1.00	1.80	5.95	2.00	2.00
11	(a)	.....	3.45	2.00	2.20	1.65	2.08	1.00	1.55	4.75	2.00	2.00
12	4.0	.....	3.25	1.95	2.30	1.65	2.02	.90	1.45	4.08	2.00	2.00
13	4.5	.....	3.10	1.90	2.45	1.65	2.18	.90	1.95	3.70	2.00	2.00
14	10.8	.....	3.00	1.90	2.32	1.60	1.90	.90	2.15	3.30	2.00	2.00
15	8.4	.....	3.00	1.90	2.20	1.58	1.80	.90	2.10	3.00	2.00	2.00
16	5.1	4.5	2.80	1.90	2.18	1.55	3.15	.90	1.85	2.85	2.00	2.00
17	4.2	5.5	2.78	1.85	2.00	1.50	2.42	.90	1.65	2.70	2.00	2.00
18	11.0	5.0	2.80	1.95	2.02	1.45	2.12	.90	1.45	2.62	2.00	2.00
19	11.6	.....	2.68	1.95	1.92	1.35	1.80	.85	1.40	2.52	2.00	2.00
20	9.0	.....	2.62	2.00	2.32	1.35	1.65	.85	1.55	2.48	2.00	2.00
21	6.9	.....	2.50	2.35	2.75	1.40	1.60	.80	1.40	2.45	2.00	2.00
22	5.6	.....	2.45	3.10	3.20	1.32	1.50	.80	1.35	2.40	2.00	2.00
23	4.8	.....	2.40	2.70	2.75	1.30	1.42	.95	1.30	2 38	2.00	2.00
24	3.7	.....	2.38	2.35	2.48	1.30	1.32	.80	1.25	2.28	2.00	2.00
25	3.5	.....	2.32	2.20	2.38	1.30	1.25	.80	1.18	2.25	2.00	2.00
26	3.2	4.0	2.30	2.15	2.32	1.30	1.20	.80	1.15	2.20	2.00	2.00
27	3.5	5.7	2.26	2.10	2.18	1.35	1.20	.75	1.35	2.15	2.10	2.00
28	3.3	15.40	2.21	2.05	2.02	1.35	1.42	.75	1.60	2.10	2.00	2.20
29	3.0	.....	2.20	2.05	2.00	1.40	1.50	.75	2.00	2.05	2.00	4.00
30	3.0	.....	2.20	2.02	1.90	1.40	1.50	.75	1.88	2.00	2.50	5.65
31	3.0	.....	2.15	.....	1.90	.....	1.40	.75	.....	2.00	.....	4.90

[a] River reported "frozen" Jan. 1 and Jan. 4 to 11.

NOTE.—Record of gage heights obtained as follows: Jan. 1 to 31 and Feb. 16 to 27, furnished by United States Weather Bureau; Feb. 4, from discharge measurement made by A. H. Horton; Feb. 28 to Dec. 31, by United States Geological Survey, C. A. Huber, observer. No ice reported by observer from Feb. 28 to Dec. 31. Relation of gage height to discharge probably affected by ice Jan. 12, 13, 30, 31, Feb. 26 and 27, and in December.

Daily gage height, in feet, and discharge, in second-feet, of Miami River at Hamilton, Ohio, for 1907–1909.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1907.			1908.			1909.		
Jan. 4	14.5	50,400	Feb. 16	15.3	54,500	May 9	6.5	15,600
5	9.3	26,400	17	11.4	35,600	10	9.5	27,300
6	7.0	17,400	Mar. 3	14.0	47,900	11	9.2	26,000
20	13.4	45,000	6	10.5	31,600	12	8.0	21,200
21	12.0	38,400	7	13.9	47,400	13	6.5	15,600
Mar. 13	14.5	50,400	8	8.5	23,200	26	4.0	7,160
14	20.0	80,500	19	8.9	24,800	27	7.0	17,400
15	16.3	59,800	May 7	12.0	38,400	28	6.5	15,600
1908.			1909.			June 25	3.5	5,630
Feb. 14	10.0	29,400	Feb. 22	5.0	10,400	26	8.5	23,200
15	17.0	63,700	26	8.9	24,800	27	6.5	15,600
						28	4.0	7,160

Daily discharge, in second-feet, of Miami River at Hamilton, Ohio, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,000	3,000	64,800	1,990	1,660	1,450	655	655	270	995	1,660	2,680
2	8,760	2,800	44,300	1,900	1,560	1,250	594	610	270	610	1,660	2,560
3	7,160	2,800	24,800	1,920	1,620	1,250	530	594	1,070	700	1,600	2,330
4	6,300	3,860	16,800	1,880	3,580	1,210	530	546	700	610	1,660	2,330
5	5,700	5,600	13,600	1,920	4,380	1,110	530	530	610	5,330	1,660	2,280
6	5,000	4,800	11,900	1,990	3,050	1,070	1,160	495	800	45,700	1,660	2,100
7	4,000	4,000	10,100	1,990	2,560	995	995	400	2,800	49,900	1,660	1,880
8	3,000	3,200	8,600	1,990	2,800	995	1,070	400	1,660	47,700	1,660	1,660
9	2,500	2,600	7,320	1,990	2,510	995	995	448	1,160	22,400	1,660	1,660
10	2,000	2,300	6,230	1,920	2,220	995	1,250	400	1,250	13,600	1,660	1,660
11	3,000	2,000	5,480	1,660	2,100	995	1,840	400	860	9,580	1,660	1,660
12	5,000	1,800	4,880	1,560	2,330	995	1,700	340	750	7,420	1,660	1,660
13	7,000	2,200	4,440	1,450	2,680	995	2,060	340	1,560	6,230	1,660	1,660
14	32,900	2,000	4,150	1,450	2,380	920	1,450	340	1,990	5,030	1,660	1,660
15	22,800	1,800	4,150	1,450	2,100	896	1,250	340	1,880	4,150	1,660	1,660
16	10,700	8,760	3,580	1,450	2,060	860	4,580	340	1,350	3,720	1,660	1,660
17	7,800	12,100	3,530	1,350	1,660	800	2,610	340	995	3,310	1,660	1,660
18	33,900	10,400	3,580	1,560	1,700	750	1,920	340	750	3,100	1,660	1,660
19	36,500	9,000	3,260	1,560	1,490	655	1,250	315	700	2,850	1,660	1,660
20	25,200	7,000	3,100	1,660	2,380	655	995	315	860	2,750	1,660	1,660
21	17,000	5,000	2,800	2,440	3,440	700	920	290	700	2,680	1,660	1,660
22	12,400	4,500	2,680	4,440	4,730	628	800	290	655	2,560	1,660	1,660
23	9,740	4,000	2,560	3,310	3,440	610	720	370	610	2,510	1,660	1,660
24	6,230	3,500	2,510	2,440	2,750	610	628	290	570	2,280	1,660	1,660
25	5,630	3,000	2,380	2,100	2,510	610	570	290	516	2,220	1,660	1,660
26	4,730	3,000	2,330	1,990	2,380	610	530	290	495	2,100	1,660	1,660
27	5,630	7,000	2,240	1,880	2,060	655	530	270	655	1,990	1,880	1,660
28	5,030	55,000	2,120	1,770	1,700	655	720	270	920	1,880	1,660	2,100
29	4,150	.....	2,100	1,770	1,660	700	800	270	1,660	1,770	1,660	7,160
30	3,600	.....	2,100	1,700	1,450	700	800	270	1,410	1,660	2,800	12,600
31	3,200	.....	1,990	.....	1,450	.....	700	270	.....	1,660	.....	10,100

NOTE.—Daily discharge determined by means of a discharge rating curve that is well defined between 250 and 66,500 second-feet (gage heights 0.7 and 17.5 feet): and is a tangent above 62,600 second-feet (gage height 16.8 feet), and extended as such above 66,500 second-feet (gage height 17.5 feet).

Daily discharge Jan. 1, 4 to 13, Jan. 30 to Feb. 3, Feb. 5 to 15, and Feb. 19 to 27 estimated, because of ice and absence of gage heights, from record of discharge at Dayton, Ohio, and climatologic records.

Daily discharge (1,660 second-feet) Nov. 1 to 26 and Dec. 9 to 29 probably too high. From a study of the gage height record on Miami River at Dayton, Ohio, kept by the United States Weather Bureau, and the United States Geological Survey discharge rating table for 1906 for Miami River at Dayton, Ohio, it appears that the mean discharge at Hamilton from Nov. 1 to 26 should be about 1,120 second-feet (ranging from about 850 to 1,600 second-feet), and from Dec. 9 to 27 about 860 second-feet (ranging from about 550 to about 1,600 second-feet).

Monthly discharge of Miami River at Hamilton, Ohio, for 1910.

[Drainage area, 3,580 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	36,500	a 2,000	10,000	2.79	3.22	C.
February	55,000	a 1,800	6,320	1.77	1.84	D.
March	64,800	1,990	8,850	2.47	2.85	A.
April	4,440	1,350	1,950	.545	.61	B.
May	4,730	1,450	2,400	.670	.77	B.
June	1,450	610	877	.245	.27	B.
July	4,580	530	1,150	.321	.37	B.
August	655	270	376	.105	.12	C.
September	2,800	270	1,020	.285	.32	B.
October	49,900	610	8,350	2.33	2.69	B.
November	2,800	b 1,660	b 1,710	.478	.53	D.
December	12,600	b 1,660	b 2,620	.732	.84	D.
The year	64,800	270	3,810	1.06	14.43	

a Estimated. b Probably too high; see footnote to table of daily discharge.

NOTE.—See footnote to table of daily discharge relative to periods of estimated discharge.

KENTUCKY RIVER BASIN.

DIX RIVER NEAR BURGIN, KY.

Kentucky River joins the Ohio from the south about halfway between Cincinnati, Ohio, and Louisville, Ky.

Dix River, the only tributary on which a gaging station is now maintained, rises in the southern part of Garrard County, flows westward into Lincoln County, then, in general, northward to its junction with Kentucky River at High Bridge. For much of its course it forms the boundary between Garrard County on the east and Boyle and Mercer counties on the west. The drainage area comprises 436 square miles.

The gaging station, which is located at the highway bridge on the Burgin-Buena Vista pike, about 4 miles from Burgin, Ky., was established by representatives of the Kentucky Geological Survey and the Madison Electric & Power Co., of Richmond, Ky. The station has not been inspected by engineers of the United States Geological Survey.

The drainage area above the station is 416 square miles.

The gage is a staff attached to an abutment of the highway bridge. The gage heights and discharge measurements are furnished by the Kentucky Geological Survey and the Madison Electric & Power Co. The computations of daily and monthly discharge were made by the United States Geological Survey.

The discharge rating curve is fairly well defined. The record is considered reliable and accurate.

Discharge measurements of Dix River near Burgin, Ky., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 18	A. F. Foerste	141	898	7.65	1,650
19	G. T. Bogard	141	715	6.44	966
20	....do	141	607	5.64	653
20	....do	141	574	5.44	600
21	....do	141	519	5.1	454
Aug. 14	A. F. Foerste	.....	.....	3.3	[a] 50.4
25	G. T. Bogard	143	372	4.3	219
Sept. 2	L. B. Herrington	142	1,610	12.35	6,260
20	....do	142	1,280	10.2	3,870

[a] Large cross section of dead water not measured.

NOTE.—These measurements were not made by the engineeers of the United States Geological Survey. Measurements computed at Newport office from copies of original notes.

Daily gage height, in feet, of Dix River near Burgin, Ky., for 1910.

[C. P. Kennedy, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5.05	7.70	5.25	3.70	6.05	16	9.00	3.28	3.88	4.60	3.20	4.80
2	3.90	4.50	10.35	4.90	3.80	5.70	17	11.15	3.28	3.75	4.35	3.30	4.60
3	3.80	4.20	8.45	4.45	3.70	5.30	18	7.82	3.30	3.70	4.05	3.35	4.60
4	5.85	4.00	8.10	4.12	.....	5.05	19	6.00	3.28	8.80	4.00	3.35	4.60
5	5.30	4.00	11.05	4.00	.....	5.00	20	5.35	3.70	11.50	3.85	3.30	4.55
6	8.30	3.80	10.00	4.20	.....	7.85	21	5.00	4.60	7.55	3.80	3.00	4.55
7	7.50	3.80	8.25	5.35	.....	7.45	22	4.65	9.05	6.40	3.90	3.00	4.50
8	9.00	3.80	6.05	8.75	3.40	6.45	23	4.50	5.60	5.90	4.05	3.15	4.55
9	6.80	3.60	5.55	6.65	3.45	5.80	24	4.30	5.05	6.05	4.25	3.10	4.75
10	5.70	3.60	5.00	5.75	3.50	5.70	25	4.10	4.45	6.55	4.10	3.15	4.85
11	5.30	3.60	4.75	5.30	3.40	6.00	26	3.95	5.20	10.65	3.95	3.15	4.80
12	5.10	3.40	4.55	5.05	3.50	6.00	27	3.90	5.05	7.45	3.90	3.55	5.05
13	5.00	3.30	4.65	4.90	3.50	5.60	28	4.15	6.50	6.45	3.80	9.00	5.30
14	6.90	3.30	4.30	4.75	3.35	5.00	29	5.10	5.50	5.85	3.70	9.15	5.75
15	6.50	3.30	4.05	4.65	3.20	4.80	30	6.25	5.15	5.50	3.80	6.45	12.55
							31	6.50	4.90	.....	3.75	.....	9.90

NOTE.—Relation of gage height to discharge probably affected by ice about December 10 to 27.

Daily discharge, in second-feet, of Dix River near Burgin, Ky., for 1910.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	436	1,730	502	99	808	16	2,760	48	129	298	41	.....
2	132	270	4,050	388	115	665	17	4,880	48	107	232	50	.....
3	115	195	2,300	257	99	519	18	1,820	50	99	162	55	.....
4	724	151	2,020	177	92	436	19	786	48	2,580	151	55	.....
5	519	151	4,770	151	84	420	20	536	99	5,240	124	50	.....
6	2,180	115	3,700	195	76	1,840	21	420	298	1,630	115	26	.....
7	1,600	115	2,140	536	68	1,570	22	312	2,800	978	132	26	.....
8	2,760	115	808	2,540	60	1,000	23	270	627	744	162	37	.....
9	1,190	84	608	1,110	66	704	24	219	436	808	207	33	.....
10	665	84	420	684	71	.....	25	172	257	1,060	172	37	.....
11	519	84	342	519	60	.....	26	142	485	4,350	142	37	.....
12	452	60	284	436	71	.....	27	132	436	1,570	132	78	.....
13	420	50	312	388	71	.....	28	184	1,030	1,000	115	2,760	519
14	1,240	50	219	342	55	.....	29	452	590	724	99	2,900	684
15	1,030	50	162	312	41	.....	30	902	468	590	115	1,000	6,380
							31	1,030	388	.....	107	.....	3,600

NOTE.—Daily discharge determined by means of a discharge rating curve fairly well defined between 50 and 6,550 second-feet (gage heights 0.3 and 12.7 feet). Discharge interpolated Nov. 4 to 7. Discharge Dec. 10 to 27 estimated, because of ice, from climatologic records; mean discharge 314 second-feet, estimated values varying from 150 to 600 second-feet.

Monthly discharge of Dix River near Burgin, Ky., for 1910.

[Drainage area, 416 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
July 2-31	4,880	115	952	2.29	2.56	A.
August	2,800	48	326	.784	.90	A.
September	5,240	99	1,520	3.66	4.08	A.
October	2,540	99	355	.853	.97	A.
November	2,900	26	277	.666	.74	B.
December	6,380	.....	800	1.92	2.21	C.

NOTE.—See footnotes to tables of daily gage height and daily discharge.

WABASH RIVER BASIN.

GENERAL FEATURES.

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 Salamonie and Mississinewa rivers, Wild Cat, Sugar, and Raccoon creeks, and White and Patoka rivers; on the right bank are Little, Eel, Tippecanoe, Vermilion, Embarrass, Little Wabash, and Saline rivers. White River is much the largest tributary. The length of the Wabash is about 410 miles (map measurement), and its drainage area comprises approximately 33,000 square miles.

The 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, drainage and flood control are subjects of considerable interest. The Department of Agriculture is making a study of conditions with a view to 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 basin is thickly settled and highly cultivated, and the timber standing comprises only groves and woodlots, generally of small extent.

The mean annual rainfall is about 40 inches. The winters 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 winters are mild and ice does not form very thick.

The high value of farm land in this section would undoubtedly prohibit the construction of reservoirs for storage.

The main stream and its tributaries afford good opportunities for water power, especially 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.

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 & 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.

WABASH RIVER AT MOUNT CARMEL, ILL.

This station, which is located at the Southern Railway bridge at Mount Carmel, Ill., was established June 16, 1884. The original gage belonged to the United States Engineer Corps, but it was rebuilt in November, 1904, by the United States Weather Bureau, which furnishes the gage readings. It is a staff gage attached to the first round pier from the west side of the railway bridge. On October 10, 1908, the United States Geological Survey began taking discharge measurements.

White River enters 1½ miles above the station and Patoka River enters immediately above the station. Measurements of extreme floods may be difficult to obtain on account of the many overflow channels east of the station.

Winters in this locality are mild. 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.

Sufficient data have not yet been collected to enable estimates of discharge to be made.

Discharge measurements of Wabash River at Mount Carmel, Ill., in 1908–1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1908.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 10	O'Neill and Chapman	772	5,400	1.15	2,620
1909.					
Mar. 9	W. M. O'Neill	1,440	19,200	13.92	53,600
Apr. 30	Jackson and Chapman	1,210	13,400	9.18	35,200
May 24	....do	979	9,910	6.33	21,300
1910.					
Jan. 29	H. J. Jackson	1,970	28,200	18.86	77,100
Mar. 23	M. E. McChristie	975	8,870	5.40	16,700
Nov. 11	C. T. Bailey	813	6,620	2.50	7,060

Daily gage height, in feet, of Wabash River at Mount Carmel, Ill., for 1910.

[H. M. Phillips, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	13.8	16.1	4.3	5.5	4.9	3.7	7.8	1.8	1.8	3.2	6.4
2	5.0	11.0	17.3	4.2	5.4	4.7	3.9	6.5	1.7	1.8	3.1	5.9
3	5.0	9.9	18.1	4.0	5.5	4.3	3.2	5.7	1.7	1.7	3.0	5.3
4	.....	8.6	18.8	3.9	5.8	4.1	3.3	4.9	2.5	2.0	2.9	5.3
5	.....	7.6	19.4	3.8	7.1	3.9	3.8	4.2	3.6	4.4	2.8	5.2
6	.....	7.5	20.2	3.8	7.3	3.8	4.5	4.0	5.2	10.5	2.8	5.0
7	.....	7.4	21.1	3.7	7.4	3.7	4.8	3.6	5.6	15.2	2.8	4.5
8	.....	7.1	21.7	3.7	7.6	3.6	5.1	3.2	6.6	16.2	2.7	4.0
9	11.4	7.3	21.9	3.6	7.7	3.5	4.8	2.8	8.2	15.9	2.7	3.6
10	.....	7.0	21.7	3.6	7.7	3.3	4.4	2.6	7.2	16.0	2.6	3.3
11	.....	6.4	21.0	3.6	7.6	3.2	5.1	2.5	7.1	16.2	2.6	3.1
12	.....	6.0	19.1	3.6	7.5	3.0	4.9	2.4	6.7	16.9	2.5	3.0
13	.....	5.5	15.5	3.6	7.7	2.9	4.9	2.3	5.8	17.4	2.5	3.0
14	11.9	5.2	12.1	3.6	7.9	2.8	5.5	2.2	5.0	17.7	2.4	2.9
15	11.8	5.0	9.7	3.6	7.6	2.8	5.5	2.1	4.6	17.5	2.4	2.7
16	13.2	4.8	8.5	3.6	7.1	2.8	5.2	2.0	4.2	17.1	2.3	2.5
17	13.8	4.8	6.8	4.1	6.2	2.7	7.7	2.0	4.0	16.2	2.2	2.4
18	15.8	4.8	6.2	5.0	5.6	2.6	12.1	1.9	3.6	14.4	2.2	2.4
19	17.1	.....	6.0	5.7	5.1	2.5	12.8	1.9	3.2	10.7	2.2	2.4
20	17.7	5.0	6.0	6.2	4.8	2.4	12.5	1.9	3.0	7.7	2.1	2.3
21	18.3	5.3	5.9	6.8	4.7	2.3	12.3	1.9	2.8	6.5	2.1	2.2
22	18.9	7.0	5.6	7.0	4.6	2.2	12.5	2.0	2.6	5.7	2.0	2.2
23	19.8	9.0	5.4	6.8	4.6	2.0	12.4	2.1	2.4	5.4	2.0	2.2
24	20.3	10.2	5.1	7.0	5.0	1.8	12.2	2.2	2.2	5.2	2.0	2.2
25	20.7	10.1	4.9	7.2	6.2	1.7	12.1	2.0	2.1	5.0	2.0	2.2
26	21.0	10.1	4.9	7.5	7.3	1.6	9.1	1.9	2.0	4.8	2.0	2.2
27	21.0	11.5	4.9	6.7	7.6	1.5	7.2	1.8	2.0	4.6	2.0	2.2
28	20.5	13.8	4.8	6.1	7.6	1.4	5.5	1.8	1.9	4.3	2.2	2.2
29	19.4	.....	4.6	5.8	7.0	1.4	5.0	1.7	1.8	4.0	5.1	2.3
30	17.9	.....	4.4	5.5	5.9	2.5	7.2	1.7	1.8	3.7	6.4	2.5
31	16.4	.....	4.3	.....	5.2	.....	9.3	1.7	.....	3.4	.....	4.0

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 1 to 15, Feb. 18 to 28, and Dec. 11 to 29. River reported "frozen" Jan. 1, 4 to 8, 10 to 13, and Feb. 19.

EMBARRASS RIVER BASIN.

GENERAL FEATURES.

The drainage area of Embarrass River lies in the southeastern portion of the State of Illinois.

The river rises in the central part of Champaign County, near Urbana, flows in a southerly direction through Douglas, Coles, and Cumberland counties to the center of Jasper County, whence it takes an extremely tortuous but in general southeasterly course across

Jasper County, the southwestern corner of Crawford County, and Lawrence County to its junction with Wabash River, about midway between Vincennes, Ind., and St. Francisville, Ill. Exclusive of the bends, its length is about 125 miles, and its drainage area comprises 2,410 square miles. Its most important tributary is Hickory Creek, or North Fork Creek, which enters from the left bank about 2½ miles below St. Marie, Ill. The sources of the river are about 730 feet and the mouth about 400 feet above sea level.

The basin is long and narrow, with a length of about 100 miles and a fairly uniform width ranging from 15 to 30 miles. The surrounding country, which is level or gently rolling, is diversified by some small hills along the river. In the lower part of the basin, in the vicinity of St. Marie, the soil is sandy along the river; farther north and west it is the familiar black loam. To the east the soil is a light-colored clay, which was formerly covered with a heavy growth of "water oak." Near Oakland, in the upper part of the area, a sandy red soil occurs near the river and black loam away from the river. A mile back from the river on either side is prairie country.

In the southwestern part of the basin, west of Lawrenceville, there are extensive oil fields.

The chief crop in the valley of the Embarrass is corn. Some wheat is also grown. Forested areas are lacking in this basin.

The mean annual rainfall is about 40 inches. The winters are, as a rule, mild, the snowfall extending over a period of about two months and lasting only a few days at a time. For about a month ice in the river is 3 or 4 inches thick. During periods of extreme drought there is little flow in the river, for there are no springs in the basin and the ground-water storage is insufficient to maintain the low-water flow. In wet seasons the ground becomes saturated, and heavy rains reach the river too rapidly for the streams to care for them. Large areas of bottom land throughout the entire length of the river are inundated by the floods, which cause a great amount of damage. Land drainage and flood control are therefore subjects of much importance and are now under investigation. Little drainage work has been done in the uplands, but the bottoms have been drained to some extent. No water-power sites are available in this basin. The question of storage has not been studied.

The stations in this drainage are maintained in cooperation with the State of Illinois.

EMBARRASS RIVER NEAR OAKLAND, ILL.

This station, which is located at the highway bridge known as the "Antioch bridge," about 2 miles northwest of Oakland, Ill., on the county-line road to Hindsboro and Arcola, was established October 23, 1909.

Brush Creek enters from the left bank about 5 miles above the station. The total drainage area above the gaging station is 535 square miles.

The datum of the chain gage, attached to the bridge, has remained unchanged since its installation.

The data are accurate and reliable.

There was no flow at this station during a portion of the summer of 1908. The flood of 1897 reached a height of about 24 feet by the present gage datum.

Discharge measurements of Embarrass River near Oakland, Ill., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 8	M. E. McChristie	119	628	7.11	792
12	do	105	426	5.44	440
12	do	105	430	5.46	419
26	H. J. Jackson	160	894	9.02	1,230
July 21	Jackson and Hanson	98	367	4.85	280

Daily gage height, in feet, of Embarrass River near Oakland, Ill., for 1910.

[A. J. McDaniels, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.7	4.7	13.0	3.35	4.75	5.1	4.35	5.6	1.9	3.1	2.7	3.55
2	4.9	4.8	12.5	3.45	5.0	4.8	3.5	5.05	1.9	2.95	2.7	3.7
3	5.85	5.1	10.5	3.35	5.25	4.6	4.65	4.2	1.95	2.9	2.75	3.8
4	5.9	5.0	10.0	3.3	6.2	4.5	4.95	3.45	1.95	4.0	2.65	3.95
5	5.8	4.95	9.2	3.25	5.65	4.4	5.0	3.0	2.8	5.85	2.65	3.8
6	5.85	4.9	8.4	3.2	5.45	4.3	5.55	2.8	3.95	6.6	2.6	3.7
7	5.6	4.65	7.3	3.15	5.25	4.1	5.9	2.75	4.4	6.55	2.6	3.7
8	5.4	4.6	6.9	3.2	5.2	4.0	5.05	2.6	4.95	6.4	2.7	3.5
9	5.0	4.5	6.1	3.25	6.95	3.9	4.75	2.55	4.5	6.15	2.65	3.35
10	4.6	4.45	5.8	3.25	6.8	3.8	4.0	2.45	4.3	5.8	2.75	3.2
11	4.4	4.2	5.55	3.25	6.8	3.75	3.05	2.4	4.15	5.6	2.75	3.2
12	5.2	4.0	5.4	3.3	7.7	3.5	3.4	2.35	4.0	5.55	2.75	3.25
13	10.55	4.0	5.2	3.35	7.7	3.4	4.25	2.25	3.9	5.3	2.75	3.15
14	14.15	3.95	5.15	3.4	7.6	3.35	3.9	2.35	3.7	5.05	2.65	3.2
15	15.0	3.95	4.9	3.45	7.3	3.3	3.6	2.3	3.4	4.8	2.65	3.1
16	13.5	3.9	4.8	3.5	6.25	3.2	9.9	2.6	3.05	4.5	2.55	3.0
17	11.2	3.85	4.7	3.9	5.8	3.1	9.0	2.55	2.75	3.95	2.4	3.05
18	12.5	3.85	4.5	4.05	5.15	3.0	8.55	2.45	2.75	3.8	2.4	2.9
19	13.5	3.9	4.3	4.0	5.0	2.8	7.95	2.35	2.65	3.55	2.3	2.85
20	12.4	3.8	4.25	4.0	4.8	2.75	6.25	2.15	2.55	3.3	2.25	2.9
21	10.45	3.9	4.2	3.9	4.45	2.7	5.6	2.1	2.55	3.1	2.2	2.8
22	9.0	4.1	4.15	3.9	4.2	2.55	5.15	2.15	2.5	3.05	2.25	2.75
23	7.6	4.2	4.1	3.9	7.9	2.55	4.5	2.05	2.85	2.9	2.3	2.7
24	6.2	3.9	4.0	3.9	9.1	2.5	3.9	2.1	2.95	2.9	2.2	2.65
25	6.0	4.1	3.95	3.95	9.5	2.4	3.55	2.0	2.95	2.85	2.25	2.7
26	5.8	4.2	3.95	4.2	8.55	2.3	3.2	2.0	2.95	2.8	2.2	2.6
27	5.6	5.0	3.9	4.2	7.1	3.5	3.15	1.95	3.2	2.8	2.3	2.65
28	5.3	9.0	3.85	4.2	6.1	4.7	3.6	1.9	3.3	2.7	2.75	2.55
29	5.1	.....	3.7	4.4	5.8	5.0	5.8	1.9	3.2	2.7	2.8	2.7
30	5.05	.....	3.55	4.5	5.6	5.1	6.35	1.85	3.1	2.6	3.0	2.95
31	4.8	.....	3.4	.....	5.5	.....	6.0	1.8	.....	2.6	.....	3.9

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to 11, Feb. 17 to 21, and Dec. 11 to 31. Dec. 26 to 31 gage read to top of ice.

Daily discharge, in second-feet, of Embarrass River near Oakland, Ill., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	300	278	2,710	90	288	356	218	456	8	68	43	110
2	300	297	2,500	100	336	297	105	346	8	58	43	128
3	300	356	1,750	90	386	260	269	194	9	55	46	140
4	300	336	1,580	85	583	243	326	100	9	165	40	158
5	300	326	1,330	90	466	226	336	61	49	508	40	140
6	300	316	1,100	76	426	210	446	49	158	671	37	128
7	300	269	830	72	386	179	519	46	226	660	37	128
8	200	260	737	76	376	165	346	37	326	627	43	105
9	200	243	561	80	748	152	288	34	243	572	40	90
10	200	234	498	80	715	140	165	30	210	498	46	76
11	200	194	446	80	715	134	64	27	186	456	46	60
12	376	165	416	85	926	105	95	24	165	446	46	50
13	1,770	165	376	90	926	95	202	20	152	396	46	40
14	3,200	158	366	95	902	90	152	24	128	346	40	30
15	3,560	158	316	100	830	85	116	22	95	297	40	30
16	2,920	152	297	105	594	76	1,550	37	64	243	34	25
17	2,000	100	278	152	498	68	1,270	34	46	158	27	25
18	2,500	100	243	172	366	61	1,150	30	46	140	27	20
19	2,920	50	210	165	336	49	988	24	40	110	22	20
20	2,460	40	202	165	297	46	594	15	34	85	20	20
21	1,730	60	194	152	234	43	456	13	34	68	17	15
22	1,270	179	186	152	194	34	366	15	32	64	20	15
23	902	194	179	152	975	34	243	12	52	55	22	15
24	583	152	165	152	1,300	32	152	13	58	55	17	15
25	540	179	158	158	1,420	27	110	10	58	52	20	15
26	498	194	158	194	1,150	22	76	10	58	49	17	20
27	456	336	152	194	783	105	72	9	76	49	22	20
28	396	1,270	146	194	561	278	116	8	85	43	46	30
29	356	.....	128	226	498	336	498	8	76	43	49	40
30	346	.....	110	243	456	356	616	7	68	37	61	50
31	297	.....	95	.....	436	.....	540	6	.....	37	.....	100

NOTE.—Daily discharge determined by means of a discharge rating curve well defined between 22 and 1,000 second-feet (gage heights 2.3 and 8.0 feet); fairly well defined between 1,030 and 1,550 second-feet (gage heights 8.1 and 9.9 feet), and is an extension above discharge 1,580 second-feet (gage height 10.0 feet).
Daily discharge Jan. 1 to 11, Feb. 17 to 21, and Dec. 11 to 31 estimated because of ice, from climatologic records and records of run-off in adjacent drainage areas.

Monthly discharge of Embarrass River near Oakland, Ill., for 1910.

[Drainage area, 535 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	3,560	200	1,030	1.93	2.22	C.
February	1,270	40	241	.450	.47	A.
March	2,710	95	594	1.11	1.28	B.
April	243	72	128	.239	.27	A.
May	1,420	194	616	1.15	1.33	A.
June	356	22	143	.267	.30	A.
July	1,550	64	401	.750	.86	A.
August	456	6	55.5	.104	.12	B.
September	326	8	93.3	.174	.19	A.
October	671	37	229	.428	.49	A.
November	61	17	35.1	.066	.07	B.
December	158	15	59.9	.112	.13	D.
The year	3,560	6	305	.570	7.73	

EMBARRASS RIVER AT ST. MARIE, ILL.

This station, which is located at the highway bridge at the north end of Main Street, St. Marie, Ill., about 150 yards downstream from

the Cincinnati, Hamilton & Dayton Railway bridge, was established October 20, 1909.

Hickory Creek, or North Fork Creek, enters from the left bank about 2½ miles below the station. The total drainage area above the gaging station is 1,540 square miles.

The datum of the chain gage, attached to the highway bridge, has remained unchanged since its installation.

The data are accurate and reliable.

The flood of the spring of 1908 reached a height of about 22.5 feet by the present gage.

Discharge measurements of Embarrass River at St. Marie, Ill., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec. ft.*
Mar. 5	M. E. McChristie	174	2,160	16.01	4,600
Apr. 8	H. J. Jackson	112	462	3.70	301
May 14	C. T. Bailey	122	1,040	8.67	1,780
15	do	120	955	8.06	1,570
16	do	118	839	7.18	1,210
17	do	117	760	6.53	1,010
17	do	117	753	6.43	1,000
18	do	116	711	6.06	953
Dec. 19	P. S. Monk	111	348	3.49	265

Daily gage height, in feet, of Embarrass River at St. Marie, Ill., for 1910.

[Observers: T. L. Britton, Jan. 1 to Apr. 16; Harvey Dalton, Apr. 17 to Aug. 14; and V. C. Wuerth, Aug. 15 to Dec. 31.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5.9	18.7	4.0	4.4	5.2	5.1	8.5	2.5	2.6	3.1	8.7
2	.....	5.5	18.3	4.1	4.3	5.6	4.5	8.0	2.4	2.4	3.1	6.8
3	.....	6.0	17.7	3.9	6.0	5.2	5.2	5.6	2.4	2.4	3.0	5.9
4	.....	6.8	17.2	3.9	13.2	.....	6.9	5.0	2.6	5.7	3.0	5.4
5	.....	6.1	15.9	3.9	10.0	.....	10.7	4.5	2.7	14.4	3.0	5.1
6	.....	5.7	14.2	3.9	7.1	.....	10.3	4.1	2.5	17.6	2.9	4.7
7	.....	5.4	12.4	3.8	6.1	.....	7.1	4.2	2.5	18.7	2.9	4.5
8	5.4	5.0	10.5	3.7	7.1	.....	6.1	3.7	4.2	18.5	2.9	4.2
9	.....	4.9	9.2	3.6	9.1	.....	6.2	3.6	6.1	16.5	2.9	4.1
10	.....	4.9	8.4	3.5	8.1	4.1	5.0	3.5	5.9	12.8	2.8	3.9
11	.....	4.7	7.6	3.4	7.5	4.0	4.5	3.4	5.0	8.8	2.8	3.8
12	.....	4.5	7.1	3.4	11.1	3.7	4.2	3.3	4.4	7.2	2.7	3.6
13	7.2	4.3	6.7	3.3	11.4	3.5	5.3	3.2	4.0	6.3	2.7	3.8
14	14.0	5.5	6.4	3.3	8.8	3.6	4.9	3.1	4.8	5.8	2.7	3.7
15	16.0	5.0	6.1	3.3	7.9	3.6	5.1	2.8	3.8	5.5	2.7	3.5
16	16.0	5.0	5.8	6.2	7.0	3.2	15.5	2.8	3.5	5.0	2.6	3.5
17	15.1	4.7	5.5	10.3	6.5	3.2	18.5	3.1	3.2	4.8	2.6	3.4
18	15.3	4.9	5.4	9.1	6.0	3.1	18.9	3.2	3.0	4.5	2.6	3.4
19	15.9	4.9	5.2	6.7	5.7	3.1	18.3	3.7	2.8	4.3	2.6	3.4
20	17.4	4.9	5.1	6.3	5.4	3.0	16.2	3.6	2.6	4.1	2.5	3.2
21	17.1	5.2	5.0	5.4	5.2	2.9	12.0	3.1	2.6	4.1	2.5	3.6
22	15.3	6.5	4.9	5.5	5.1	2.8	8.1	2.8	2.5	3.9	2.4	3.4
23	12.9	7.4	4.7	4.9	7.5	2.9	6.9	2.8	2.5	3.8	2.4	3.2
24	10.3	7.1	4.6	4.8	12.0	2.7	6.0	2.8	2.5	3.8	2.4	3.4
25	8.7	6.5	4.5	4.5	9.3	2.6	5.5	2.8	2.4	3.7	2.4	2.9
26	7.8	5.6	4.5	4.3	8.9	2.9	5.1	3.0	3.1	3.5	2.4	2.9
27	7.5	15.7	4.3	4.8	8.2	4.0	4.9	6.2	3.1	3.5	2.8	3.0
28	7.4	18.1	4.2	4.9	9.1	4.3	4.3	4.8	3.0	3.4	11.3	3.4
29	6.9	.....	4.2	4.5	7.3	7.0	8.2	3.2	2.8	3.3	15.6	5.9
30	6.4	.....	4.1	4.4	7.2	5.4	10.2	2.9	2.7	3.2	12.8	9.4
31	6.1	.....	4.0	.....	5.9	.....	11.2	2.7	.....	3.2	.....	8.5

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to 16. Gage read to top of ice Jan. 13 to 16, Feb. 18 to 20, and Dec. 25 and 26.

Daily discharge, in second-feet, of Embarrass River at St. Marie, Ill., for 1909–10.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1909.				1909.				1909.			
1	.....	122	345	11	.....	122	250	21	174	291	500
2	.....	122	326	12	.....	122	465	22	140	259	400
3	.....	129	291	13	.....	122	3,110	23	126	769	400
4	.....	122	259	14	.....	122	4,790	24	202	2,300	400
5	.....	122	259	15	.....	129	4,710	25	275	1,200	400
6	.....	115	259	16	.....	129	3,930	26	179	893	350
7	.....	118	291	17	.....	160	2,740	27	144	740	350
8	.....	118	250	18	.....	423	1,830	28	136	579	350
9	.....	118	250	19	.....	259	1,340	29	144	465	350
10	.....	122	250	20	179	190	800	30	136	423	350
								31	129	.....	350

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	400	799	5,860	345	423	604	579	1,720	144	152	202	1,790
2	400	683	5,690	364	403	711	444	1,630	136	136	202	1,100
3	400	830	5,450	326	830	604	604	711	136	136	190	799
4	500	1,100	5,240	326	3,600	570	1,130	555	152	740	190	656
5	500	861	4,710	326	2,300	535	2,580	444	160	4,090	190	579
6	500	740	4,010	326	1,200	501	2,420	364	144	5,410	179	487
7	500	656	3,270	308	861	467	1,200	333	144	5,860	179	444
8	500	555	2,500	291	1,200	433	861	291	333	5,780	179	383
9	400	532	1,980	275	1,940	398	893	275	861	4,960	179	364
10	400	532	1,680	259	1,570	364	555	259	799	3,440	169	326
11	400	487	1,380	244	1,340	345	444	244	555	1,830	169	308
12	800	444	1,200	244	2,740	291	383	229	423	1,240	160	275
13	1,000	403	1,060	229	2,860	259	630	215	345	926	160	308
14	3,500	683	959	229	1,830	275	532	202	509	769	160	291
15	4,500	555	861	229	1,490	275	579	169	308	683	160	259
16	4,500	555	769	893	1,160	215	4,540	169	259	555	152	259
17	4,380	487	683	2,420	992	215	5,780	202	215	509	152	244
18	4,460	532	656	1,940	830	202	5,940	215	190	444	152	244
19	4,710	532	604	1,060	740	202	5,690	291	169	403	152	244
20	5,320	532	579	926	656	190	4,830	275	152	364	144	215
21	5,200	604	555	656	604	179	3,110	202	152	364	144	275
22	4,460	992	532	683	579	169	1,570	169	144	326	136	244
23	3,480	1,310	487	532	1,340	179	1,130	169	144	308	136	215
24	2,420	1,200	465	509	3,110	160	830	169	144	308	136	244
25	1,790	992	444	444	2,020	152	683	169	136	291	136	179
26	1,460	711	444	403	1,870	179	579	190	202	259	136	179
27	1,340	4,630	403	509	1,600	345	532	893	202	259	169	190
28	1,310	5,610	383	532	1,940	403	403	509	190	244	2,820	244
29	1,130	.....	383	444	1,270	1,160	1,600	215	169	229	4,590	799
30	959	.....	364	423	1,240	656	2,380	179	160	215	3,440	2,060
31	861	.....	345	.....	799	.....	2,780	160	.....	215	.....	1,720

NOTE.—Discharge for 1909 redetermined by means of a rating curve which was revised as result of discharge measurements made since 1909. Daily discharge, 1910, determined by means of the revised rating curve, which is poorly defined below 160 second-feet (gage height 2.7 feet); well defined between 169 and 1,870 second-feet (gage heights 2.8 and 8.9 feet); fairly well defined between 1,900 and 4,750 second-feet (gage heights 9.0 and 16.0 feet); and above 4,750 second-feet (gage height 16.0 feet) is extended on a tangent which starts at discharge 2,700 second-feet (gage height 11.0 feet). Discharge Dec. 8 to 11, 1909, and Dec. 20, 1909, to Jan. 16, 1910, estimated, because of ice, from climatologic records and records of run-off in adjacent drainage areas. Because of the revision the figures in these tables differ from those published by the Internal Improvement Commission of Illinois in its report for 1908–1910.

Monthly discharge of Embarrass River at St. Marie, Ill., for 1909–10.

[Drainage area, 1,540 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1909.						
October 20–31	275	126	164	0.106	0.05	B.
November	2,300	115	364	.236	.26	A.
December	4,790	250	998	.648	.75	B.
1910.						
January	5,320	400	2,020	1.31	1.51	B.
February	5,610	403	1,020	.662	.69	A.
March	5,860	345	1,740	1.13	1.30	A.
April	2,420	229	556	.361	.40	A.
May	3,600	403	1,460	.948	1.09	A.
June	1,160	152	375	.244	.27	A.
July	5,940	383	1,810	1.18	1.36	A.
August	1,720	160	380	.247	.28	A.
September	861	136	261	.169	.19	A.
October	5,860	136	1,340	.870	1.00	A.
November	4,590	136	509	.331	.37	A.
December	2,060	179	514	.334	.39	B.
The year	5,940	136	1,000	.649	8.85	

NOTE.—See footnotes to daily discharge table.

WHITE RIVER BASIN.

EAST BRANCH OF WHITE RIVER AT SHOALS, IND.

White River, the largest tributary of Wabash River, is formed by the junction of the East and West branches near Petersburg, Ind., and discharges into the Wabash above Mount Carmel, Ill. The area of the oval-shaped basin comprises about one-half of the Wabash drainage in Indiana, or one-sixth of the entire State.

The two branches rise in eastern Indiana at an elevation of about 1,000 feet and flow in a general southwesterly direction nearly across the State. The West Branch rises in Randolph County near the Ohio-Indiana State line, flows west to Hamilton County near the center of the State, then southwest to its junction with the East Branch. The East Branch is formed in Bartholomew County by several streams which have their sources in Henry and Hancock counties. Its course is south and west through Jackson, Lawrence, Martin, and Daviess counties to the junction with the West Branch.

The fall is much greater on the East and West branches of the White than on the Wabash, and these streams afford good water-power sites which have not been utilized to a great extent because of the abundance of cheap fuel.

The gaging station, which is located at the highway bridge between East Shoals and West Shoals, Ind., a short distance above the Baltimore & Ohio Southwestern Railroad bridge, was established June

25, 1903, discontinued July 21, 1906, and reestablished October 12, 1908.

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.

The datum of the chain gage, which is attached to the highway bridge, was raised 61 feet on January 1, 1909, so as to be the same as that used by the Weather Bureau.

The records are reliable and accurate. The winters are mild in this vicinity and the winter flow is affected but little by ice.

Discharge measurements of East Branch of White River at Shoals, Ind., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.ft.*
Mar. 24	M. E. McChristie	321	828	3.84	2,420
Oct. 29 [a]	R. H. Bolster	308	815	3.79	1,970

[a] Drift collected in left-hand span of railroad bridge, below bridge from which measurement was made.

Daily gage height, in feet, of East Branch of White River at Shoals, Ind., for 1910.

[O. H. Greist, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.1	5.2	14.5	3.5	3.8	3.6	3.45	4.3	3.05	2.7	3.6	5.4
2	3.2	4.9	15.2	3.4	3.8	3.5	3.45	3.95	3.15	2.6	3.5	4.9
3	3.5	4.8	17.9	3.4	3.9	3.4	3.35	3.85	3.05	2.6	3.5	4.4
4	4.6	4.6	20.5	3.4	4.2	3.3	3.15	3.7	3.2	2.9	3.4	4.05
5	4.0	4.6	22.2	3.4	4.7	3.3	3.1	3.5	3.3	5.5	3.4	3.85
6	4.8	4.6	22.3	3.4	4.7	3.2	3.3	3.4	4.5	15.5	3.4	3.7
7	5.4	4.6	20.6	3.3	4.7	3.2	4.05	3.3	4.45	18.65	3.4	3.6
8	5.6	4.5	16.3	3.5	4.9	3.2	4.5	3.2	4.0	17.55	3.4	3.5
9	5.2	4.3	11.2	3.4	5.3	3.1	5.0	3.1	3.95	17.2	3.4	3.4
10	4.8	4.2	7.7	3.4	5.9	3.1	5.1	3.1	3.65	19.55	3.4	3.4
11	4.6	4.1	6.1	3.3	6.0	3.1	5.1	3.0	3.5	21.95	3.3	3.35
12	3.9	4.1	5.5	3.4	5.8	3.1	5.0	3.0	3.35	23.55	3.3	3.3
13	4.4	3.9	5.2	3.5	5.6	3.1	5.2	2.9	3.15	23.65	3.2	3.2
14	8.9	3.8	4.9	3.4	5.2	3.2	4.75	2.9	3.1	22.15	3.2	3.2
15	9.9	3.8	4.7	3.6	4.9	3.2	4.55	2.9	3.0	18.55	3.2	3.15
16	8.4	3.8	4.5	3.7	4.6	3.1	5.05	2.8	2.9	11.8	3.2	3.2
17	11.2	4.0	4.4	4.5	4.3	3.1	6.7	2.8	2.8	7.5	3.2	3.2
18	12.5	4.8	4.3	4.4	4.1	3.1	6.9	2.9	2.7	6.0	3.1	3.1
19	16.1	5.6	4.2	5.0	4.1	2.9	8.15	2.8	2.7	5.15	3.1	3.1
20	17.3	5.6	4.1	5.7	4.0	2.9	8.65	2.8	2.7	4.9	3.1	3.0
21	17.7	5.7	4.0	5.7	4.0	2.8	9.2	2.8	2.6	4.6	3.1	3.0
22	18.0	6.8	4.0	5.6	4.3	2.8	9.45	2.75	2.6	4.5	3.1	2.85
23	17.6	8.1	3.9	5.2	5.0	2.7	7.85	2.95	2.6	4.35	3.1	3.0
24	16.0	9.1	3.8	4.8	5.4	2.7	6.25	2.8	2.6	4.3	3.1	3.0
25	12.8	8.6	3.7	4.5	5.3	2.7	5.2	2.7	2.7	4.2	3.05	2.9
26	9.4	8.3	3.7	4.2	5.1	2.7	4.45	2.7	2.8	4.1	3.0	2.8
27	7.3	8.3	3.7	4.1	4.8	2.8	4.3	2.8	2.8	4.0	3.0	2.8
28	6.3	12.3	3.6	4.0	4.6	3.2	4.25	2.9	2.7	3.9	3.75	3.25
29	5.8	.....	3.6	3.9	4.3	3.1	4.6	3.0	2.7	3.8	4.85	4.25
30	5.8	.....	3.6	3.9	4.0	3.2	5.3	2.9	2.7	3.7	5.45	6.0
31	5.7	.....	3.5	.....	3.8	.....	5.0	2.9	.....	3.7	.....	7.7

NOTE.—No record of ice kept by observer. Relation of gage height to discharge probably not affected by ice.

Daily discharge, in second-feet, of East Branch of White River at Shoals, Ind., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,270	6,080	22,200	1,890	2,460	2,070	1,800	3,710	1,200	770	1,680	5,970
2	1,410	5,320	23,300	1,720	2,460	1,890	1,800	2,800	1,340	670	1,530	4,680
3	1,890	5,060	27,400	1,720	2,680	1,720	1,640	2,570	1,200	670	1,530	3,350
4	4,520	4,520	31,200	1,720	3,440	1,560	1,340	2,260	1,410	1,000	1,400	2,510
5	2,920	4,520	33,800	1,720	4,790	1,560	1,270	1,890	1,560	6,800	1,400	2,100
6	5,060	4,520	34,000	1,720	4,790	1,410	1,560	1,720	4,250	23,800	1,400	1,840
7	6,560	4,520	31,400	1,560	4,790	1,410	3,050	1,560	4,120	28,500	1,400	1,680
8	7,040	4,250	25,000	1,890	5,320	1,410	4,250	1,410	2,920	26,800	1,400	1,530
9	6,080	3,710	17,300	1,720	6,320	1,270	5,580	1,270	2,800	26,300	1,400	1,400
10	5,060	3,440	11,400	1,720	7,730	1,270	5,830	1,270	2,160	29,800	1,400	1,400
11	4,520	3,180	8,170	1,560	7,950	1,270	5,830	1,130	1,890	33,400	1,280	1,340
12	2,680	3,180	6,800	1,720	7,500	1,270	5,580	1,130	1,640	35,800	1,280	1,280
13	3,980	2,680	6,080	1,890	7,040	1,270	6,080	1,000	1,340	36,000	1,170	1,170
14	13,600	2,460	5,320	1,720	6,080	1,410	4,920	1,000	1,270	33,700	1,170	1,170
15	15,200	2,460	4,790	2,070	5,320	1,410	4,380	1,000	1,130	28,300	1,170	1,120
16	12,700	2,460	4,250	2,260	4,520	1,270	5,700	880	1,000	18,200	1,170	1,170
17	17,300	2,920	3,980	4,250	3,710	1,270	9,450	880	880	10,600	1,170	1,170
18	19,200	5,060	3,710	3,980	3,180	1,270	9,850	1,000	770	7,400	1,060	1,060
19	24,600	7,040	3,440	5,580	3,180	1,000	12,200	880	770	5,330	1,060	1,060
20	26,400	7,040	3,180	7,270	2,920	1,000	13,100	880	770	4,680	1,060	965
21	27,000	7,270	2,920	7,270	2,920	880	14,100	880	670	3,890	1,060	965
22	27,500	9,650	2,920	7,040	3,710	880	14,500	825	670	3,620	1,060	820
23	26,900	12,100	2,680	6,080	5,580	770	11,700	1,060	670	3,220	1,060	965
24	24,500	13,900	2,460	5,060	6,560	770	8,500	880	670	3,090	1,060	965
25	19,700	13,000	2,260	4,250	6,320	770	6,080	770	770	2,850	1,020	865
26	14,400	12,500	2,260	3,440	5,830	770	4,120	770	880	2,620	965	775
27	10,600	12,500	2,260	3,180	5,060	880	3,710	880	880	2,400	965	775
28	8,610	19,000	2,070	2,920	4,520	1,410	3,580	1,000	770	2,200	1,920	1,220
29	7,500	.....	2,070	2,680	3,710	1,270	4,660	1,130	770	2,010	4,550	2,970
30	7,500	.....	2,070	2,680	2,920	1,410	6,320	1,000	770	1,840	6,100	7,400
31	7,270	.....	1,890	.....	2,460	.....	5,580	1,000	.....	1,840	.....	11,100

NOTE.—Daily discharge, Jan. 1 to Oct. 16, determined from a rating curve that is based on discharge measurements made from 1903 to October, 1910, is well defined below 4,250 second-feet (gage height 4.5 feet), reverses at about 4,250 second-feet (gage height 4.5 feet), and is drawn on a tangent above 17,000 second-feet (gage height 11.0 feet). Daily discharge, Oct. 17 to Dec. 31, determined from a rating curve that is based on 1 discharge measurement made Oct. 29, 1910, and the shape of the previous curve being approximately parallel to previous curve above 2,400 second-feet (gage height 4.0 feet). This curve reverses at about 3,620 second-feet (gage height 4.5 feet) and is not well defined. The change indicated by the discharge measurement made Oct. 29, 1910, is probably due to drift lodged in the channel below the gaging section. The date and stage for change from one curve to the other are very uncertain.

Monthly discharge of East Fork of White River at Shoals, Ind., for 1910.

[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.		
January	27,500	1,270	11,700	2.39	2.76	B.
February	19,000	2,460	6,590	1.34	1.40	B.
March	34,000	1,890	10,700	2.18	2.51	B.
April	7,270	1,560	3,140	.641	.72	A.
May	7,950	2,460	4,700	.959	1.11	A.
June	2,070	770	1,260	.257	.29	A.
July	14,500	1,270	6,070	1.24	1.43	A.
August	3,710	770	1,300	.265	.31	A.
September	4,250	670	1,400	.286	.32	A.
October	36,000	670	12,500	2.55	2.94	B.
November	6,100	965	1,530	.312	.35	B.
December	11,100	775	2,150	.439	.51	B.
The year	36,000	670	5,290	1.08	14.66	

LITTLE WABASH RIVER BASIN.

GENERAL FEATURES.

The drainage basin of Little Wabash River lies in the southeastern part of the State of Illinois.

The river rises in the southwestern corner of Coles County, flows slightly southeastward, and discharges into Wabash River about 15 miles above its mouth, at the boundary line between White and Gallatin counties. Skillet Fork, its only important tributary, joins it not far above its mouth. The Little Wabash is about 150 miles long, and its drainage area comprises 3,200 square miles. The elevation of the sources of the river is about 720 feet; at its mouth it is about 340 feet above sea level.

The basin is shaped somewhat like a parallelogram, with the long sides north and south. The country is level or undulating. The soil, a rich black loam in the northern part, gradually changes into a yellow clay or "mulatto soil" in the southern part. There are no forested areas in this basin.

The annual rainfall is about 42 inches. The winters are mild; ice does not form very thick and snowfall is light and does not last long.

No water-power sites exist anywhere in this basin.

The question of storage has not been investigated, though it is recognized as important in connection with the growing demand for water supplies and the general subjects of drainage and flood control. The United States Department of Agriculture is making a study of the surface with a view to formulating 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 gaging stations in this drainage are maintained in cooperation with the State of Illinois.

LITTLE WABASH RIVER NEAR CLAY CITY, ILL.

This station, which is located at the Baltimore & Ohio Southwestern Railroad bridge, about 2 miles east of Clay City, Ill., was established October 3, 1908.

Big Muddy Creek enters from the left bank, about 5 miles below the section. The total drainage area above the gaging station is 808 square miles.

This station is at the toe of a horseshoe bend in the river, and the ground inside the bend along the railroad track is low. During high water the Little Wabash overflows into Little Muddy Creek, a branch of Big Muddy Creek, and in extreme high water also overflows into Big Muddy Creek, forming at such times a sheet of water about 4 miles wide along the railroad embankment. The discharge of the Little Wabash at the gaging station during extreme high water can not be determined on account of the above conditions, for the water

which passes the gaging station includes some of the flood water of Big Muddy Creek. The station is not good for measurement of low-water flow because of comparatively large area of the section and low velocity of the current at low stages. Springs feed the river near the gaging station, and the river has not been known to go dry at this point. The flood of February 8, 1909, reached a height of about 23.7 feet by the present gage datum.

The datum of the chain gage, attached to the railroad bridge, has remained unchanged since its installation, and the records are reliable and accurate.

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

Discharge measurements of Little Wabash River near Clay City, Ill., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 4	Jackson and McChristie	1,703	6,970	18.73	[a]9,760
11	H. J. Jackson	64	342	8.92	317
11	do	64	341	8.89	302
Dec. 18	Bailey and Monk	51	193	6.50	49.1

[a] Includes Little Muddy and Big Muddy creeks.

Daily gage height, in feet, of Little Wabash River near Clay City, Ill., for 1910.

[Wm. F. Davis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.9	8.4	18.75	6.7	7.9	10.4	7.8	6.85	6.8	7.05	6.15	12.35
2	7.0	8.9	19.5	6.7	7.4	8.7	7.2	6.8	6.6	7.0	6.2	9.4
3	7.1	8.9	19.0	6.7	7.1	8.0	7.0	6.7	6.9	6.4	6.2	8.3
4	7.1	9.45	18.7	6.7	7.1	7.7	7.0	6.7	7.0	10.55	6.15	7.85
5	8.4	11.2	18.5	6.9	10.55	7.8	11.7	6.5	8.0	18.1	6.1	7.4
6	8.9	10.2	18.3	7.0	10.8	10.2	13.7	6.5	8.3	18.7	6.1	7.15
7	9.3	9.0	17.0	7.0	9.0	10.1	14.2	6.4	7.9	19.0	6.05	7.2
8	9.3	8.4	13.35	7.0	9.4	8.4	12.0	6.4	9.8	18.8	6.1	7.1
9	9.3	7.85	11.3	7.0	11.6	7.9	9.5	6.4	12.3	19.1	6.05	6.85
10	7.9	7.4	9.3	7.0	12.5	7.4	9.0	6.4	14.0	19.0	6.1	6.9
11	7.3	7.55	8.95	6.8	11.5	7.3	8.8	6.4	11.0	18.7	6.1	6.85
12	7.3	7.45	8.5	6.6	9.7	7.3	8.4	6.3	10.4	16.8	6.05	6.9
13	10.05	7.3	8.3	6.55	13.5	7.2	7.7	6.3	7.1	12.8	6.1	6.8
14	15.9	7.3	8.0	6.55	15.4	7.0	7.7	6.3	6.85	10.6	6.05	6.65
15	18.0	7.9	7.9	6.55	.....	6.8	7.7	6.25	6.7	7.95	6.1	6.6
16	18.2	9.4	7.7	7.0	9.7	6.7	9.0	6.25	6.65	7.8	6.05	6.55
17	18.2	9.4	7.5	8.6	8.6	6.6	16.9	6.25	6.7	7.45	6.1	6.6
18	17.9	9.4	7.4	9.6	8.15	6.5	18.0	6.25	6.45	7.4	6.1	6.55
19	17.55	9.2	7.3	9.9	7.9	6.5	18.1	6.2	6.5	7.4	6.05	6.6
20	17.8	9.2	7.2	9.3	7.8	7.4	18.15	6.2	6.4	7.25	6.1	6.6
21	18.0	9.2	7.1	8.4	7.6	6.6	18.1	6.3	6.35	7.2	6.15	6.6
22	17.45	10.2	7.1	8.0	7.6	6.4	16.1	6.7	6.4	6.75	6.2	6.5
23	14.0	12.7	7.1	7.7	7.5	6.4	9.6	6.8	6.25	6.8	6.2	6.5
24	10.4	13.3	7.3	7.4	12.3	6.4	8.5	6.8	6.3	6.8	6.15	6.5
25	9.5	12.5	7.3	7.3	16.1	.....	8.0	6.8	6.2	6.75	6.2	6.5
26	9.0	10.2	7.3	7.4	17.1	6.3	7.5	6.8	6.15	6.8	6.15	6.5
27	8.9	14.45	7.0	7.7	17.3	6.6	7.4	12.3	6.2	6.75	6.2	6.5
28	9.5	18.8	6.8	8.6	14.1	6.6	7.3	12.9	7.15	6.7	6.3	6.5
29	9.95	.....	6.8	9.0	13.4	12.0	7.1	10.1	7.2	6.6	6.35	6.5
30	9.0	.....	6.7	8.2	8.9	9.0	7.0	7.7	7.1	6.35	12.9	6.9
31	8.9	.....	6.7	.....	9.5	.....	7.0	7.1	.....	6.3	.....	10.2

NOTE.—No ice reported by observer. Relation of gage height to discharge probably affected by ice about Jan. 1 to 3 and Dec. 15 to 31.

LITTLE WABASH RIVER NEAR GOLDEN GATE, ILL.

This station, which is located at the Southern Railway bridge about 1 mile west of Golden Gate, Ill., was established August 17, 1908.

Elm Creek enters from the right bank about 3 miles above the station. The total drainage area above the gaging station is 1,780 square miles.

The datum of the chain gage, which is attached to the railroad bridge, has not been changed since its installation, and the records are accurate and reliable.

The stream does not go dry at this point.

During high water there is flow through three openings in the railroad embankment east of the main channel. All of the flood flow can be measured.

No reliable estimates of discharge can yet be made, because of the backwater which is known to occur at this station at times.

Discharge measurements of Little Wabash River near Golden Gate, Ill., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 2	Jackson and McChristie	1,228	9,420	23.59	9,150
7	H. J. Jackson	1,252	13,100	25.42	9,520
9	....do	1,239	11,900	24.56	8,400
12	....do	1,215	7,650	22.23	4,240
14	....do	207	2,360	18.65	2,080
15	....do	155	1,760	15.50	1,170
16	....do	124	1,070	10.25	747
17	....do	93	630	6.48	410
Dec. 15	Bailey and Monk	76	328	3.05	[a] 76.3
16	....do	76	323	2.90	[a] 59.7

[a] Measurements made with slightly damaged meter. Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of Little Wabash River near Golden Gate, Ill., for 1910.

[Ben Chalcraft, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.7	7.7	22.2	3.3	6.5	7.0	6.8	4.3	3.95	3.45	3.1	8.45
2	4.7	6.9	23.3	3.0	6.0	6.1	6.1	3.75	3.6	3.4	2.95	8.55
3	5.1	6.2	24.3	3.3	6.5	6.2	5.4	3.3	3.25	3.05	2.75	7.95
4	5.2	5.9	25.4	3.2	5.3	5.1	4.3	3.15	3.1	7.5	2.65	6.55
5	5.3	7.2	25.8	3.1	4.7	4.4	6.8	3.1	6.95	14.45	2.65	5.2
6	6.2	9.5	25.8	3.0	4.3	4.2	9.15	3.0	12.5	20.4	2.9	4.25
7	8.0	9.0	25.5	3.4	7.3	4.3	11.4	2.85	14.1	22.5	2.95	3.95
8	7.7	7.4	25.1	3.5	8.1	6.5	12.35	2.8	15.2	24.2	2.85	3.75
9	7.3	6.9	24.7	3.8	6.7	6.6	12.6	2.65	15.7	24.9	2.75	3.55
10	7.0	6.0	24.3	3.8	5.6	5.5	11.3	2.7	15.1	25.7	2.65	3.5
11	6.6	5.4	23.6	3.4	7.5	4.6	8.45	2.7	14.8	25.7	2.7	3.35
12	5.0	5.2	22.7	3.8	8.9	4.1	7.3	2.55	14.5	25.6	2.65	3.35
13	8.0	4.3	21.3	5.7	7.5	4.1	6.95	2.6	12.5	25.4	2.55	2.75
14	14.8	4.5	19.7	5.0	7.0	4.7	6.2	2.55	8.4	25.2	2.55	2.95
15	16.5	4.5	16.7	4.6	11.2	4.3	5.3	2.6	5.75	24.8	2.55	3.1
16	17.2	4.5	12.4	5.4	11.5	3.9	4.65	2.5	4.65	24.4	2.5	2.85
17	17.6	4.4	7.6	7.4	9.9	3.5	8.4	2.45	3.7	23.9	2.65	2.9
18	18.0	5.5	4.9	9.7	7.5	3.3	12.75	2.5	3.45	23.8	2.55	2.9
19	18.5	5.9	4.6	12.0	7.4	3.1	14.4	2.35	3.3	22.1	2.55	2.8
20	19.6	7.1	4.4	11.5	6.5	3.0	15.0	2.4	3.05	20.1	2.55	2.8

Daily gage height, in feet, of Little Wabash River near Golden Gate, Ill., for 1910—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	20.3	7.5	4.1	9.9	5.1	3.0	15.45	2.5	2.85	17.35	2.5	2.7
22	20.3	9.4	4.1	8.1	4.5	5.9	15.1	2.35	2.8	13.4	2.45	2.6
23	20.5	12.9	4.1	6.5	4.6	5.4	14.95	3.9	2.35	7.75	2.45	2.6
24	20.3	14.6	4.0	6.0	7.9	4.9	15.0	3.55	2.6	4.35	2.45	2.6
25	19.7	15.4	3.9	5.5	9.9	4.2	14.9	3.5	2.45	3.95	2.45	2.5
26	18.8	15.8	3.8	5.6	12.1	3.5	13.15	4.1	2.45	3.65	2.4	2.6
27	16.5	17.9	3.9	6.0	12.6	3.0	9.0	3.55	2.6	3.3	2.65	2.7
28	12.5	20.1	3.8	6.5	13.0	3.5	5.95	4.4	2.45	2.65	5.85	2.9
29	9.8	.....	3.6	6.7	13.0	4.4	4.9	7.45	2.5	2.55	7.45	4.2
30	9.0	.....	3.5	7.0	11.5	5.4	3.4	6.5	2.55	2.95	8.15	7.3
31	8.9	.....	3.4	.....	9.0	.....	4.75	5.75	.....	3.05	.....	9.2

NOTE.—Relation of gage height to discharge affected by ice about Dec. 11 to 20.

LITTLE WABASH RIVER AT CARMI, ILL.

This station, which is located at the highway bridge in the northeastern part of Carmi, Ill., about one-fourth mile below the bridge of the Big Four and Louisville & Nashville railroads, was established October 9, 1908.

Skillet Fork River enters on the right bank about 4½ miles above the station. The drainage area above the gaging section is 3,090 square miles.

The relation between discharge and gage height at this station is affected by backwater from Wabash and Ohio rivers. There is but one channel at all stages.

The datum of the chain gage, attached to the highway bridge, has remained unchanged since its installation. The records are accurate and reliable, but are affected by backwater as stated above.

From high-water marks preserved at this station the following flood heights have been measured and referred to the present gage datum: 1875, gage height 33.5 feet; about year 1895, gage height 34.0 feet; 1897, gage height 34.5 feet; and 1898, gage height 36 feet. These records are authentic, but it is possible that some of the dates may be in error.

The data thus far obtained are insufficient to enable estimates of the flow to be made.

Discharge measurements of Little Wabash River at Carmi, Ill., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 10	C. T. Bailey	156	324	3.54	757
Dec. 14	Bailey and Monk	132	137	2.01	137

Daily gage height, in feet, of Little Wabash River at Carmi, Ill., for 1910.

[Noah Weigant, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.3	11.4	19.9	2.25	4.65	4.5	2.85	2.45	3.4	2.1	2.15	5.35
2	2.4	9.4	20.3	2.25	4.55	3.25	3.4	2.35	2.75	2.2	2.2	4.3
3	2.5	6.7	21.35	2.25	5.25	3.2	3.3	2.25	2.35	2.25	2.1	4.4
4	2.7	4.1	22.9	2.25	4.55	3.1	3.0	2.2	2.8	7.75	2.05	4.2
5	3.5	3.5	24.2	2.2	3.6	3.05	3.4	2.15	6.85	16.9	2.1	3.65
6	4.7	4.25	25.5	2.2	3.1	2.6	4.1	2.1	8.7	22.75	2.05	3.0
7	4.9	5.5	26.4	2.15	3.05	2.5	5.0	2.05	11.15	23.2	2.05	2.55
8	5.0	5.5	26.95	2.15	4.3	2.4	6.1	2.0	12.2	23.0	2.0	2.45
9	5.45	4.9	27.15	2.2	4.75	3.25	6.7	2.0	13.8	23.2	2.0	2.3
10	5.1	4.1	27.05	2.3	4.0	3.5	7.0	2.0	13.95	23.9	1.95	2.25
11	4.55	3.35	26.7	2.35	3.7	3.25	6.25	1.95	13.35	24.6	1.95	2.15
12	3.5	3.1	26.1	2.55	5.05	2.8	5.9	1.95	12.7	25.25	2.0	2.1
13	6.3	2.8	25.2	2.7	5.55	2.6	4.65	1.9	11.6	25.7	1.95	2.1
14	11.15	2.75	24.0	3.0	5.05	2.45	4.0	1.9	9.3	25.85	2.0	2.0
15	12.45	2.7	22.15	3.3	5.65	2.55	3.75	1.9	5.85	25.85	1.9	2.0
16	13.0	2.7	19.0	3.45	6.35	2.5	3.8	1.9	3.7	25.6	1.9	1.95
17	13.7	2.8	13.8	4.65	6.55	2.4	3.75	1.85	3.0	25.3	1.85	2.0
18	15.6	2.8	8.0	5.35	5.55	2.25	4.4	1.85	2.55	24.75	1.9	2.0
19	16.4	2.7	3.9	6.95	4.3	2.2	6.85	2.1	2.4	23.95	1.85	2.0
20	16.75	3.3	2.9	7.8	4.0	2.1	9.1	1.95	2.25	22.9	1.9	2.0
21	17.3	3.95	2.75	7.55	3.45	2.1	10.15	2.0	2.2	21.45	1.85	2.0
22	17.9	5.3	2.6	6.3	3.05	2.1	10.2	2.05	2.1	19.35	1.85	1.9
23	18.35	8.05	2.55	5.0	3.25	2.65	9.55	2.5	2.0	15.6	1.9	2.0
24	18.5	9.35	2.5	3.95	4.25	3.25	9.0	2.55	2.05	10.55	1.85	2.0
25	18.35	11.1	2.45	3.65	5.1	2.95	8.9	2.7	1.95	5.3	1.9	1.95
26	17.65	12.4	2.45	3.55	6.5	2.55	10.9	2.6	2.0	3.25	1.85	1.95
27	16.8	16.65	2.4	4.3	7.45	2.4	8.6	2.7	2.0	2.65	1.85	2.0
28	15.7	19.4	2.35	4.8	7.75	2.35	5.95	2.6	2.3	2.5	2.15	2.05
29	14.15	.....	2.35	4.85	7.65	2.3	4.0	2.35	2.25	2.35	2.95	2.3
30	13.25	.....	2.3	4.75	7.3	2.3	3.15	3.45	2.2	2.25	5.2	3.45
31	12.5	.....	2.3	.....	6.4	.....	2.75	3.9	.....	2.25	.....	5.25

NOTE.—No ice reported by observer; gage heights probably not affected by ice.

SKILLET FORK RIVER NEAR WAYNE CITY, ILL.

This station, which is located at the Southern ailway bridge, about 1 mile east of Wayne City, Ill., was established August 16, 1908.

Horse Creek enters on the right bank about 4 miles above the section. The drainage area above the gaging section is 481 square miles.

The datum of the chain gage, which is attached to the railroad bridge, has remained unchanged since its installation.

The discharge measurements made to date indicate that the section at the point of control has not changed.

The records are accurate and reliable.

Discharge measurements of Skillet Fork River near Wayne City, Ill., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 1	Jackson and McChristie	652	4,980	20.72	6,050
1–2	do	652	5,000	20.72	[a]6,470
6	H. J. Jackson	138	1,050	11.90	980
7	do	113	590	8.12	432
8	do	92	287	5.26	222
9	do	84	211	4.55	157
Dec. 17	Bailey and Monk	17	10.8	2.32	[b]2.9

[a] This measurement is a combination of measurements made on Mar. 1 and Mar. 2.
[b] Measurement not made at regular section.

Daily gage height, in feet, of Skillet Fork River at Wayne City, Ill., for 1910.

[Evert Higdon, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.3	4.0	20.6	2.55	5.3	2.6	2.3	2.4	2.1	2.35	2.75	2.75
2	2.5	3.9	20.7	2.55	3.6	2.5	2.3	2.35	2.05	2.3	2.75	2.65
3	2.55	3.7	20.4	2.7	3.1	2.5	2.3	2.2	2.1	2.3	2.7	2.55
4	3.6	3.5	19.9	2.75	4.2	2.45	2.85	2.2	3.2	13.85	2.75	2.55
5	4.0	4.5	18.9	2.65	3.5	2.4	2.7	2.2	10.05	20.3	2.75	2.5
6	5.4	5.9	14.0	3.0	3.2	2.7	2.55	2.15	13.5	20.95	2.7	2.45
7	5.8	4.4	7.6	3.0	2.9	3.2	2.9	2.15	12.65	20.7	2.7	2.45
8	5.35	3.5	5.6	2.95	4.9	3.1	2.95	2.1	11.85	20.6	2.75	2.4
9	4.3	3.25	4.55	2.9	5.3	2.9	2.95	2.05	10.0	20.65	2.75	2.45
10	3.0	3.2	3.95	2.85	4.2	2.8	3.25	2.15	13.55	11.0	2.8	2.35
11	2.7	3.2	3.7	2.8	3.7	2.55	3.65	2.1	9.0	5.05	2.8	2.35
12	2.6	3.15	3.2	2.75	3.8	2.55	6.8	2.2	5.15	3.3	2.85	2.35
13	5.8	3.1	3.1	2.8	5.6	2.5	4.4	2.2	3.15	2.95	2.85	2.3
14	17.0	3.15	3.0	2.8	5.0	2.5	2.95	2.1	2.9	2.85	2.85	2.3
15	17.7	3.1	2.95	2.7	4.7	2.5	2.8	2.15	2.65	2.8	2.8	2.25
16	16.7	4.3	2.9	2.8	3.2	2.4	2.65	2.05	2.65	2.7	2.85	2.25
17	15.7	4.7	2.8	7.15	3.0	2.4	2.65	2.05	2.55	2.7	2.8	2.25
18	16.0	5.3	2.75	5.9	2.7	2.4	11.9	2.0	2.5	2.6	2.8	2.3
19	17.9	5.8	2.7	5.25	2.5	2.35	13.05	2.1	2.45	2.6	2.9	2.35
20	17.6	6.0	2.75	4.25	2.8	2.35	9.5	2.2	2.4	2.55	2.8	2.35
21	12.9	7.2	2.7	3.85	2.7	2.3	3.45	2.2	2.4	2.6	2.85	2.3
22	10.3	10.2	2.7	3.5	2.65	2.3	3.3	2.15	2.25	2.6	2.9	2.3
23	9.8	13.6	2.65	3.1	3.1	2.25	2.9	2.15	2.25	2.55	2.85	2.3
24	5.4	11.6	2.65	3.5	9.1	2.25	2.65	2.05	2.65	2.5	2.85	2.35
25	4.7	10.3	2.65	4.5	8.1	2.25	2.6	2.2	3.05	2.6	2.85	2.35
26	4.25	7.6	2.7	4.7	5.5	2.25	2.5	2.15	3.0	2.6	2.85	2.35
27	4.8	18.6	2.7	5.8	3.9	2.25	2.45	2.15	2.65	2.65	2.85	2.35
28	5.7	20.5	2.65	6.9	3.6	2.2	2.4	2.05	2.5	2.7	2.85	2.35
29	6.0	.....	2.6	6.3	2.95	2.2	2.4	2.1	2.25	2.65	10.85	4.3
30	5.4	.....	2.6	5.8	2.8	2.25	2.5	2.05	2.4	2.75	5.25	7.1
31	4.6	.....	2.55	.....	2.7	.....	2.4	2.1	.....	2.7	.....	5.0

NOTE.—No ice reported by observer; relation of gage height to discharge probably not affected by ice.

Daily discharge, in second-feet, of Skillet Fork River at Wayne City, Ill., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3	115	6,420	12	212	14	3	5	0.5	4	22	22
2	9	107	6,530	12	85	9	3	4	.4	3	22	16
3	12	92	6,220	19	47	9	3	1	.5	3	19	12
4	85	77	5,700	22	130	7	28	1	55	1,750	22	12
5	115	152	4,700	16	77	5	19	1	769	6,110	22	9
6	220	257	1,810	40	55	19	12	.8	1,630	6,800	19	7
7	250	145	431	40	32	55	32	.8	1,360	6,530	19	7
8	216	77	235	36	182	47	36	.5	1,140	6,420	22	5
9	137	58	156	32	212	32	36	.4	760	6,480	22	7
10	40	55	111	28	130	25	58	.8	1,650	950	25	4
11	19	55	92	25	92	12	88	.5	600	194	25	4
12	14	51	55	22	100	12	343	1	201	62	28	4
13	250	47	47	25	235	9	145	1	51	36	28	3
14	3,250	51	40	25	190	9	36	.5	32	28	28	3
15	3,710	47	36	19	167	9	25	.8	16	25	25	2
16	3,080	137	32	25	55	5	16	.4	16	19	28	2
17	2,550	167	25	382	40	5	16	.4	12	19	25	2
18	2,700	212	22	257	19	5	1,160	.3	9	14	25	3
19	3,860	250	19	208	9	4	1,480	.5	7	14	32	4
20	3,640	265	22	134	25	4	678	1	5	12	25	4
21	1,430	387	19	104	19	3	74	1	5	14	28	3
22	814	796	19	77	16	3	62	.8	2	14	32	3
23	726	1,660	16	47	47	2	32	.8	2	12	28	3
24	220	1,080	16	77	614	2	16	.4	16	9	28	4
25	167	814	16	152	487	2	14	1	44	14	28	4
26	134	431	19	167	227	2	9	.8	40	14	28	4
27	175	4,440	19	250	107	2	7	.8	16	16	28	4
28	242	6,320	16	354	85	1	5	.4	9	19	28	4
29	265	.....	14	293	36	1	5	.5	2	16	920	137
30	220	.....	14	250	25	2	9	.4	5	22	208	376
31	160	.....	12	.....	19	.....	5	.5	.....	19	.....	190

NOTE.—Daily discharge determined by means of a discharge rating curve fairly well defined between 1.0 and 1,180 second-feet (gage heights 2.2 and 12.0 feet), and poorly defined above 1,180 second-feet (gage height 12.0 feet). Above 14 second-feet (gage height 2.6 feet) this discharge rating curve coincides with the 1909 curve, but below 14 second-feet (gage height 2.6 feet) the curve was revised by means of recent discharge measurements. Because of the change in the rating curve daily discharge figures differ from those published by the Internal Improvement Commission of Illinois in its report for 1908–1910.

Monthly discharge of Skillet Fork River near Wayne City, Ill., for 1910.

[Drainage area, 481 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	3,860	3	926	1.93	2.22	B.
February	6,320	47	655	1.36	1.42	B.
March	6,530	12	1,060	2.20	2.54	B.
April	382	12	105	.218	.24	B.
May	614	9	122	.254	.29	B.
June	55	1	10.5	.022	.02	D.
July	1,480	3	144	.299	.34	B.
August	5	.3	.94	.0020	.002	D.
September	1,650	.4	282	.586	.65	B.
October	6,800	3	1,150	2.39	2.76	B.
November	920	19	61.3	.127	.14	B.
December	376	2	27.9	.058	.07	C.
The year	6,800	.3	379	.788	10.69	

NOTE.—Monthly discharge differs from that published by the Internal Improvement Commission of Illinois because of revision of discharge rating curve.

SKILLET FORK RIVER NEAR MILL SHOALS, ILL.

This station, which is located at the Baltimore & Ohio Southwestern Railroad bridge about 1 mile south of Mill Shoals, Ill., was established October 9, 1908.

Griffin Creek joins the river on the left bank about 1½ miles above the station, and Haw Creek enters on the right bank about 5 miles above the station. The drainage area above the gaging section is 912 square miles.

The datum of the chain gage, attached to the railroad bridge, has remained unchanged since its installation, and the records are accurate and reliable. There is but one channel at all stages, and the entire flood discharge can be measured at the regular section.

Backwater occurs at this station, and reliable estimates of the daily discharge can not be made with the data at present available.

Discharge measurements of Skillet Fork River near Mill Shoals, Ill., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 1	Jackson and McChristie	791	3,400	19.65	3,440
3	H. J. Jackson	1,060	5,860	22.12	5,460
5	do	1,067	7,010	23.11	5,640
8	do	1,063	6,630	22.82	4,330
10	do	1,058	5,500	21.80	3,380
12	do	1,031	4,120	20.45	2,280
14	do	141	1,450	18.03	1,440
15	do	124	1,110	15.46	935
16	do	91	660	11.43	519
17	do	70	325	7.50	216
18	do	59	150	4.70	117
Dec. 14	Bailey and Monk	36	25.3	2.29	[a] 10.8

[a] Relation of gage height to discharge slightly affected by ice.

Daily gage height, in feet, of Skillet Fork River near Mill Shoals, Ill., for 1910.

[John A. Clow, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.1	5.5	19.8	2.8	6.2	3.1	1.7	3.6	1.65	2.45	3.0	5.8
2	3.3	5.0	21.2	2.7	5.4	2.9	1.7	3.5	1.65	2.4	2.85	4.05
3	3.4	4.8	22.3	2.7	5.0	2.6	1.8	3.15	1.7	2.35	2.85	2.95
4	3.4	4.8	22.9	2.6	4.5	2.5	2.9	2.8	2.75	13.75	2.75	2.95
5	4.1	5.4	23.3	2.5	4.4	2.5	4.9	2.55	9.6	18.4	2.75	2.75
6	5.0	6.0	23.4	2.6	4.4	2.4	3.85	2.0	14.35	19.95	2.5	2.8
7	6.5	6.0	22.9	2.6	4.4	2.2	3.8	2.0	15.35	22.2	2.45	2.65
8	7.0	5.8	22.7	2.8	4.3	3.1	3.5	1.85	15.9	23.35	2.35	2.65
9	6.9	4.9	22.2	3.5	4.2	3.5	3.35	1.9	16.65	24.15	2.25	2.65
10	6.8	4.4	21.6	3.4	4.4	3.7	3.0	1.75	16.3	24.3	2.15	2.65
11	5.0	4.3	21.0	3.3	4.6	3.6	2.85	1.8	15.85	24.25	2.2	2.4
12	4.2	4.0	20.4	3.3	5.5	3.0	3.8	1.7	15.75	23.9	2.15	2.35
13	11.4	4.0	19.6	3.7	6.0	2.9	4.5	1.55	11.8	23.65	1.95	2.25
14	13.5	3.9	17.5	4.05	6.4	2.6	5.25	1.6	7.85	23.35	1.85	2.15
15	14.9	3.9	14.8	4.4	6.0	2.4	4.8	1.55	5.15	23.1	1.85	2.2
16	15.4	4.7	10.7	4.7	5.3	2.3	3.85	1.6	4.8	22.35	1.9	2.2
17	16.3	4.5	6.0	8.4	4.5	2.3	4.8	1.5	3.65	21.8	1.85	2.1
18	16.5	5.1	4.3	9.5	4.2	2.2	7.5	1.65	3.3	21.05	1.75	2.1
19	16.9	5.4	3.8	9.0	3.9	2.0	9.85	1.7	2.95	21.8	1.75	2.0
20	17.3	5.6	3.8	8.3	3.6	1.9	10.2	1.65	2.55	21.25	1.75	2.0

Daily gage height, in feet, of Skillet Fork River near Mill Shoals, Ill., for 1910—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	17.3	7.1	3.4	7.0	3.4	1.8	10.65	1.6	2.6	19.95	1.8	2.1
22	16.9	9.2	3.4	6.5	3.2	1.7	8.9	5.1	2.35	19.3	1.65	2.1
23	15.7	13.4	3.3	6.3	7.2	1.7	4.5	4.05	2.4	13.35	1.65	2.2
24	15.3	14.4	3.2	6.0	8.1	1.6	4.25	3.0	2.35	9.45	1.65	2.2
25	11.3	14.3	3.2	5.9	9.3	1.6	4.1	2.55	2.45	5.85	1.65	2.2
26	8.6	13.5	3.2	5.65	9.3	1.6	4.15	1.9	3.0	4.55	1.6	2.2
27	7.7	17.4	3.2	6.9	7.1	1.6	4.3	1.8	4.45	3.5	1.55	2.2
28	7.0	19.3	3.1	7.8	5.0	1.5	4.4	1.75	3.0	3.15	5.75	2.6
29	6.8	.....	2.9	7.6	4.5	1.6	4.15	1.8	2.95	2.95	9.15	4.1
30	6.6	.....	2.8	7.0	4.0	1.6	4.0	1.75	2.85	2.95	7.75	8.2
31	6.2	.....	2.8	.....	3.5	.....	3.85	1.8	.....	2.95	.....	9.6

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 1 to 14 and Dec. 8 to 24. Gage read to top of ice Jan. 7, 12, 13, and 14.

TENNESSEE RIVER BASIN.

GENERAL FEATURES.[1]

Tennessee River gathers its waters from seven States—Virginia, North Carolina, Georgia, Tennessee, Alabama, Mississippi, and Kentucky. Its drainage area comprises about 39,000 square miles, and 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 begins 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 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 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. In the river and harbor act of 1890 the head of Tennessee River appears to have been definitely fixed by the specific

[1] Description abstracted in part from Rept. Chief Engineers, U. S. Army, 1893, pt. 3, p. 2330; 1897, pt. 3, pp. 2247, 2249, 2250.

language of the act providing for a survey of Tennessee River from Chattanooga to the junction of Holston and French Broad rivers.

The Tennessee is, therefore, here considered as beginning at the junction of French Broad and Holston rivers, which are designated headwater tributaries; and in determining the order in which the various tributaries and their gaging stations are described, the French Broad is regarded as the main stream.

The French Broad, the largest tributary stream in the system, heads in the Blue Ridge Mountains in Transylvania County, N. C., where the mountain peaks and ridges rise more than 5,000 feet above sea level. The headwater creeks descend very rapidly until they reach an elevation of about 2,200 feet at a point above Brevard, N. C., below which the river, though yet quite small, flows with a smooth current through a flat valley of considerable width for some 50 miles to the vicinity of Asheville, N. C. Among the tributaries entering this stretch of the French Broad are Davidsons and Mills rivers, both of which are small, rapid streams flowing southeastward from the highest mountains in this part of the drainage area, the Pisgah Ridge with its numerous knobs and peaks. Excepting the cultivated districts in the immediate river valley, this part of the area is largely in forest land, much of which, especially in the basins of Davidsons and Mills rivers, lies in the forest reserves of the Biltmore estates.

The river flows at first northeastward, but its course becomes nearly due north before it reaches Asheville; below Asheville, where its general course is northwestward, at right angles to the mountain ridges, it descends rapidly from an extensive plateau region in the midst of the Appalachian Mountains, cutting through the Unaka Mountains, which form its northwestern rim, and passing to the Appalachian Valley. The river channel is narrow and canyon like, with steep, rocky bluffs which give a very rugged appearance to the adjacent country when viewed from the river, although it is really a broad, elevated basin, comparatively smooth and mostly cleared and in cultivation. Further down in the vicinity of the North Carolina-Tennessee State line, where the mountain ranges are higher, and up the tributary streams a long way from the river, the area is mostly forested.

Opportunities for water-power development on the French Broad are very great, the fall in the river from Asheville down to the State line being 800 feet in 45 miles. Special engineering problems would have to be solved, however, in making developments, as the tracks of the Southern Railway lie along the river, usually just above the water's edge, for its entire length.

For the remainder of its course, about 90 miles in length, the French Broad has a much flatter grade and flows through a valley which

widens rapidly into the broad agricultural valley of the upper Tennessee and Holston rivers.

Tennessee River, below the junction of its headwater tributaries, flows southwestward, crossing into Alabama about 40 miles below Chattanooga, Tenn. At Gunthersville, Ala., it turns almost a right angle and flows northwestward past the corner of Mississippi into Tennessee for the second time, then almost due north across the State, emptying into Ohio River at Paducah, about 40 miles above Cairo.

French Broad River has at its mouth a drainage area comprising 4,800 square miles. The Holston is somewhat smaller, having 3,750 square miles of drainage area. Fifty miles below, in Loudon County, Tenn., Little Tennessee River contributes its area of 2,650 square miles, and at Kingston, 30 miles farther down, the Clinch, with its nearly 4,400 square miles of drainage area, is added. Hiwassee River, having about 2,700 square miles of basin, enters 50 miles below the mouth of the Clinch, and is the last of the five large tributaries which combine to make up a great river within the comparatively short distance of 130 miles. Indeed, with the exception of Duck River, with between 3,000 and 4,000 square miles of area, which enters the lower portion of the Tennessee 100 miles above its mouth, all other tributaries in the 500 miles of length below the Hiwassee are comparatively small.

Pigeon River, the first large tributary of French Broad River, rises among the Balsam and Pisgah mountains, cuts its way through the Great Smoky Mountains, thus passing to the Appalachian Valley, and joins the French Broad a short distance below Newport, Tenn. 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.

Nolichucky River, the second large tributary of French Broad 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 near Embreville, where, preserving its general westerly direction, it finally enters the French Broad about 7½ miles southeast of Morristown and about 5 miles below the mouth of Pigeon River. Its tributaries, like the main stream, rise near the summits of mountain chains and flow

over rocky and precipitous beds through narrow valleys. The total fall of the river 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. The whole area is subject to sudden and violent rains, producing great floods. The rainfall over the basin is about 51.0 inches per annum.

The rocks of the upper portion of the drainage basins of French Broad River and other eastern tributaries heading in the Appalachian Mountains include the older granites, quartzites, conglomerate schists, shales, and sandstones.

The Cumberland Plateau, drained in part by Clinch River and other western tributaries of the Tennessee and crossed by Tennessee River below Chattanooga, comprises widespread beds of limestone and extensive deposits of coal.

Tennessee River 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 river is now navigable from its mouth for a distance of 673 miles during several months of the year, and as work is continued upon other less formidable obstructions the season of navigation will be correspondingly lengthened. The river channel, especially at low stages, is mainly a succession of pools of comparatively deep water with smooth surfaces separated by bars or ledges where most of the fall is concentrated. These ridges, many of which are solid rock ledges, are usually at the wider parts of the river channel, and are the obstructions to low-water navigation, causing shallow and swift water at such stages. The radical improvement of this river, so as to make navigation continuous throughout its length for boats of moderate draft, is by no means impossible.

In connection with navigation projects a large amount of water power can be developed. The greatest water power possibilities, however, are at Muscle Shoals and other shoals near Florence, Ala.

The following special reports contain information regarding the hydrography of the Tennessee River basin:

Water power in North Carolina: Bull. North Carolina Geol. Survey No. 8 (postage 16c.).

Water powers of North Carolina: Bull. North Carolina Geol. Survey No. 20. Dr. J. H. Pratt, State geologist, Chapel Hill, N. C. This report contains all records of discharge collected in the Tennessee River basin in North Carolina prior to 1908 by engineers of the U. S. Geological Survey.

Water resources of Georgia, by B. M. and M. R. Hall: Water-Supply Paper U. S. Geol. Survey No. 197. Contains data on stream flow, water power, and river surveys collected in the Tennessee basin in Georgia prior to 1906.

Water powers of Alabama, by B. M. Hall: Water-Supply Paper U. S. Geol. Survey No. 107. Contains data on stream flow collected in the Tennessee basin in Alabama prior to 1904.

Hydrography of the southern Appalachian Mountain region, Parts 1 and 2, by H. A. Pressey: Water-Supply Papers U. S. Geol. Survey Nos. 62 and 63. The Geological Survey has no copies of these papers for free distribution, but they may be consulted at libraries or may be purchased from the Superintendent of Documents, Washington, D. C., for 15 cents each.

River surveys and profiles made during 1903, arranged by W. C. Hall and J. C. Hoyt: Water-Supply Paper U. S. Geol. Survey No. 115.

Relation of southern Appalachian Mountains to the development of inland water navigation and water power: U. S. Forest Service circulars Nos. 143 and 144.

STATIONS ON FRENCH BROAD AND MAIN TENNESSEE RIVERS.

FRENCH BROAD RIVER AT ASHEVILLE, N. C.

This station is located at the steel highway bridge known as Smith's Bridge, about 1 mile below the Southern Railway depot at Asheville. This bridge is about a quarter of a mile above the new Southern Railway bridge and about a quarter of a mile below a new concrete highway bridge. It is about 2 miles below the mouth of Swannanoa River. The total drainage area above the station is 987 square miles.

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

The United States Weather Bureau gage is a heavy vertical timber securely bolted to a bridge pier. The gage terminates at zero on a stone shelf projection. An auxiliary chain gage is located on the bridge at about the same point. It is set to read the same as the staff gage and used only for minus readings. Discharge measurements are made from the downstream side of the bridge. The conditions of flow are favorable for accurate results.

The discharge at this station was not affected by any artificial control until 1907, when a new railroad bridge was constructed across the river about 1,500 feet below the gage. Measurements made since 1907 indicate that the conditions of flow have been changed.

Discharge measurements of French Broad River at Asheville, N. C., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Nov. 18	M. R. Hall	302	694	−0.46	960
19	....do	302	725	−0.36	1,044

Daily gage height, in feet, of French Broad River at Asheville, N. C., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.4	0.1	2.7	0.0	−0.3	0.1	0.2	0.1	7.9	0.1	−0.4	−0.4
2	.2	.1	2.9	.0	− .3	.1	.2	.2	5.5	.1	− .4	− .4
3	.1	.0	2.0	.1	− .3	.1	.3	.9	4.6	.0	− .2	− .4
4	.1	.0	1.4	.0	− .3	.0	.4	.3	2.8	.0	− .2	− .5
5	.1	.0	1.1	.0	− .3	.0	.7	.2	2.2	− .2	− .3	− .5
6	.0	.0	.9	− .1	− .2	.5	1.1	.1	1.6	− .3	− .4	1.7
7	2.0	.0	.8	− .1	− .2	.2	.8	.5	1.3	.8	− .4	1.1
8	1.5	− .1	.4	− .1	2.5	.0	2.0	1.1	1.0	1.3	− .4	.2
9	.6	− .1	.4	.0	3.2	.0	1.3	.3	.7	1.9	− .4	.0
10	.4	− .1	.3	− .1	2.5	.0	2.3	.1	.7	1.3	− .4	− .1
11	.3	− .1	.5	− .2	1.2	.3	2.2	.1	.4	.5	− .4	− .2
12	.2	.0	.7	− .2	.8	.4	1.1	.0	.3	.2	− .4	− .2
13	.1	.0	.5	− .2	.5	.8	1.0	.2	.4	.2	− .4	− .2
14	.1	.0	.3	− .2	.4	2.0	1.3	− .2	.3	.1	− .4	− .4
15	.1	.0	.3	− .2	.3	1.9	1.3	− .3	.2	.0	− .4	− .4
16	.1	.1	.3	− .2	.2	1.1	1.1	− .3	.2	.0	− .4	− .4
17	.1	.9	.3	.5	.2	.8	.7	− .4	.1	.0	− .4	− .4
18	.1	2.7	.2	.8	.3	.5	.6	− .4	.1	.0	− .4	− .4
19	.2	1.9	.2	.6	.5	.3	.4	− .4	.0	.0	− .4	− .3
20	.1	1.2	.2	.3	.3	.3	.3	− .3	.0	.1	− .4	− .3
21	.3	.8	.2	.3	.5	.5	.2	− .4	.0	.0	− .4	− .3
22	1.1	1.0	.1	.1	.5	.3	.2	.0	.0	.0	− .4	− .5
23	.5	.8	.2	.0	.4	.4	.1	.0	.0	− .2	− .4	− .5
24	.3	.6	.2	.0	.3	.4	.1	− .1	.0	− .2	− .4	1.3
25	.2	.4	.2	.0	1.1	.4	.0	− .2	.4	− .3	− .4	.7
26	.2	.3	.0	.2	1.1	.2	.0	.1	.3	− .3	− .4	.2
27	.1	.8	.1	.1	.7	.1	.4	.0	.5	− .3	− .4	.0
28	.1	1.5	.0	.0	.5	.0	.3	− .2	.5	− .3	− .4	.0
29	.2	.....	.0	.0	.3	.3	.2	− .3	.1	− .3	− .4	− .1
30	.2	.....	.0	− .1	.3	.2	.1	− .3	.5	− .4	− .4	.1
31	.2	.....	.0	.....	.2	.....	.2	8.8	.....	− .4	.....	.5

NOTE.—Relation of gage height to discharge probably not affected by ice.

Daily discharge, in second-feet, of French Broad River at Asheville, N. C., for 1909–1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	2,190	1,820	2,750	2,750	7,690	3,410	3,770	2,600	1,290	1,490	1,190	1,100
2	2,060	1,710	2,460	2,600	6,640	3,240	4,350	2,910	1,290	1,490	1,190	1,100
3	1,940	1,710	2,460	2,600	4,150	3,960	3,590	2,320	1,290	1,390	1,190	1,100
4	1,820	1,600	2,460	2,460	3,240	15,200	3,590	2,750	1,290	1,390	1,190	1,010
5	3,240	1,600	2,320	2,320	2,910	11,400	2,750	2,320	1,390	1,190	1,190	1,010
6	4,980	1,820	2,460	2,190	2,750	10,200	2,910	2,060	1,290	1,190	1,190	1,010
7	3,410	1,820	2,910	2,190	2,600	8,230	3,240	1,940	1,290	1,190	1,190	1,290
8	2,600	1,940	2,600	2,190	2,320	4,980	4,350	1,820	1,290	1,190	1,190	1,600
9	2,320	1,820	2,460	2,190	1,940	4,760	4,350	1,600	1,290	1,190	1,190	2,320
10	2,060	3,240	4,980	2,320	10,800	7,690	4,350	1,490	1,600	1,290	1,100	1,600
11	1,940	3,590	4,550	2,060	5,660	6,640	3,770	1,710	1,490	2,600	1,190	1,390
12	1,820	2,750	3,410	1,940	3,590	4,350	3,240	1,710	1,190	2,190	1,190	1,290
13	1,820	2,320	3,240	2,060	2,910	5,660	2,600	2,060	1,190	1,600	1,190	2,910
14	1,710	2,060	5,430	4,350	2,600	4,980	3,960	2,460	1,190	1,940	1,190	7,960
15	1,940	1,940	4,550	3,410	2,460	5,900	4,150	2,190	1,190	2,750	1,190	7,690
16	2,060	3,410	3,590	2,750	2,460	4,980	3,240	4,150	1,490	2,460	1,190	3,410
17	3,960	3,770	3,240	2,460	2,320	6,140	2,910	3,770	2,460	1,940	1,190	2,600
18	3,070	2,750	2,750	2,320	2,190	4,980	2,600	2,600	1,940	1,490	1,190	2,190
19	2,600	4,150	2,600	2,190	2,060	3,770	2,320	2,060	1,940	1,290	1,190	1,940
20	2,190	3,590	2,750	2,060	3,590	8,230	2,190	1,820	1,710	1,390	1,190	1,820
21	2,060	2,460	2,600	1,940	10,800	8,230	2,060	1,710	1,600	1,390	1,190	1,710
22	1,940	2,910	2,750	1,940	7,960	3,960	1,940	1,710	1,940	1,390	1,190	1,600
23	1,710	4,550	2,460	2,060	8,230	3,960	2,190	1,600	6,640	1,290	1,190	1,490
24	1,710	5,900	2,320	2,600	5,660	4,760	2,060	1,600	4,350	1,290	1,190	1,390
25	1,710	6,140	5,660	2,190	4,350	3,770	1,940	1,490	2,600	1,290	1,190	1,710
26	1,710	4,550	6,140	2,060	3,960	3,770	1,710	1,390	2,320	1,290	1,190	1,600
27	1,710	3,770	3,960	1,940	3,960	3,410	2,060	1,390	1,940	1,190	1,190	1,600
28	1,600	3,240	4,980	1,940	3,410	4,150	3,410	1,390	1,820	1,190	1,100	1,600
29	1,600	.....	4,350	1,820	2,910	4,550	2,320	1,490	1,820	1,190	1,100	1,600
30	1,600	.....	3,590	1,710	3,070	3,960	2,060	1,390	1,710	1,190	1,100	1,390
31	1,940	.....	3,240	.....	3,070	.....	2,910	1,290	.....	1,190	.....	1,290

Daily discharge, in second-feet, of French Broad River at Asheville, N. C., for 1909–1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	1,820	1,490	5,900	1,390	1,100	1,490	1,600	1,490	21,900	1,490	1,010	1,010
2	1,600	1,490	6,390	1,390	1,100	1,490	1,600	1,600	14,000	1,490	1,010	1,010
3	1,490	1,390	4,350	1,490	1,100	1,490	1,710	2,460	11,100	1,390	1,190	1,010
4	1,490	1,390	3,240	1,390	1,100	1,390	1,820	1,710	6,140	1,390	1,190	920
5	1,490	1,390	2,750	1,390	1,100	1,390	2,190	1,600	4,760	1,190	1,100	920
6	1,390	1,390	2,460	1,290	1,190	1,940	2,750	1,490	3,590	1,100	1,010	3,770
7	4,350	1,390	2,320	1,290	1,190	1,600	2,320	1,940	3,070	2,320	1,010	2,750
8	3,410	1,290	1,820	1,290	5,430	1,390	4,350	2,750	2,600	3,070	1,010	1,600
9	2,060	1,290	1,820	1,390	7,160	1,390	3,070	1,710	2,190	4,150	1,010	1,390
10	1,820	1,290	1,710	1,290	5,430	1,390	4,980	1,490	2,190	3,070	1,010	1,290
11	1,710	1,290	1,940	1,190	2,910	1,710	4,760	1,490	1,820	1,940	1,010	1,190
12	1,600	1,390	2,190	1,190	2,320	1,820	2,750	1,390	1,710	1,600	1,010	1,190
13	1,490	1,390	1,940	1,190	1,940	2,320	2,600	1,600	1,820	1,600	1,010	1,190
14	1,490	1,390	1,710	1,190	1,820	4,350	3,070	1,190	1,710	1,490	1,010	1,010
15	1,490	1,390	1,710	1,190	1,710	4,150	3,070	1,100	1,600	1,390	1,010	1,010
16	1,490	1,490	1,710	1,190	1,600	2,750	2,750	1,100	1,600	1,390	1,010	1,010
17	1,490	2,460	1,710	1,940	1,600	2,320	2,190	1,010	1,490	1,390	1,010	1,010
18	1,490	5,900	1,600	2,320	1,710	1,940	2,060	1,010	1,490	1,390	1,010	1,010
19	1,600	4,150	1,600	2,060	1,940	1,710	1,820	1,010	1,390	1,390	1,010	1,100
20	1,490	2,910	1,600	1,710	1,710	1,710	1,710	1,100	1,390	1,490	1,010	1,100
21	1,710	2,320	1,600	1,710	1,940	1,940	1,600	1,010	1,390	1,390	1,010	1,100
22	2,750	2,600	1,490	1,490	1,940	1,710	1,600	1,390	1,390	1,390	1,010	920
23	1,940	2,320	1,600	1,390	1,820	1,820	1,490	1,390	1,390	1,190	1,010	920
24	1,710	2,060	1,600	1,390	1,710	1,820	1,490	1,290	1,390	1,190	1,010	3,070
25	1,600	1,820	1,600	1,390	2,750	1,820	1,390	1,190	1,820	1,100	1,010	2,190
26	1,600	1,710	1,390	1,600	2,750	1,600	1,390	1,490	1,710	1,100	1,010	1,600
27	1,490	2,320	1,490	1,490	2,190	1,490	1,820	1,390	1,940	1,100	1,010	1,390
28	1,490	3,410	1,390	1,390	1,940	1,390	1,710	1,190	1,940	1,100	1,010	1,390
29	1,600	.....	1,390	1,390	1,710	1,710	1,600	1,100	1,490	1,100	1,010	1,290
30	1,600	.....	1,390	1,290	1,710	1,600	1,490	1,100	1,940	1,010	1,010	1,490
31	1,600	.....	1,390	.....	1,600	.....	1,600	25,100	.....	1,010	.....	1,940

NOTE.—Daily discharge determined by means of a discharge rating curve, well defined between 920 and 10,800 second-feet (gage heights, −0.5 and 4.5 feet).

Monthly discharge of French Broad River at Asheville, N. C., for 1909–1910.

[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.		
1909.						
January	4,980	1,600	2,230	2.26	2.61	B.
February	6,140	1,600	2,960	3.00	3.12	A.
March	6,140	2,320	3,420	3.47	4.00	A.
April	4,350	1,710	2,320	2.35	2.62	A.
May	10,800	1,940	4,270	4.33	4.99	A.
June	15,200	3,240	5,770	5.85	6.53	A.
July	4,350	1,710	3,000	3.04	3.50	A.
August	4,150	1,290	2,030	2.06	2.38	A.
September	6,640	1,190	1,860	1.88	2.10	A.
October	2,750	1,190	1,500	1.52	1.75	B.
November	1,190	1,100	1,180	1.20	1.34	B.
December	7,960	1,010	2,040	2.07	2.39	A.
The year	15,200	1,010	2,710	2.75	37.33	
1910.						
January	4,350	1,390	1,790	1.81	2.09	B.
February	5,900	1,290	2,000	2.03	2.11	A.
March	6,390	1,390	2,150	2.18	2.51	A.
April	2,320	1,190	1,440	1.46	1.63	B.
May	7,160	1,100	2,170	2.20	2.54	A.
June	4,350	1,390	1,890	1.91	2.13	A.
July	4,980	1,390	2,270	2.30	2.65	A.
August	25,100	1,010	2,190	2.22	2.56	C.
September	21,900	1,390	3,470	3.52	3.93	B.
October	4,150	1,010	1,560	1.58	1.82	A.
November	1,190	1,010	1,020	1.03	1.15	A.
December	3,770	920	1,410	1.43	1.65	A.
The year	25,100	920	1,950	1.98	26.77	

TENNESSEE RIVER AT KNOXVILLE, TENN.

This station is located at the Gay Street or county highway bridge in the city of Knoxville, Tenn., and is abcut 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 United States Geological Survey. Since 1899 discharge measurements have been made by the United States Geological Survey.

Gage heights up to 1899 were made from a staff gage at the old Gay Street Bridge.. When this bridge was rebuilt, the gage was moved to a temporary location at the Knoxville & Augusta Railroad bridge, one-half mile below, and was used during the greater part of 1899. On November, 1899, readings were begun from a new staff gage located on the right bank, just below the mouth of West Knoxville Bayou, about 1,000 feet below the temporary gage. These gages were at different datums, but the latter gage was set to read the same as the original gage.

The new staff gage, which was used continuously until December 31, 1908, was located near the foot of a series of rapids, just above a long stretch of deep smooth water. Since January 1, 1909, a new staff gage attached to the bridge pier at Gay Street has been used. Although it was set to read with the old gage at low stages, the readings vary considerably, as rising water brings the beginning of the pool above the old gage. Comparative readings of the two gages have been made by the United States Weather Bureau to determine the relation between them at all stages, and this relation has been used to adjust the old rating curve to the new location of the gage. The derived curve shows a pronounced reversal between the gage heights 2 and 7 feet. Above 7 feet it again becomes approximately parallel to the old 1907–8 curve.

The measurements which have been made and referred to the new gage agree well with the derived curve.

No discharge measurements were made at this station during 1910. The station was last inspected September 16, 1909, and estimates of discharge since that date, published in Water-Supply Paper 263, page 130, should be used with caution. Estimates of daily and monthly discharge for 1910 are withheld from publication pending an investigation of a possible change in the relation of gage height to discharge at low stages since September 16, 1909.

Daily gage height, in feet, of Tennessee River at Knoxville, Tenn., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.2	2.0	4.3	0.8	1.5	2.0	1.6	2.8	8.1	1.4	0.3	1.1
2	.2	1.8	5.5	.8	1.3	1.7	1.6	2.2	8.1	1.2	.2	1.1
3	1.0	1.6	5.2	.8	1.2	1.6	1.5	1.8	5.2	.9	.2	1.0
4	.9	1.6	4.1	.7	1.1	1.5	1.5	2.2	4.4	.8	.2	1.0
5	.9	2.2	3.3	.7	1.0	1.5	1.5	2.5	3.5	.6	.0	.5
6	1.4	2.2	2.9	.7	1.0	2.2	2.3	2.4	3.8	.5	.2	4.8
7	2.2	2.2	2.7	.7	1.0	2.6	3.8	2.1	3.1	.5	.0	4.9
8	3.4	2.0	2.5	.7	1.8	2.5	4.1	2.3	2.7	.5	.0	5.4
9	4.1	1.7	2.3	.7	2.3	2.3	5.0	3.1	2.7	1.6	.0	3.2
10	2.9	1.5	2.1	.7	4.0	1.8	4.9	2.6	3.3	1.8	.0	2.3
11	2.2	1.5	2.2	.5	3.4	1.7	4.4	2.2	2.4	1.8	.0	1.9
12	1.8	1.7	2.1	.5	2.6	1.8	2.9	1.7	2.4	1.5	.0	1.6
13	1.6	1.8	2.1	1.0	2.3	1.8	2.7	1.6	2.0	1.0	.0	1.4
14	1.4	1.4	2.1	.9	2.3	2.1	2.7	1.6	1.6	1.0	— .2	1.2
15	1.4	1.3	2.0	.8	2.1	3.5	3.9	1.5	1.5	.8	— .3	1.1
16	1.4	1.2	1.8	1.1	2.0	3.7	3.1	1.3	1.5	.7	— .3	1.0
17	1.2	1.8	1.7	1.5	1.9	3.5	2.8	1.1	1.4	.4	— .5	1.0
18	1.1	3.5	1.5	2.0	2.0	3.0	2.6	.9	1.3	.2	— .6	.9
19	.8	5.5	1.5	2.2	2.1	3.0	2.3	.9	1.2	.3	— .6	1.1
20	2.5	5.4	1.2	2.1	2.1	2.5	2.3	.8	1.2	.3	— .6	.6
21	2.8	3.8	1.2	2.0	2.1	2.2	2.0	1.8	1.1	.3	— .6	.5
22	3.4	3.5	1.2	1.8	2.1	2.1	2.0	1.4	1.0	.6	— .7	.7
23	4.4	3.5	1.2	1.8	2.0	2.0	1.8	1.3	.9	.6	— .7	.6
24	3.5	3.1	1.2	1.8	2.1	2.0	1.8	1.1	.9	.6	— .7	.6
25	2.7	2.8	1.1	1.5	2.5	2.0	1.6	1.0	.9	.4	— .2	1.0
26	2.4	2.3	1.1	1.9	4.3	2.0	1.4	.9	1.0	.3	.0	1.8
27	2.2	2.3	1.0	1.5	4.1	2.1	1.3	.9	1.2	.2	— .1	1.8
28	2.0	2.1	1.0	2.0	3.1	1.8	1.7	.9	1.0	.2	.1	1.5
29	2.0	.....	1.0	1.8	2.4	1.6	2.1	1.0	.9	.2	.5	1.0
30	1.9	.....	.9	1.7	2.5	1.3	3.1	1.0	1.2	.1	1.0	.9
31	2.0	.....	.9	.....	2.3	.....	4.2	1.0	.....	.3	.....	2.0

NOTE.—Gage heights probably not affected by ice.

TENNESSEE RIVER AT CHATTANOOGA, TENN.

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

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.

A dam about 20 miles down the river when completed will raise the low-water surface several feet on the Chattanooga gage, thus destroying the usefulness of the gaging station. Comparisons of hydrographs of daily discharge at Knoxville, Chattanooga, and Florence do not show any effect from backwater at Chattanooga during 1910.

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.

Discharge measurements of Tennessee River at Chattanooga, Tenn., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 27	M. R. Hall	1,126	16,760	12.42	76,000
Sept. 24	do	1,100	6,150	2.40	13,000

Daily gage height, in feet, of Tennessee River at Chattanooga, Tenn., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.4	5.0	7.8	3.5	6.2	7.5	6.0	7.3	2.9	2.5	1.4	1.7
2	2.3	4.9	10.8	3.4	5.6	6.8	6.3	8.1	3.7	2.6	1.4	1.8
3	2.2	4.7	13.6	3.3	5.2	6.3	6.4	6.8	9.1	2.8	1.4	1.8
4	2.9	4.5	13.2	3.2	4.9	6.2	7.0	5.9	8.7	2.8	1.4	1.8
5	3.0	4.6	11.7	3.2	4.6	5.9	7.0	5.6	7.3	2.6	1.4	2.1
6	3.6	4.8	9.9	3.1	4.4	6.9	6.8	6.2	6.8	2.4	1.4	4.8
7	6.0	5.1	8.6	3.1	4.2	8.5	7.6	6.4	6.2	2.3	1.4	8.4
8	11.6	5.1	7.6	2.9	4.2	9.3	9.3	6.2	6.2	2.3	1.4	10.6
9	11.6	5.0	6.9	2.9	6.9	8.0	11.6	6.5	5.8	2.3	1.4	8.7
10	9.8	4.7	6.5	2.8	8.4	7.4	11.1	5.6	5.3	2.4	1.4	8.0
11	9.0	4.6	6.1	2.8	8.7	7.3	10.6	5.7	5.2	2.9	1.4	6.3
12	7.3	4.5	6.1	2.8	8.7	7.1	10.4	5.4	4.9	3.1	1.3	5.0
13	6.0	4.4	6.1	2.7	8.5	6.9	8.9	4.7	4.9	3.1	1.3	4.2
14	5.3	4.4	5.9	2.7	7.4	7.2	8.1	4.3	4.7	2.9	1.3	3.7
15	4.8	4.4	5.8	2.7	6.7	7.5	8.2	3.9	4.2	2.5	1.3	3.3
16	4.5	4.3	5.7	3.0	6.1	7.4	8.5	3.8	3.8	2.3	1.2	3.0
17	4.4	4.3	5.4	3.8	6.1	7.9	8.9	3.6	3.5	2.1	1.2	2.8
18	4.3	7.3	5.1	6.2	6.2	7.9	8.6	3.5	3.3	2.0	1.2	2.6
19	4.2	12.6	4.9	8.0	7.0	7.8	8.3	3.3	3.0	2.0	1.2	2.5
20	5.1	13.9	4.7	7.5	7.6	7.2	7.5	3.3	2.9	1.9	1.2	2.4
21	6.8	12.9	4.5	6.8	8.3	7.0	6.9	3.2	2.7	1.8	1.2	2.4
22	8.1	11.7	4.4	6.2	9.2	6.7	6.5	3.7	2.6	1.7	1.2	2.4
23	9.6	10.4	4.4	5.7	9.4	6.5	6.1	3.7	2.6	1.7	1.2	2.4
24	9.4	9.9	4.1	5.2	9.1	6.0	5.7	3.4	2.5	1.6	1.2	2.4
25	9.3	9.2	4.1	4.9	11.1	5.9	5.3	3.3	2.4	1.6	1.2	2.4
26	8.2	8.2	4.1	4.9	13.4	5.9	5.2	3.2	2.3	1.6	1.2	2.6
27	7.0	7.2	4.0	4.9	12.7	5.8	5.0	3.1	2.3	1.6	1.2	3.1
28	6.3	6.8	3.8	5.1	11.8	5.6	4.8	3.0	2.4	1.6	1.3	3.3
29	5.8	.....	3.8	6.0	10.7	5.8	4.8	2.9	2.4	1.6	1.5	3.4
30	5.4	.....	3.7	6.5	9.2	5.9	5.2	3.1	2.5	1.6	1.5	3.4
31	5.3	.....	3.6	.....	7.8	.....	5.7	3.1	.....	1.5	.....	3.7

NOTE.—Relation of gage height to discharge probably not affected by ice.

Daily discharge, in second-feet, of Tennessee River at Chattanooga, Tenn., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	13,100	27,200	45,000	18,600	34,600	43,000	33,300	41,700	15,500	13,600	8,730	9,900
2	12,600	26,600	65,000	18,100	30,800	38,400	35,200	47,000	19,700	14,000	8,730	10,300
3	12,100	25,400	83,900	17,600	28,400	35,200	35,800	38,400	53,600	15,000	8,730	10,300
4	15,500	24,300	81,200	17,000	26,600	34,600	39,700	32,700	50,900	15,000	8,730	10,300
5	16,000	24,800	71,000	17,000	24,800	32,700	39,700	30,800	41,700	14,000	8,730	11,700
6	19,200	26,000	58,900	16,500	23,700	32,700	38,400	34,600	38,400	13,100	8,730	26,000
7	33,300	27,800	50,300	16,500	22,500	49,600	43,700	35,800	34,600	12,600	8,730	48,900
8	70,300	27,800	43,700	15,500	22,500	54,900	54,900	34,600	34,600	12,600	8,730	63,600
9	70,300	27,200	39,000	15,500	39,000	46,300	70,300	36,500	32,100	12,600	8,730	50,900
10	58,300	25,400	36,500	15,000	48,900	42,300	67,000	30,800	29,000	13,100	8,730	46,300
11	52,900	24,800	33,900	15,000	50,900	41,700	63,600	31,400	28,400	15,500	8,730	35,200
12	41,700	24,300	33,900	15,000	50,900	40,400	62,300	29,600	26,600	16,500	8,380	27,200
13	33,300	23,700	33,900	14,500	49,600	39,000	52,200	25,400	26,600	16,500	8,380	22,500
14	29,000	23,700	32,700	14,500	42,300	41,000	47,000	23,100	25,400	15,500	8,380	19,700
15	26,000	23,700	32,100	14,500	37,800	43,000	47,600	20,800	22,500	13,600	8,380	17,600
16	24,300	23,100	31,400	16,000	33,900	42,300	49,600	20,300	20,300	12,600	8,050	16,000
17	23,700	23,100	29,600	20,300	33,900	45,600	52,200	19,200	18,600	11,700	8,050	15,000
18	23,100	41,700	27,800	34,600	34,600	45,600	50,300	18,600	17,600	11,200	8,050	14,000
19	22,500	77,100	26,600	46,300	39,700	45,000	48,300	17,600	16,000	11,200	8,050	13,600
20	27,800	85,900	25,400	43,000	43,700	41,000	43,000	17,600	15,500	10,800	8,050	13,100
21	38,400	79,100	24,300	38,400	48,300	39,700	39,000	17,000	14,500	10,300	8,050	13,100
22	47,000	71,000	23,700	34,600	54,200	37,800	36,500	19,700	14,000	9,900	8,050	13,100
23	56,900	62,300	23,700	31,400	55,600	36,500	33,900	19,700	14,000	9,900	8,050	13,100
24	55,600	58,900	22,000	28,400	53,600	33,300	31,400	18,100	13,600	9,490	8,050	13,100
25	54,900	54,200	22,000	26,600	67,000	32,700	29,000	17,600	13,100	9,490	8,050	13,100
26	47,600	47,600	22,000	26,600	82,500	32,700	28,400	17,000	12,600	9,490	8,050	14,000
27	39,700	41,000	21,400	26,600	77,800	32,100	27,200	16,500	12,600	9,490	8,050	16,500
28	35,200	38,400	20,300	27,800	71,700	30,800	26,000	16,000	13,100	9,490	8,380	17,600
29	32,100	.....	20,300	33,300	64,300	32,100	26,000	15,500	13,100	9,490	9,100	18,100
30	29,600	.....	19,700	36,500	54,200	32,700	28,400	16,500	13,600	9,490	9,100	18,100
31	29,000	.....	19,200	.....	45,000	.....	31,400	16,500	.....	9,100	.....	19,700

NOTE.—Daily discharge determined from a rating curve well defined between 8,050 and 37,100 second-feet (gage heights 1.2 and 6.6 feet), fairly well defined between 37,800 and 86,600 second-feet (gage heights 6.7 and 14.0 feet), and poorly defined above 86,600 second-feet (gage height 14.0 feet). The discharge rating curve is based on 3 measurements made during 1910 and the form of the 1909 rating curve.

Monthly discharge of Tennessee River at Chattanooga, Tenn., for 1910.

[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.		
January	70,300	12,100	35,200	1.64	1.89	A.
February	85,900	23,100	38,800	1.81	1.88	A.
March	83,900	19,200	36,100	1.69	1.95	A.
April	46,300	14,500	23,700	1.11	1.24	A.
May	82,500	22,500	44,900	2.10	2.42	A.
June	54,900	30,800	39,200	1.83	2.04	A.
July	70,300	26,000	42,300	1.98	2.28	A.
August	47,000	15,500	25,100	1.17	1.35	A.
September	53,600	12,600	23,400	1.09	1.22	A.
October	16,500	9,100	12,100	.565	.65	A.
November	9,100	8,050	8,420	.393	.44	A.
December	63,600	9,900	21,000	.981	1.13	A.
The year	85,900	8,050	29,200	1.36	18.49	

HOLSTON RIVER BASIN.

GENERAL FEATURES.

Holston River rises in Wythe and Bland counties, Va., partly in the western border of the Appalachian Mountains and partly in the plateau region of the Appalachian Valley, in three forks known as the North, Middle, and South forks. These forks flow almost parallel and rather close together in a southwesterly direction conforming with the long ridges and valleys characteristic of the drainage basin, and continue in the same general direction and entirely in the Appalachian Valley until they have united and the main stream has joined the French Broad to form the Tennessee.

Although it contains many steep and rocky mountainous ridges, the valley portion of the Holston basin is mainly an agricultural region a large part of its area being cleared and under cultivation. The valley parallels the western mountain border and the tributaries from that side are mountain streams, some of them descending from great heights.

Watauga River, a large and important tributary, heads with the Catawba on Grandfather Mountain in the Blue Ridge and, like French Broad and Little Tennessee rivers, cuts entirely across the Appalachian Mountains. It is the uppermost of the Tennessee River tributaries to occupy the entire width of the Appalachian summit. The mountains in its basin are high and rugged and are mostly forest covered.

The average annual rainfall in the Holston River basin is about 45 inches.

SOUTH FORK OF HOLSTON RIVER AT BLUFF CITY, TENN.

This station, which is located at the highway bridge at Bluff City, Tenn., about 300 feet below the bridge of the Virginia & Southwestern Railroad, about 10 miles above the mouth of Watauga River and 1 mile below Indian Creek, 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 the records have been furnished by the United States Weather Bureau.

The total drainage area above the station is 828 square miles.

The flow is not affected by artificial control nor, unless for a few days during exceptional years, by ice.

The staff gage, which is attached to the downstream side of a bridge pier, has not been changed.

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.

No discharge measurements were made during 1910. The station was last inspected September 18, 1909. The accuracy of the recorded daily gage heights and determination of daily and monthly discharge given in the following tables depends on the permanency of the elevation of the gage and of conditions of flow since that date.

Daily gage height, in feet, of South Fork of Holston River at Bluff City, Tenn., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.4	2.3	0.8	1.5	0.9	0.8	1.3	0.9	0.4	0.4	1.3
2	0.5	1.3	2.7	.7	1.3	.8	.7	1.1	.8	.4	.4	1.2
3	.7	1.3	2.5	.6	1.2	.7	.7	1.0	1.0	.3	.4	.7
4	.4	1.5	2.2	.6	1.1	.7	.7	1.0	2.0	.3	.3	.6
5	1.3	1.9	2.0	.6	1.1	1.3	.7	1.8	2.2	.3	.3	.9
6	1.3	1.7	1.8	.6	1.0	1.8	2.0	1.4	1.7	.3	.3	4.0
7	2.8	1.5	1.8	.7	.9	1.8	3.6	1.2	1.3	.3	.3	4.0
8	3.3	1.3	1.7	.6	1.1	1.5	5.6	1.1	1.1	.3	.2	2.7
9	2.3	1.3	1.6	.5	1.6	1.3	3.7	1.0	1.2	.5	.2	2.0
10	1.5	1.3	1.5	.5	1.6	1.3	2.6	1.0	1.2	.4	.2	1.5
11	1.4	1.3	1.5	.5	1.5	1.2	2.1	1.0	1.2	.3	.2	1.3
12	1.2	1.1	1.5	.6	1.5	1.3	1.8	.8	.9	.3	.2	1.2
13	1.2	1.0	1.4	.9	2.3	1.5	2.1	.8	.8	.3	.1	1.2
14	1.0	.8	1.3	1.5	2.0	2.7	2.0	.8	.8	.3	.1	1.2
15	1.1	1.3	1.2	1.3	1.7	3.1	2.0	.8	.8	.2	.3	1.2
16	.9	1.1	1.1	1.1	1.5	2.7	1.7	.7	.6	.2	.5	1.2
17	.8	1.1	1.0	1.5	1.4	3.4	1.6	.6	.5	.2	.4	1.1
18	.8	3.2	1.0	1.4	1.4	2.4	2.1	.6	.5	.2	.3	1.1
19	2.1	3.3	1.0	1.6	1.4	2.2	2.3	.5	.4	.2	.3	.9
20	2.3	2.5	1.0	1.6	1.3	1.8	1.7	.7	.4	.2	.3	.9
21	2.3	2.0	.9	1.6	1.2	2.1	1.6	.6	.5	.2	.3	.8
22	3.6	2.0	.9	1.6	1.4	1.7	1.5	.6	.4	.4	.3	.....
23	2.6	2.0	.9	1.5	1.3	1.5	1.3	.7	.4	.4	.3	.....
24	2.3	1.8	.8	1.5	1.3	1.5	1.2	.5	.4	.4	.3	1.0
25	2.0	1.7	.8	1.7	1.3	2.0	1.1	.5	.4	.3	.2	1.3
26	1.7	1.5	.8	1.7	1.3	1.5	1.0	.5	.4	.3	1.3	1.2
27	1.6	1.5	.8	1.7	1.7	1.1	1.0	.5	.4	.3	.8	1.2
28	1.6	1.3	.8	1.7	1.4	1.0	1.3	.5	.5	.8	.9	1.1
29	1.6	.....	.8	1.6	1.3	.9	2.4	.5	.5	.8	2.2	1.0
30	1.5	.....	.7	1.5	1.1	.8	1.7	.5	.4	.6	2.0	1.5
31	1.4	.....	.8	.....	1.0	.....	1.5	.4	.....	.5	.....	2.7

NOTE.—River reported "frozen" Jan. 1, Dec. 22 and 23.

Daily discharge, in second-feet, of South Fork of Holston River at Bluff City, Tenn., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	300	940	1,790	530	1,020	590	530	860	590	325	325	860
2	370	860	2,250	475	860	530	425	715	530	325	325	785
3	475	860	2,010	420	785	425	425	650	650	285	325	475
4	325	1,020	1,680	420	715	425	425	650	1,480	285	285	420
5	860	1,380	1,480	420	715	860	425	1,280	1,680	285	285	590
6	860	1,190	1,280	420	650	1,280	1,480	940	1,190	285	285	4,060
7	2,370	1,020	1,280	475	590	1,280	3,460	785	860	285	285	4,060
8	3,040	860	1,190	420	715	1,020	6,990	715	715	285	245	2,250
9	1,790	860	1,100	370	1,100	860	3,610	650	785	370	245	1,480
10	1,020	860	1,020	370	1,100	860	2,130	650	785	325	245	1,020
11	940	860	1,020	370	1,020	785	1,580	650	785	285	245	860
12	785	715	1,020	420	1,020	860	1,280	530	590	285	245	785
13	785	650	940	590	1,790	1,020	1,580	530	530	285	212	785
14	650	530	860	1,020	1,480	2,250	1,480	530	530	285	212	785
15	715	860	785	860	1,190	2,760	1,480	530	530	245	285	785
16	590	715	715	715	1,020	2,250	1,190	475	420	245	370	785
17	530	715	650	1,020	940	3,180	1,100	420	370	245	325	715
18	530	2,900	650	940	940	1,900	1,580	420	370	245	285	715
19	1,580	3,040	650	1,100	940	1,680	1,790	370	325	245	285	590
20	1,790	2,010	650	1,100	860	1,280	1,190	475	325	245	285	590
21	1,790	1,480	590	1,100	785	1,580	1,100	420	370	245	285	530
22	3,460	1,480	590	1,100	940	1,190	1,020	420	325	325	285	500
23	2,130	1,480	590	1,020	860	1,020	860	475	325	325	285	500
24	1,790	1,280	530	1,020	860	1,020	785	370	325	325	285	650
25	1,480	1,190	530	1,190	860	1,480	715	370	325	285	245	860
26	1,190	1,020	530	1,190	860	1,020	650	370	325	285	860	785
27	1,100	1,020	530	1,190	1,190	715	650	370	325	285	530	785
28	1,100	860	530	1,190	940	650	860	370	370	530	590	715
29	1,100	.....	530	1,100	860	590	1,900	370	370	530	1,680	650
30	1,020	.....	475	1,020	715	530	1,190	370	325	420	1,480	1,020
31	940	.....	530	.....	650	.....	1,020	325	.....	370	.....	2,250

NOTE.—Daily discharge determined from a rating curve fairly well defined between 185 and 3,320 second-feet (gage heights 0 and 3.5 feet), and poorly defined between 3,460 and 6,990 second-feet (gage heights 3.6 and 5.6 feet). Daily discharge Jan. 1, Dec. 22 and 23, estimated, because of ice.

Monthly discharge of South Fork of Holston River at Bluff City, Tenn., for 1910.

[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.		
January	3,460	300	1,210	1.46	1.68	B.
February	3,040	530	1,170	1.41	1.47	B.
March	2,250	475	935	1.13	1.30	B.
April	1,190	370	789	.953	1.06	B.
May	1,790	590	935	1.13	1.30	B.
June	3,180	425	1,200	1.45	1.62	B.
July	6,990	425	1,450	1.75	2.02	B.
August	1,280	325	550	.664	.77	B.
September	1,680	325	581	.702	.78	B.
October	530	245	309	.373	.43	B.
November	1,680	212	404	.488	.54	B.
December	4,060	420	1,050	1.27	1.46	B.
The year	6,990	212	880	1.06	14.43	

HOLSTON RIVER NEAR ROGERSVILLE, TENN.

This station, which is located at the Virginia & Southwestern Railway bridge, 1 mile north of Austins Mills and 3 miles south of Rogersville, Tenn., was established by the United States Weather Bureau March 10, 1902, and all gage heights have been furnished by the Weather Bureau.

The station is just below the mouth of Honeycut Creek and about 2 miles below Dodson Creek, both of which are small tributaries entering from the south.

The vertical staff gage is attached to the downstream end of the bridge pier nearest the right bank.

The section of river is good for measurements, but the high-decked railroad bridge is difficult and somewhat dangerous to work from. The conditions of flow are practically constant, and a good rating curve has been developed for the low and ordinary stages.

No discharge measurements were made during 1910. The station was last inspected March 16, 1909. The accuracy of the recorded daily gage heights and the determination of daily and monthly discharge given in the following tables depends on the permanency of the elevation of the gage and of conditions of flow since that date.

Daily gage height, in feet, of Holston River near Rogersville, Tenn., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.4	2.5	3.7	1.8	2.4	2.3	2.0	2.7	1.8	1.7	1.6	2.4
2	1.4	2.5	4.2	1.7	2.2	2.1	2.0	2.4	3.2	1.7	1.5	2.1
3	1.4	2.4	4.0	1.7	2.0	2.0	1.9	2.3	2.6	1.7	1.5	1.8
4	1.4	2.5	3.6	1.6	2.0	2.0	1.9	2.6	3.3	1.6	1.5	1.7
5	2.4	2.8	3.3	1.6	1.9	2.0	1.9	2.8	3.8	1.6	1.5	1.7
6	2.4	3.0	3.1	1.6	1.9	2.6	2.0	2.6	3.5	1.6	1.5	3.2
7	3.0	2.8	2.9	1.6	1.9	2.9	3.4	2.3	2.9	1.6	1.5	6.0
8	4.6	2.6	2.9	1.6	2.1	3.0	4.4	2.8	2.6	1.6	1.5	4.3
9	3.8	2.5	2.9	1.6	2.6	2.6	5.5	2.8	2.5	1.8	1.5	3.3
10	3.1	2.4	2.7	1.5	3.0	2.4	4.0	2.6	3.2	1.8	1.5	2.8
11	2.6	2.4	2.7	1.5	2.8	2.3	3.4	2.4	2.7	1.8	1.5	2.6
12	2.3	2.4	2.7	1.5	2.6	2.5	3.0	2.2	2.5	1.7	1.5	2.4
13	2.2	2.3	2.6	1.5	2.8	2.5	2.6	2.1	2.4	1.7	1.5	2.4
14	2.4	2.1	2.5	1.6	3.1	2.9	3.2	2.0	2.3	1.6	1.5	2.2
15	2.2	2.0	2.4	2.0	2.9	3.8	3.0	2.0	2.1	1.6	1.5	2.0
16	2.2	2.6	2.4	2.1	2.7	4.0	3.5	2.0	1.9	1.6	1.5	1.9
17	2.0	2.8	2.3	2.0	2.5	3.8	2.7	1.9	1.9	1.6	1.5	1.9
18	1.8	3.5	2.3	2.4	2.5	4.3	3.0	1.9	1.9	1.6	1.5	1.9
19	2.8	5.2	2.2	2.5	2.5	3.5	3.2	1.9	1.8	1.5	1.5	1.8
20	3.7	4.3	2.2	2.5	2.5	3.0	3.1	2.3	1.8	1.5	1.5	2.0
21	4.0	3.6	2.2	2.4	2.4	2.7	2.8	2.0	1.8	1.5	1.5	1.9
22	5.0	3.8	2.1	2.4	2.3	2.8	2.4	2.0	1.8	1.5	1.5	1.8
23	4.5	3.6	2.1	2.4	2.3	2.8	2.4	1.9	1.8	1.6	1.5	1.5
24	3.6	3.3	2.0	2.6	2.3	2.7	2.4	1.8	1.8	1.6	1.5	1.5
25	3.3	3.0	1.9	2.5	4.1	2.7	2.3	1.8	1.8	1.6	1.5	2.1
26	2.9	2.8	1.9	2.6	4.4	3.0	2.2	1.7	1.7	1.5	1.6	2.4
27	2.7	2.7	1.9	2.7	3.6	2.5	2.1	1.7	1.7	1.5	1.6	2.4
28	2.7	2.6	1.8	2.7	3.1	2.2	2.7	1.7	1.7	1.5	1.7	2.3
29	2.6	.....	1.8	2.6	2.7	2.1	4.4	1.7	1.9	1.6	1.9	2.1
30	2.6	.....	1.8	2.5	2.5	2.0	3.8	1.6	1.8	1.7	2.8	2.5
31	2.6	.....	1.8	.....	2.4	.....	3.1	1.7	.....	1.6	.....	2.8

NOTE.—Gage heights probably not affected by ice.

Daily discharge, in second-feet, of Holston River near Rogersville, Tenn., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,140	3,420	6,720	1,900	3,190	2,960	2,310	3,900	1,900	1,700	1,510	3,190
2	1,140	3,420	8,400	1,700	2,740	2,520	2,310	3,190	5,220	1,700	1,320	2,520
3	1,140	3,190	7,710	1,700	2,310	2,310	2,100	2,960	3,660	1,700	1,320	1,900
4	1,140	3,420	6,410	1,510	2,310	2,310	2,100	3,660	5,510	1,510	1,320	1,700
5	3,190	4,150	5,510	1,510	2,100	2,310	2,100	4,150	7,040	1,510	1,320	1,700
6	3,190	4,670	4,940	1,510	2,100	3,660	2,310	3,660	6,100	1,510	1,320	5,220
7	4,670	4,150	4,410	1,510	2,100	4,410	5,800	2,960	4,410	1,510	1,320	15,400
8	9,860	3,660	4,410	1,510	2,520	4,670	9,120	4,150	3,660	1,510	1,320	8,760
9	7,040	3,420	4,410	1,510	3,660	3,660	13,400	4,150	3,420	1,900	1,320	5,510
10	4,940	3,190	3,900	1,320	4,670	3,190	7,710	3,660	5,220	1,900	1,320	4,150
11	3,660	3,190	3,900	1,320	4,150	2,960	5,800	3,190	3,900	1,900	1,320	3,660
12	2,960	3,190	3,900	1,320	3,660	3,420	4,670	2,740	3,420	1,700	1,320	3,190
13	2,740	2,960	3,660	1,320	4,150	3,420	3,660	2,520	3,190	1,700	1,320	3,190
14	3,190	2,520	3,420	1,510	4,940	4,410	5,220	2,310	2,960	1,510	1,320	2,740
15	2,740	2,310	3,190	2,310	4,410	7,040	4,670	2,310	2,520	1,510	1,320	2,310
16	2,740	3,660	3,190	2,520	3,900	7,710	6,100	2,310	2,100	1,510	1,320	2,100
17	2,310	4,150	2,960	2,310	3,420	7,040	3,900	2,100	2,100	1,510	1,320	2,100
18	1,900	6,100	2,960	3,190	3,420	8,760	4,670	2,100	2,100	1,510	1,320	2,100
19	4,150	12,200	2,740	3,420	3,420	6,100	5,220	2,100	1,900	1,320	1,320	1,900
20	6,720	8,760	2,740	3,420	3,420	4,670	4,940	2,960	1,900	1,320	1,320	2,310
21	7,710	6,410	2,740	3,190	3,190	3,900	4,150	2,310	1,900	1,320	1,320	2,100
22	11,400	7,040	2,520	3,190	2,960	4,150	3,190	2,310	1,900	1,320	1,320	1,900
23	9,490	6,410	2,520	3,190	2,960	4,150	3,190	2,100	1,900	1,510	1,320	1,320
24	6,410	5,510	2,310	3,660	2,960	3,900	3,190	1,900	1,900	1,510	1,320	1,320
25	5,510	4,670	2,100	3,420	8,050	3,900	2,960	1,900	1,900	1,510	1,320	2,520
26	4,410	4,150	2,100	3,660	9,120	4,670	2,740	1,700	1,700	1,320	1,510	3,190
27	3,900	3,900	2,100	3,900	6,410	3,420	2,520	1,700	1,700	1,320	1,510	3,190
28	3,900	3,660	1,900	3,900	4,940	2,740	3,900	1,700	1,700	1,320	1,700	2,960
29	3,660	.....	1,900	3,660	3,900	2,520	9,120	1,700	2,100	1,510	2,100	2,520
30	3,660	.....	1,900	3,420	3,420	2,310	7,040	1,510	1,900	1,700	4,150	3,420
31	3,660	.....	1,900	.....	3,190	.....	4,940	1,700	.....	1,510	.....	4,150

NOTE.—Daily discharge determined from a rating curve well defined between 490 and 15,400 second-feet (gage heights 1.0 and 6.0 feet).

Monthly discharge of Holston River near Rogersville, Tenn., for 1910.

[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.		
January	11,400	1,140	4,330	1.42	1.63	A.
February	12,200	2,310	4,550	1.49	1.55	A.
March	8,400	1,900	3,660	1.20	1.38	A.
April	3,900	1,320	2,450	.801	.89	A.
May	9,120	2,100	3,800	1.24	1.43	A.
June	8,760	2,310	4,110	1.34	1.50	A.
July	13,400	2,100	4,680	1.53	1.76	A.
August	4,150	1,510	2,630	.859	.99	A.
September	7,040	1,700	3,030	.990	1.10	A.
October	1,900	1,320	1,540	.503	.58	A.
November	4,150	1,320	1,470	.481	.54	A.
December	15,400	1,320	3,360	1.10	1.27	A.
The year	15,400	1,140	3,300	1.08	14.62	

LITTLE TENNESSEE RIVER BASIN.

GENERAL FEATURES.

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 the territory between the basins of Pigeon and Hiwassee rivers. Its larger tributaries are the Tuckasegee from the east and the Nantahala from the south, and these streams, with the upper portion of the Little Tennessee as a middle fork, all head on top of the Blue Ridge. After cutting through the northwestern mountain rim with a great amount of fall, the river enters a broad and almost level plain extending to Tennessee River.

The upper or southern part of the basin, lying on the northwest slope of the Blue Ridge, is an elevated plateau with low, rounded granite knobs and few high summits and having a general altitude of more than 3,000 feet above sea level.

Farther downstream, in the interior and toward the northwestern border of the mountain section, the Balsam, Cowee, Nantahala, Cheoah, Unaka, and Great Smoky mountains, with many crests over 6,000 feet high, form the watershed, and from these descend many swift streams which have carved deep, narrow valleys, leaving high and irregular intervening ridges. The lower part of the basin includes some of the most rugged land in the southern Appalachians and contains only a very small part suited for tillage, but in the upper part much of the mountain land is not steep and there are several large and fertile valleys. As a whole, this basin probably contains a larger proportion of original forests and better timber than any basin in the southern Appalachian region. The great mountains on the northwestern border especially are almost entirely in forests.

The soils in the upper part of the basin are derived from granite and are sandy. On Little Tennessee River around and above Franklin, where most of the good farms are located, they comprise deep and fertile red loams, derived from schists. In the narrow valleys around the high mountains, where sandstones, quartzite, and conglomorates prevail, the soils are generally thin, sandy, and agriculturally poor, but on north slopes and in hollows they are well suited to forests.

The mean annual rainfall for the Little Tennessee River basin is about 52 inches.

LITTLE TENNESSEE RIVER NEAR FRANKLIN, N. C.

This station, which is located at the iron wagon bridge, about 1 mile northeast of Franklin, N. C., was established June 12, 1907, in cooperation with the Forest Service, to supply data regarding the water resources and power sites in the southern Appalachian Mountains.

The station is 1 mile below the mouth of Cullasagee River, which is an important tributary, and about 1 mile above the mouth of Cat Creek. The total drainage area above the station is 297 square miles. The few mills above the station probably cause a small amount of variation in the flow.

Discharge measurements are made from the bridge, where the river has high banks, permanent, rocky bottom, and swift current, and is about 125 feet wide.

The vertical staff gage is attached to a tree on the left bank about 700 feet above the bridge. Its datum has not been changed.

Backwater from a fish-trap dam about 2,000 feet below the gage affected the relation of gage height to discharge during 1910 and part of 1909. This station was abandoned July 12, 1910, on account of the effect of the fish-trap dam.

Discharge measurements of Little Tennessee River near Franklin, N. C., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq.ft.*	*Feet.*	*Sec.-ft.*
June 25	M. R. Hall	128	288	2.49	827
25	do	128	288	2.49	833

Daily gage height, in feet, of Little Tennessee River near Franklin, N. C., for 1910.

[Lewis Angel, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	1.9	1.9	4.5	1.95	1.85	2.65	1.9	16	2.0	1.85	2.2	1.9	2.5	3.0	.....
2	1.95	1.85	4.4	1.9	1.85	2.55	1.8	17	2.0	2.0	2.2	4.0	2.55	2.8	.....
3	2.0	2.0	3.6	1.9	1.8	2.9	1.9	18	2.0	4.4	2.15	2.65	2.95	2.55	.....
4	2.0	2.0	3.1	1.9	1.9	2.5	1.95	19	2.0	3.1	2.1	2.4	2.55	2.5	.....
5	1.95	1.9	2.95	1.9	1.75	3.3	1.9	20	1.95	2.7	2.3	2.3	2.9	2.4	.....
6	1.9	1.85	2.75	2.0	1.75	3.9	3.1	21	2.95	2.5	2.2	2.1	3.6	2.5	.....
7	4.6	1.85	2.65	1.8	1.8	3.1	3.6	22	2.4	2.5	2.15	2.05	4.0	2.5	.....
8	3.1	1.85	2.5	1.8	5.5	2.9	3.0	23	2.25	2.45	2.1	2.0	3.4	2.5	.....
9	2.6	1.9	2.4	1.8	5.1	2.8	2.9	24	2.1	2.4	2.05	2.1	4.9	2.5	.....
10	2.4	1.9	2.45	1.75	4.5	2.6	2.7	25	2.05	2.4	2.05	2.05	3.2	2.5	.....
11	2.3	2.05	2.7	1.75	3.1	2.5	2.65	26	2.1	2.35	2.0	2.0	3.8	2.35	.....
12	2.2	2.0	2.5	2.0	3.0	2.8	2.75	27	2.1	2.55	2.0	2.1	3.3	2.25	.....
13	2.15	1.95	2.4	1.9	2.7	2.9	.....	28	2.05	2.9	2.0	2.0	3.0	2.2	.....
14	2.3	1.9	2.3	1.8	2.5	3.0	.....	29	2.0	.....	1.95	1.95	2.9	2.2	.....
15	2.2	1.85	2.25	1.75	2.45	2.9	.....	30	2.0	.....	1.95	1.9	3.1	2.3	.....
								31	1.95	.....	1.95	.....	2.7	.....	.....

NOTE.—Daily gage height affected by backwater from fish-trap dam about 2,000 feet below the gage.

Daily discharge, in second-feet, of Little Tennessee River near Franklin, N. C., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	555	555	2,480	575	535	930	555
2	575	535	2,380	555	535	870	515
3	595	595	1,640	555	515	1,090	555
4	595	595	1,240	555	555	840	575
5	575	555	1,120	555	498	1,390	555
6	555	535	992	595	498	1,910	1,240
7	2,580	535	930	515	515	1,240	1,640
8	1,240	535	840	515	3,500	1,090	1,160
9	900	555	785	515	3,080	1,020	1,090
10	785	555	812	498	2,480	900	960
11	735	618	960	498	1,240	840	930
12	685	595	840	595	1,160	1,020	992
13	662	575	785	555	960	1,090	.....
14	735	555	735	515	840	1,160	.....
15	685	535	710	498	812	1,090	.....
16	595	535	685	555	840	1,160	.....
17	595	595	685	2,000	870	1,020	.....
18	595	2,380	662	930	1,120	870	.....
19	595	1,240	640	785	870	840	.....
20	575	960	735	735	1,090	785	.....
21	1,120	840	685	640	1,640	840	.....
22	785	840	662	618	2,000	840	.....
23	710	812	640	595	1,470	840	.....
24	640	785	618	640	2,880	840	.....
25	618	785	618	618	1,310	840	.....
26	640	760	595	595	1,820	760	.....
27	640	870	595	640	1,390	710	.....
28	618	1,090	595	595	1,160	685	.....
29	595	.....	575	575	1,090	685	.....
30	595	.....	575	555	1,240	735	.....
31	575	.....	575	.....	960	.....	.....

NOTE.—Daily discharge determined by means of a discharge rating curve that is poorly defined.

Monthly discharge of Little Tennessee River near Franklin, N. C., for 1910.

[Drainage area, 297 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	2,580	555	740	2.49	2.87	C.
February	2,380	535	747	2.52	2.62	C.
March	2,480	575	884	2.98	3.44	C.
April	2,000	498	646	2.18	2.43	C.
May	3,500	498	1,270	4.28	4.93	C.
June	1,910	685	964	3.25	3.63	B.
July 1–12	1,640	515	897	3.02	1.36	B.

LITTLE TENNESSEE RIVER AT JUDSON, N. C.

This station, which is located at the Southern Railway bridge about a quarter of a mile from Judson, N. C., and a short distance below the mouth of Sawyer Branch, was established in June, 1896. The station is 1 mile below the mouth of Alarka Creek, 2½ miles below the mouth of Nantahala River, and about 4 miles above the mouth of Tuckasegee River. The total drainage area above the station is 675 square miles.

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. The flow is little affected by artificial control, and conditions are probably constant, although many of the measurements plot wide, owing, it is thought, to the rough bottom and broken current.

Discharge measurements of Little Tennessee River at Judson, N. C., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Nov. 16	M. R. Hall	127	234	2.50	563
16	do	127	223	2.49	596
17	do	175	[a] 555	2.47	589

[a] Measurement made from footway of flume bridge about 2,000 feet above the railroad bridge.

Daily gage height, in feet, of Little Tennessee River at Judson, N. C., for 1910.

[Miss E. G. Enloe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.3	3.5	6.7	3.3	3.3	4.5	3.7	3.4	3.3	3.0	2.6	2.5
2	3.5	3.5	6.0	3.2	3.2	4.1	3.7	3.4	4.0	3.0	2.6	2.4
3	3.5	3.4	5.2	3.2	3.2	4.1	4.1	4.2	3.3	2.8	2.6	2.4
4	3.5	3.4	5.0	3.2	3.1	4.0	4.7	4.2	3.25	2.7	2.6	2.5
5	3.5	3.4	4.4	3.2	3.1	4.0	4.7	4.2	3.2	2.7	2.6	6.5
6	3.4	3.4	4.3	3.2	3.1	5.2	4.6	4.5	3.15	2.7	2.6	4.5
7	6.7	3.4	4.2	3.2	3.1	5.0	4.7	4.5	3.1	3.0	2.5	3.6
8	4.9	3.5	4.2	3.2	6.5	4.9	4.9	4.5	3.0	3.8	2.5	3.05
9	4.8	3.5	4.2	3.1	5.0	4.5	4.7	4.4	3.0	3.5	2.5	2.8
10	4.8	3.5	4.0	3.1	4.9	4.2	4.7	4.4	3.0	3.3	2.5	2.6
11	4.8	3.4	4.5	3.1	4.9	4.2	4.7	4.3	3.0	3.2	2.5	2.8
12	4.3	3.3	4.2	3.1	4.8	4.2	4.7	4.3	2.9	3.0	2.5	2.8
13	4.0	3.2	4.0	3.1	4.8	4.2	4.5	4.2	2.9	3.05	2.5	2.75
14	4.0	3.3	3.9	3.3	4.5	4.5	4.5	3.0	2.9	3.0	2.5	2.7
15	4.9	3.4	3.9	3.3	4.5	4.7	4.1	3.0	2.9	2.9	2.5	2.7
16	3.3	3.4	3.8	3.3	4.0	4.2	4.1	3.0	2.9	2.95	2.5	2.6
17	3.5	3.4	3.8	6.0	3.8	4.1	4.1	4.2	2.9	2.8	2.5	2.6
18	3.3	5.9	3.7	4.8	3.7	4.1	4.1	4.3	2.85	2.85	2.5	2.6
19	4.0	5.0	3.6	4.5	4.5	4.0	3.8	4.3	2.85	2.8	2.5	2.55
20	3.5	4.5	3.6	3.7	4.4	3.9	3.8	3.0	2.8	2.75	2.5	2.55
21	3.3	4.3	3.5	3.6	4.5	3.9	3.6	3.0	2.8	2.7	2.5	2.5
22	3.3	4.3	3.5	3.5	5.0	4.3	3.5	3.0	2.8	2.65	2.5	2.4
23	3.3	4.3	3.4	3.5	4.9	3.8	3.5	3.2	2.8	2.6	2.45	2.4
24	3.3	4.0	3.4	3.4	4.7	4.0	3.5	3.2	2.7	2.6	2.45	2.3
25	3.3	3.8	3.4	3.3	6.2	4.0	3.4	3.1	2.9	2.6	2.45	2.3
26	3.5	3.8	3.4	3.3	5.5	3.8	3.4	3.0	3.0	2.6	2.45	2.25
27	3.5	3.8	3.4	3.3	5.5	3.6	3.4	3.0	3.0	2.6	2.5	2.25
28	3.5	4.4	3.4	3.3	5.5	3.5	3.8	3.0	2.95	2.6	3.8	2.2
29	3.4	.....	3.3	3.5	5.4	3.7	3.8	3.5	2.9	2.8	2.8	4.0
30	3.4	.....	3.3	3.3	4.6	3.7	3.5	3.5	3.1	2.7	2.5	3.6
31	3.5	.....	3.3	.....	4.5	.....	3.5	3.3	.....	2.6	.....	3.6

Daily discharge, in second-feet, of Little Tennessee River at Judson, N. C., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,200	1,390	8,000	1,200	1,200	2,640	1,600	1,300	1,200	950	660	595
2	1,390	1,390	5,900	1,120	1,120	2,050	1,600	1,300	1,930	950	660	530
3	1,390	1,300	3,950	1,120	1,120	2,050	2,050	2,180	1,200	800	660	530
4	1,390	1,300	3,550	1,120	1,030	1,930	2,990	2,180	1,160	730	660	595
5	1,390	1,300	2,480	1,120	1,030	1,930	2,990	2,180	1,120	730	660	7,380
6	1,300	1,300	2,320	1,120	1,030	3,950	2,810	2,640	1,070	730	660	2,640
7	8,000	1,300	2,180	1,120	1,030	3,550	2,990	2,640	1,030	950	595	1,490
8	3,360	1,390	2,180	1,120	7,380	3,360	3,360	2,640	950	1,700	595	990
9	3,170	1,390	2,180	1,030	3,550	2,640	2,990	2,480	950	1,390	595	800
10	3,170	1,390	1,930	1,030	3,360	2,180	2,990	2,480	950	1,200	595	660
11	3,170	1,300	2,640	1,030	3,360	2,180	2,990	2,320	950	1,120	595	800
12	2,320	1,200	2,180	1,030	3,170	2,180	2,990	2,320	875	950	595	800
13	1,930	1,120	1,930	1,030	3,170	2,180	2,640	2,180	875	990	595	765
14	1,930	1,200	1,820	1,200	2,640	2,640	2,640	950	875	950	595	730
15	3,360	1,300	1,820	1,200	2,640	2,990	2,050	950	875	875	595	730
16	1,200	1,300	1,700	1,200	1,930	2,180	2,050	950	875	912	595	660
17	1,390	1,300	1,700	5,900	1,700	2,050	2,050	2,180	875	800	595	660
18	1,200	5,630	1,600	3,170	1,600	2,050	2,050	2,320	838	838	595	660
19	1,930	3,550	1,490	2,640	2,640	1,930	1,700	2,320	838	800	595	628
20	1,390	2,640	1,490	1,600	2,480	1,820	1,700	950	800	765	595	628
21	1,200	2,320	1,390	1,490	2,640	1,820	1,490	950	800	730	595	595
22	1,200	2,320	1,390	1,390	3,550	2,320	1,390	950	800	695	595	530
23	1,200	2,320	1,300	1,390	3,360	1,700	1,390	1,120	800	660	562	530
24	1,200	1,930	1,300	1,300	2,990	1,930	1,390	1,120	730	660	562	470
25	1,200	1,700	1,300	1,200	6,470	1,930	1,300	1,030	875	660	562	470
26	1,390	1,700	1,300	1,200	4,610	1,700	1,300	950	950	660	562	440
27	1,390	1,700	1,300	1,200	4,610	1,490	1,300	950	950	660	595	440
28	1,890	2,480	1,300	1,200	4,610	1,390	1,700	950	912	660	1,700	410
29	1,300	.....	1,200	1,390	4,380	1,600	1,700	1,390	875	800	800	1,930
30	1,300	.....	1,200	1,200	2,810	1,600	1,390	1,390	1,030	730	595	1,490
31	1,390	.....	1,200	.....	2,640	.....	1,390	1,200	.....	660	.....	1,490

NOTE.—Daily discharge determined from discharge rating curve well defined between 530 and 2,990 second-feet (gage heights 2.4 and 4.7 feet, fairly well defined between 3,170 and 10,200 second-feet (gage heights 4.8 and 7.4 feet, and poorly defined above discharge 10,200 second-feet (gage height 7.4 feet).

Monthly discharge of Little Tennessee River at Judson, N. C., for 1910.

[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.		
January	8,000	1,200	1,930	2.86	3.30	B.
February	5,630	1,120	1,800	2.67	2.78	B.
March	8,000	1,200	2,170	3.22	3.71	B.
April	5,900	1,030	1,470	2.08	2.32	B.
May	7,380	1,030	2,900	4.30	4.96	B.
June	3,950	1,390	2,200	3.26	3.64	B.
July	3,360	1,300	2,100	3.11	3.58	B.
August	2,640	950	1,660	2.46	2.84	B.
September	1,930	730	965	1.43	1.60	A.
October	1,700	660	861	1.28	1.48	A.
November	1,700	562	647	.954	1.06	A.
December	7,380	410	1,030	1.53	1.76	B.
The year	8,000	410	1,650	2.44	33.03	

LITTLE TENNESSEE RIVER AT M'GHEE, TENN.

This station, which is located at the Louisville & Nashville Railroad bridge about one-third mile south of McGhee, Tenn., and one-half mile below the mouth of Tellico River, was established by the United States Weather Bureau late in 1904, the gage readings begin-

ning 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.

The boxed chain gage is 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 Dceember 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).

Although the river is navigable up to the station, very valuable water-power sites exist a short distance above. There are no dams of sufficient size to cause any noticeable interference with the natural flow of the stream. 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 it is fairly satisfactory for measuring.

No discharge measurements were made at this station during 1910. The station was last visited May 25, 1909, and the accuracy of the estimates of daily and monthly discharges published in the following tables depends on the constancy of the elevation of the gage and the permanency of the relation of gage height to discharge since that date.

Daily gage height, in feet, of Little Tennessee River at McGhee, Tenn., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.3	3.7	9.1	3.3	3.8	4.5	4.4	4.4	5.6	3.3	2.5	2.5
2	3.7	3.5	8.0	3.3	3.8	4.4	5.4	4.0	4.2	3.0	2.4	2.3
3	3.9	3.6	6.8	3.3	3.6	4.5	5.2	3.8	4.0	2.9	2.4	2.3
4	3.9	4.6	5.8	3.2	3.6	4.5	5.4	4.4	4.0	2.8	2.4	2.2
5	3.7	4.0	5.2	3.2	3.6	4.5	4.9	5.0	4.0	2.8	2.3	2.7
6	3.6	3.8	4.9	3.2	3.5	9.5	4.9	4.3	3.6	2.7	2.5	10.0
7	6.6	3.5	4.7	3.4	3.5	6.8	6.8	4.6	3.6	2.6	2.5	5.9
8	6.4	3.3	4.4	3.1	4.2	5.6	6.4	4.3	3.4	3.7	2.4	4.0
9	5.0	3.6	4.3	3.1	8.6	5.1	5.6	4.0	3.3	3.6	2.4	3.7
10	4.5	3.8	4.1	3.1	6.2	4.8	5.2	3.8	3.3	3.6	2.4	3.6
11	4.1	3.6	4.3	3.1	5.2	5.0	4.8	3.7	3.2	3.1	2.4	3.3
12	3.9	4.0	4.5	3.1	4.7	4.9	4.7	3.6	3.2	3.0	2.4	3.1
13	3.8	3.7	4.2	3.3	5.0	5.1	4.6	3.5	3.1	2.9	2.4	3.0
14	3.7	3.4	4.1	3.5	4.5	5.4	5.6	3.5	3.1	2.8	2.4	2.9
15	4.0	3.6	3.9	3.3	4.2	4.9	5.4	3.4	3.0	2.7	2.3	2.8
16	3.6	3.7	3.8	3.3	4.1	4.9	5.0	3.4	3.0	2.7	2.3	2.7
17	3.5	4.0	3.8	4.1	4.2	4.7	5.0	3.4	2.9	2.7	2.3	2.6
18	3.5	8.8	3.7	7.1	4.7	4.5	5.2	3.3	2.9	2.6	2.3	2.9
19	4.8	6.8	3.7	4.8	6.1	4.3	4.8	3.3	2.8	2.6	2.3	2.8
20	4.3	5.5	3.6	4.2	5.1	4.2	4.3	4.0	2.9	2.6	2.3	2.8
21	4.6	4.8	3.8	4.0	5.5	4.5	4.2	3.7	2.9	2.6	2.2	2.8
22	5.2	5.3	3.7	3.8	5.7	4.4	4.1	3.6	2.8	2.5	2.2	2.7
23	4.8	5.0	3.7	3.8	5.9	4.4	4.0	3.5	2.8	2.5	2.3	2.7
24	4.4	4.6	3.6	4.0	5.7	4.4	3.8	3.5	2.8	2.5	2.4	3.3
25	4.3	4.4	3.6	3.7	8.5	4.5	3.8	3.3	2.7	2.5	2.4	4.0
26	4.1	4.2	3.5	3.7	7.4	4.4	3.7	3.2	3.1	2.4	2.5	3.6
27	4.1	4.0	3.5	3.8	6.2	4.1	4.4	3.4	3.0	2.4	2.4	3.2
28	4.1	4.3	3.4	4.2	5.5	3.9	4.3	3.4	2.9	2.7	2.6	3.1
29	3.9	.....	3.4	4.1	5.1	4.2	4.2	3.3	2.9	2.8	3.6	3.1
30	3.9	.....	3.4	3.9	4.9	5.5	4.0	3.2	3.3	2.6	3.1	3.4
31	3.8	.....	3.3	.....	5.1	.....	4.7	3.0	.....	2.5	.....	4.7

NOTE.—Gage heights probably not affected by ice.

Daily discharge, in second-feet, of Little Tennessee River at McGhee, Tenn., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,650	4,630	21,200	3,650	4,890	6,780	6,500	6,500	10,000	3,650	2,090	2,090
2	4,630	4,130	17,500	3,650	4,890	6,500	9,420	5,410	5,950	2,990	1,940	1,790
3	5,150	4,380	13,700	3,650	4,380	6,780	8,820	4,890	5,410	2,790	1,940	1,790
4	5,150	7,060	10,600	3,420	4,380	6,780	9,420	6,500	5,410	2,600	1,940	1,650
5	4,630	5,410	8,820	3,420	4,380	6,780	7,930	8,220	5,410	2,600	1,790	2,420
6	4,380	4,890	7,930	3,420	4,130	22,500	7,930	6,220	4,380	2,420	2,090	24,200
7	13,100	4,130	7,350	3,890	4,130	13,700	13,700	7,060	4,380	2,250	2,090	10,900
8	12,500	3,650	6,500	3,200	5,950	10,000	12,500	6,220	3,890	4,630	1,940	5,410
9	8,220	4,380	6,220	3,200	19,500	8,520	10,000	5,410	3,650	4,380	1,940	4,630
10	6,780	4,890	5,680	3,200	11,800	7,640	8,820	4,890	3,650	4,380	1,940	4,380
11	5,680	4,380	6,220	3,200	8,820	8,220	7,640	4,630	3,420	3,200	1,940	3,650
12	5,150	5,410	6,780	3,200	7,350	7,930	7,350	4,380	3,420	2,990	1,940	3,200
13	4,890	4,630	5,950	3,650	8,220	8,520	7,060	4,130	3,200	2,790	1,940	2,990
14	4,630	3,890	5,680	4,130	6,780	9,420	10,000	4,130	3,200	2,600	1,940	2,790
15	5,410	4,380	5,150	3,650	5,950	7,930	9,420	3,890	2,990	2,420	1,790	2,600
16	4,380	4,630	4,890	3,650	5,680	7,930	8,220	3,890	2,990	2,420	1,790	2,420
17	4,130	5,410	4,890	5,680	5,950	7,350	8,220	3,890	2,790	2,420	1,790	2,250
18	4,130	20,200	4,630	14,600	7,350	6,780	8,820	3,650	2,790	2,250	1,790	2,790
19	7,640	13,700	4,630	7,640	11,500	6,220	7,640	3,650	2,600	2,250	1,790	2,600
20	6,220	9,720	4,380	5,950	8,520	5,950	6,220	5,410	2,790	2,250	1,790	2,600
21	7,060	7,640	4,890	5,410	9,720	6,780	5,950	4,630	2,790	2,250	1,650	2,600
22	8,820	9,120	4,630	4,890	10,300	6,500	5,680	4,380	2,600	2,090	1,650	2,420
23	7,640	8,220	4,630	4,890	10,900	6,500	5,410	4,130	2,600	2,090	1,790	2,420
24	6,500	7,060	4,380	5,410	10,300	6,500	4,890	4,130	2,600	2,090	1,940	3,650
25	6,220	6,500	4,380	4,630	19,200	6,780	4,890	3,650	2,420	2,090	1,940	5,410
26	5,680	5,950	4,130	4,630	15,600	6,500	4,630	3,420	3,200	1,940	2,090	4,380
27	5,680	5,410	4,130	4,890	11,800	5,680	6,500	3,890	2,990	1,940	1,940	3,420
28	5,680	6,220	3,890	5,950	9,720	5,150	6,220	3,890	2,790	2,420	2,250	3,200
29	5,150	.....	3,890	5,680	8,520	5,950	5,950	3,650	2,790	2,600	4,380	3,200
30	5,150	.....	3,890	5,150	7,930	9,720	5,410	3,420	3,650	2,250	3,200	3,890
31	4,890	.....	3,650	.....	8,520	.....	7,350	2,990	.....	2,090	.....	7,350

NOTE.—Daily discharge determined by means of a discharge rating curve fairly well defined between 1,390 and 1,650 second-feet (gage heights 2.0 and 2.2 feet), well defined between 1,790 and 8,820 second-feet (gage heights 2.3 and 5.2 feet), and fairly well defined between 9,120 and 24,200 second-feet (gage heights 5.3 and 10.0 feet).

Monthly discharge of Little Tennessee River at McGhee, Tenn., for 1910.

[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.		
January	13,100	3,650	6,090	2.47	2.85	A.
February	20,200	3,650	6,430	2.60	2.71	A.
March	21,200	3,650	6,620	2.68	3.09	A.
April	14,600	3,200	4,720	1.91	2.13	A.
May	19,500	4,130	8,610	3.49	4.02	A.
June	22,500	5,150	7,940	3.21	3.58	A.
July	13,700	4,630	7,690	3.12	3.60	A.
August	8,220	2,990	4,680	1.89	2.18	A.
September	10,000	2,420	3,690	1.49	1.66	A.
October	4,630	1,940	2,650	1.07	1.23	A.
November	4,380	1,650	2,030	.822	.92	A.
December	24,200	1,650	4,160	1.68	1.94	A.
The year	24,200	1,650	5,450	2.21	29.91	

TUCKASEGEE 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 and about 15 miles above the junction of Tuckasegee River with Little Tennessee

River. Oconalufty River, an important tributary, comes in about 8 miles above Bryson. The total drainage area above the station is 662 square miles.

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 measuring section. The present station was established November 7, 1897, and has been maintained continuously since that time.

The gage is read twice a day in order to equalize any small variations in flow caused by the operations of power plants.

Discharge measurements are made at the bridge, where the current and other conditions are good. A staff gage is attached to the left bank pier. Its datum has not been changed.

Discharge measurements of Tuckasegee River at Bryson, N. C., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 20	F. P. Thomas	191	975	2.00	1,700
21	do	191	961	1.90	1,560
21	do	191	956	1.91	1,580
Nov. 17	M. R. Hall	185	760	1.12	542

Daily gage height, in feet, of Tuckasegee River at Bryson, N. C., for 1910.

[J. M. Welch, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.8	1.5	3.85	1.5	1.6	2.0	1.9	1.8	2.2	1.5	1.2	1.1
2	1.7	1.5	3.1	1.5	1.6	1.9	1.95	1.8	2.0	1.4	1.2	1.1
3	1.8	1.6	2.65	1.5	1.5	2.25	1.85	2.0	1.9	1.3	1.2	1.1
4	1.75	1.7	2.5	1.5	1.7	2.15	1.95	2.0	1.9	1.3	1.2	1.15
5	1.6	1.6	2.3	1.45	1.5	3.0	2.1	1.85	1.85	1.3	1.2	2.1
6	1.65	1.55	2.2	1.55	1.5	3.25	2.3	1.8	1.7	1.3	1.2	3.4
7	3.3	1.6	2.1	1.4	1.6	2.55	2.95	1.8	1.65	1.95	1.2	1.9
8	2.45	1.5	2.0	1.4	3.35	2.35	2.4	1.8	1.6	1.95	1.2	1.6
9	2.0	1.65	2.0	1.4	3.55	2.2	2.2	1.8	1.7	1.9	1.2	1.5
10	1.95	1.65	1.95	1.4	2.7	2.1	2.25	1.7	1.5	1.6	1.2	1.5
11	1.8	1.6	2.2	1.4	2.15	2.0	2.15	1.6	1.5	1.5	1.2	1.5
12	1.75	1.6	2.0	1.6	2.2	2.2	2.1	1.6	1.5	1.4	1.15	1.4
13	1.7	1.45	1.9	1.5	2.05	2.25	2.45	1.5	1.5	1.4	1.15	1.3
14	1.75	1.5	1.8	1.5	1.9	2.55	2.65	1.6	1.45	1.35	1.15	1.2
15	1.7	1.5	1.8	1.5	1.8	2.6	2.75	1.55	1.4	1.3	1.15	1.3
16	1.6	1.7	1.7	1.8	1.8	2.4	2.65	1.5	1.5	1.3	1.15	1.4
17	1.6	2.15	1.7	3.8	1.95	2.25	2.5	1.5	1.4	1.3	1.1	1.35
18	1.7	3.65	1.7	2.85	2.7	2.1	2.35	1.5	1.35	1.3	1.15	1.3
19	1.9	2.45	1.7	1.95	2.25	2.0	2.2	1.7	1.35	1.3	1.1	1.4
20	2.65	2.2	1.8	1.8	2.5	2.1	2.05	1.7	1.4	1.25	1.1	1.3
21	2.2	2.2	1.7	1.7	2.4	2.15	1.9	1.6	1.35	1.25	1.1	1.15
22	1.95	2.25	1.7	1.65	2.45	2.1	1.85	1.65	1.3	1.25	1.1	1.2
23	1.8	2.05	1.65	1.7	2.4	2.1	1.8	1.55	1.3	1.2	1.1	1.4
24	1.8	2.0	1.6	1.6	3.1	2.15	1.8	1.5	1.3	1.2	1.15	2.4
25	1.8	1.9	1.6	1.6	3.35	2.0	1.8	1.5	1.5	1.2	1.2	1.6
26	1.7	1.9	1.6	1.6	2.9	2.0	1.7	1.6	1.4	1.2	1.15	1.45
27	1.7	1.9	1.55	1.7	2.55	1.85	2.15	1.65	1.4	1.25	1.2	1.5
28	1.7	3.1	1.55	1.6	2.35	1.9	2.05	1.5	1.4	1.35	1.55	1.45
29	1.65	.....	1.55	1.6	2.2	1.9	2.0	1.4	1.4	1.25	1.35	1.5
30	1.6	.....	1.5	1.6	2.45	1.9	2.35	1.4	1.65	1.2	1.2	2.75
31	1.6	.....	1.5	.....	2.15	.....	1.95	2.7	.....	1.2	.....	1.9

Daily discharge, in second-feet, of Tuckasegee River at Bryson, N. C., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,090	960	5,420	960	1,090	1,660	1,510	1,360	1,970	960	625	530
2	1,220	960	3,670	960	1,090	1,510	1,580	1,360	1,660	840	625	530
3	1,360	1,090	2,760	960	960	2,050	1,440	1,660	1,510	730	625	530
4	1,300	1,220	2,480	960	1,220	1,890	1,580	1,660	1,510	730	625	578
5	1,090	1,090	2,130	900	960	3,460	1,810	1,440	1,440	730	625	1,810
6	1,160	1,020	1,970	900	960	4,000	2,130	1,360	1,220	730	625	4,330
7	4,110	1,090	1,816	840	1,090	2,570	3,360	1,360	1,160	1,580	625	1,510
8	2,390	960	1,660	840	4,220	2,220	2,300	1,360	1,090	1,580	625	1,090
9	1,660	1,160	1,660	840	4,680	1,970	1,970	1,360	1,220	1,510	625	960
10	1,580	1,160	1,580	840	2,850	1,810	2,050	1,220	960	1,090	625	960
11	1,360	1,090	1,970	840	1,890	1,660	1,890	1,090	960	960	625	960
12	1,300	1,090	1,660	1,090	1,970	1,970	1,810	1,090	960	840	578	840
13	1,220	900	1,510	960	1,740	2,050	2,390	960	960	840	578	730
14	1,300	960	1,360	960	1,510	2,570	2,760	1,090	900	785	578	625
15	1,220	960	1,360	960	1,360	2,660	2,950	1,020	840	730	578	730
16	1,090	1,220	1,220	1,360	1,360	2,300	2,760	960	960	730	578	840
17	1,090	1,890	1,220	5,290	1,580	2,050	2,480	960	840	730	530	785
18	1,220	4,920	1,220	3,150	2,850	1,810	2,220	960	785	730	578	730
19	1,510	2,390	1,220	1,580	2,050	1,660	1,970	1,220	785	730	530	840
20	1,740	1,970	1,360	1,360	2,480	1,810	1,740	1,220	840	678	530	730
21	1,970	1,970	1,220	1,220	2,300	1,890	1,510	1,090	785	678	530	578
22	1,580	2,050	1,220	1,160	2,390	1,810	1,440	1,160	730	678	530	625
23	1,360	1,740	1,160	1,220	2,300	1,810	1,360	1,020	730	625	530	840
24	1,360	1,660	1,090	1,090	3,670	1,890	1,360	960	730	625	578	2,300
25	1,360	1,510	1,090	1,090	4,220	1,660	1,360	960	960	625	625	1,090
26	1,220	1,510	1,090	1,090	3,250	1,660	1,220	1,090	840	625	578	900
27	1,220	1,510	1,020	1,220	2,570	1,440	1,890	1,160	840	678	625	960
28	1,220	3,670	1,020	1,090	2,220	1,510	1,740	960	840	785	1,020	900
29	1,160	.....	1,020	1,090	1,970	1,510	1,660	840	840	678	785	960
30	1,090	.....	960	1,090	2,390	1,510	2,220	840	1,160	625	625	2,950
31	1,090	.....	960	.....	1,890	.....	1,580	2,850	.....	625	.....	1,510

NOTE.—Daily discharge determined from a discharge rating curve well defined between 530 and 3,250 second-feet (gage heights 1.1 and 2.9 feet), and fairly well defined between 3,460 and 10,700 second-feet (gage heights 3.0 and 5.5 feet).

Monthly discharge of Tuckasegee River at Bryson, N. C., for 1910.

[Drainage area, 662 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	4,110	1,090	1,440	2.18	2.51	A.
February	4,920	900	1,560	2.36	2.46	A.
March	5,420	960	1,650	2.49	2.87	A.
April	5,290	840	1,260	1.90	2.12	A.
May	4,680	960	2,160	3.26	3.76	A.
June	4,000	1,440	2,010	3.04	3.39	A.
July	3,360	1,220	1,940	2.93	3.38	A.
August	2,850	840	1,210	1.83	2.11	A.
September	1,970	730	1,030	1.56	1.74	A.
October	1,580	625	822	1.24	1.43	A.
November	1,020	530	612	.924	1.03	A.
December	4,330	530	1,100	1.66	1.91	A.
The year	5,420	530	1,400	2.11	28.71	

HIWASSEE RIVER BASIN.

GENERAL FEATURES.

Hiwassee River rises in the mountains of the Blue Ridge in western North Carolina and northern Georgia, takes a northwesterly direction, breaks through the Unaka Mountains, and enters Tennessee River 36 miles above Chattanooga, after flowing for 41 miles through a level country.

Nottely and Ocoee rivers, important tributaries, head in the Blue Ridge in Georgia. The Nottely enters the Hiwassee a short distance below Murphy, N. C., but the Ocoee has cut for itself a separate channel through the mountain border and enters the Hiwassee about 6 miles below Savannah Ford, which is the head of navigation. The lower mountain channels of both Hiwassee and Ocoee are exceedingly narrow, with high, precipitous banks, and the fall of both streams is very large.

The Hiwassee River basin occupies the southwestern portion of the Appalachian Mountains northwest of the Blue Ridge, and is therefore the southern extremity of the great mountain drainage area whose southeastern border is the top of the Blue Ridge, extending solid without a single crosscutting stream south of Roanoke River in Virginia.

The altitude of this tract, separated from the Little Tennessee basin by a mountainous divide, extending from the Blue Ridge to the Unaka Mountains, ranges between 1,500 and 5,000 feet. Spurs from 5 to 20 miles long reach from the eastern divide toward the river, and deep valleys extend from the river far into the mountains. The mountain sides are steep and in many places rocky, and the creek valleys, several of which are important, have considerable areas of alluvial flats and rolling foothills.

HIWASSEE RIVER AT MURPHY, N. C.

This station, which is located at the highway bridge in Murphy, N. C., about 80 feet above the Louisville & Nashville Railroad bridge, one-half mile above the mouth of Valley River, was established July 26, 1896, and the record is continuous except for a short period from August 8 to October 19, 1897.

The total drainage area above the station is 410 square miles. The natural flow is little, if any, affected either by diversions or dams above.

Prior to 1903 a wire gage located at the bridge was used. This was broken a number of times, introducing uncertainties in the gage height records. Since January 1, 1903, a chain gage fastened to the bridge

has been used. There has been no change in the gage datum since October 20, 1897. At the measuring section the current is good and fairly regular, but the bed, which is rock, is uneven, and soundings require careful work. Backwater from Valley River is not apt to disturb the rating, though such an effect is possible.

Discharge measurements of Hiwassee River at Murphy, N. C., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 19	M. R. Hall	157	385	5.81	800
19	F. P. Thomas	157	395	5.82	804
22	do	161	412	5.75	806
Nov. 16	M. R. Hall	150	267	5.15	287
16	do	150	254	5.14	282

Daily gage height, in feet, of Hiwassee River at Murphy, N. C., for 1910.

[Miss Willie Mingus, observer.]

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.6	5.7	7.0	5.45	5.65	6.1	6.2	5.7	6.1	5.35	5.2	5.15
2	5.6	5.65	8.0	5.5	5.6	6.0	6.25	5.6	6.0	5.3	5.2	5.15
3	5.7	5.7	6.6	5.45	5.6	6.1	6.2	5.65	5.65	5.25	5.2	5.15
4	5.6	6.0	6.3	5.45	5.6	6.0	6.4	5.55	5.65	5.25	5.2	5.15
5	5.6	5.85	6.25	5.5	5.55	6.2	6.2	5.85	5.8	5.25	5.2	5.75
6	5.6	5.8	6.15	5.6	5.5	7.7	7.0	5.6	5.55	5.25	5.2	8.0
7	7.6	5.7	6.0	5.5	5.6	6.7	6.7	6.0	5.5	5.35	5.2	6.2
8	6.6	5.8	5.95	5.45	8.4	6.45	6.15	5.9	5.45	5.5	5.2	6.2
9	6.2	5.7	5.85	5.45	7.8	6.3	6.4	5.6	5.45	5.75	5.2	5.6
10	6.0	5.7	5.85	5.45	6.75	6.3	6.2	5.55	5.4	5.45	5.2	5.55
11	5.9	5.65	6.1	5.45	6.5	6.35	6.3	5.55	5.4	5.35	5.2	5.5
12	5.8	5.9	6.0	5.45	6.25	6.2	6.5	5.5	5.4	5.3	5.2	5.4
13	5.7	5.7	5.9	5.6	6.2	6.5	6.3	5.5	5.7	5.3	5.15	5.3
14	5.8	5.65	5.85	5.6	6.05	6.3	6.2	5.5	5.4	5.2	5.15	5.3
15	5.7	5.7	5.75	5.45	6.05	6.4	6.15	5.7	5.4	5.25	5.15	5.3
16	5.65	5.75	5.75	5.6	5.8	6.75	6.0	5.5	5.4	5.25	5.15	5.3
17	5.65	5.8	5.7	7.0	6.0	6.2	6.0	5.45	5.3	5.25	5.15	5.3
18	5.6	7.6	5.7	5.6	6.2	6.1	5.95	5.5	5.3	5.2	5.15	5.3
19	6.05	6.65	5.65	6.0	6.2	6.0	5.85	5.6	5.3	5.2	5.15	5.4
20	5.7	6.4	5.8	5.9	5.8	5.9	5.8	5.9	5.3	5.2	5.15	5.3
21	6.3	6.2	5.7	5.8	8.4	6.35	5.8	5.55	5.3	5.2	5.15	5.3
22	6.2	6.3	5.65	5.7	7.4	6.15	5.8	5.5	5.25	5.2	5.15	5.3
23	6.0	6.15	5.6	5.75	7.2	6.25	5.7	5.7	5.25	5.2	5.15	5.35
24	6.0	6.1	5.6	5.65	7.0	6.2	5.95	5.5	5.35	5.2	5.2	5.95
25	5.9	6.0	5.6	5.6	7.8	6.15	5.95	5.5	5.55	5.2	5.2	5.55
26	5.85	5.9	5.55	5.75	7.0	6.0	5.9	5.6	5.55	5.15	5.2	5.45
27	5.85	5.9	5.55	5.75	6.8	5.9	5.9	5.5	5.5	5.15	5.15	5.45
28	5.8	6.0	5.5	5.7	6.55	5.8	6.0	5.5	5.35	5.4	5.5	5.4
29	5.9	.....	5.5	5.7	6.4	6.0	5.95	5.45	5.3	5.25	5.3	5.4
30	5.8	.....	5.45	5.7	6.3	5.9	5.95	5.4	5.4	5.2	5.2	5.8
31	5.75	.....	5.45	.....	6.2	.....	5.8	5.55	.....	5.2	.....	5.75

Daily discharge, in second-feet, of Hiwassee River at Murphy, N. C., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	640	720	2,130	512	670	1,070	1,170	710	1,070	438	330	295
2	640	680	3,850	550	630	975	1,220	630	975	400	330	295
3	720	720	1,610	512	630	1,070	1,170	670	670	365	330	295
4	640	975	1,270	512	630	975	1,380	590	670	365	330	295
5	640	842	1,220	550	590	1,170	1,170	840	795	365	330	752
6	640	800	1,120	630	550	3,290	2,130	630	590	365	330	3,850
7	3,110	720	975	550	630	1,730	1,730	975	550	438	330	1,170
8	1,610	800	930	512	4,660	1,440	1,120	885	512	550	330	1,170
9	1,170	720	840	512	3,470	1,270	1,380	630	512	752	330	630
10	975	720	840	512	1,800	1,270	1,170	590	475	512	330	590
11	885	680	1,070	512	1,490	1,320	1,270	590	475	438	330	550
12	800	885	975	512	1,220	1,170	1,490	550	475	400	330	475
13	720	720	885	630	1,170	1,490	1,270	550	710	400	295	400
14	800	680	840	630	1,020	1,270	1,170	550	475	330	295	400
15	720	720	752	512	1,020	1,380	1,120	710	475	365	295	400
16	680	760	752	630	795	1,800	975	550	475	365	295	400
17	680	800	710	2,130	975	1,170	975	512	400	365	295	400
18	640	3,110	710	630	1,170	1,070	930	550	400	330	295	400
19	1,020	1,670	670	975	1,170	975	840	630	400	330	295	475
20	720	1,380	795	885	795	885	795	885	400	330	295	400
21	1,270	1,170	710	795	4,660	1,320	795	590	400	330	295	400
22	1,170	1,270	670	710	2,760	1,020	795	550	365	330	295	400
23	975	1,120	630	752	2,430	1,220	710	710	365	330	295	438
24	975	1,070	630	670	2,130	1,170	930	550	438	330	330	930
25	885	975	630	630	3,470	1,120	930	550	590	330	330	590
26	842	885	590	752	2,130	975	885	630	590	295	330	512
27	842	885	590	752	1,860	885	885	550	550	295	295	512
28	800	975	550	710	1,550	795	975	550	438	475	550	475
29	885	.....	550	710	1,380	975	930	512	400	365	400	475
30	800	.....	512	710	1,270	885	930	475	475	330	330	795
31	760	.....	512	.....	1,170	.....	795	590	.....	330	.....	752

NOTE.—Daily discharge determined from rating curves well defined between 260 and 1,860 second-feet (gage heights 5.1 and 6.8 feet), fairly well defined between 1,990 and 3,850 second-feet (gage heights 6.9 and 8.0 feet), and poorly defined above 3,850 second-feet (gage height 8.0 feet). The rating curve used below discharge 885 second-feet (gage height 5.9 feet), from Jan. 1 to Feb. 28, differed from that used Mar. 1 to Dec. 31. The necessity for this change in rating was shown by discharge measurements made during 1909 and 1910.

Monthly discharge of Hiwassee River at Murphy, N. C., for 1910.

[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.		
January	3,110	640	924	2.25	2.59	B.
February	3,110	680	980	2.39	2.48	B.
March	3,850	512	952	2.32	2.68	B.
April	2,130	512	686	1.67	1.86	B.
May	4,660	550	1,610	3.93	4.53	B.
June	3,290	795	1,240	3.02	3.37	A.
July	2,130	710	982	2.40	2.77	A.
August	975	475	629	1.53	1.76	A.
September	1,070	365	537	1.31	1.46	A.
October	752	295	385	.939	1.08	A.
November	550	295	326	.795	.89	A.
December	3,850	295	643	1.57	1.81	A.
The year	4,660	295	824	2.01	27.29	

HIWASSEE RIVER AT RELIANCE, TENN.

This station, which is located at the Louisville & Nashville Railroad bridge at Reliance, Tenn., 2 miles above Spring Creek and 1 mile below Lost Creek, was established August 17, 1900.

The total drainage area above the station is 1,180 square miles.

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. It is possible, however, that at low water there is some effect, and also that the observed changes in rating may be due to variable heights of the temporary dam at the mill.

There has been no change in the datum of the staff gage, which is attached to a tree at the right ferry landing 150 feet above the bridge.

Discharge measurements of Hiwassee River at Reliance, Tenn., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 11	M. R. Hall	335	2,140	2.16	2,570
11	do	336	2,190	2.20	2,720
July 25	F. P. Thomas	344	2,110	2.09	2,320
25	do	344	2,110	2.01	2,230
26	do	344	2,130	1.97	2,220

Daily gage height, in feet, of Hiwassee River at Reliance, Tenn., for 1910.

[C. V. Higdon, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.9	1.85	3.2	1.6	1.85	2.3	2.45	2.0	3.2	1.45	1.3	1.3
2	1.8	1.8	3.5	1.6	1.8	2.2	2.55	1.9	2.65	1.45	1.3	1.25
3	1.9	1.85	3.0	1.6	1.75	2.6	2.45	1.9	2.2	1.4	1.3	1.2
4	1.8	2.0	2.7	1.6	1.7	2.35	2.9	1.95	2.1	1.4	1.25	1.2
5	1.75	2.3	2.5	1.55	1.7	2.5	2.7	2.6	2.05	1.35	1.25	1.6
6	1.7	2.0	2.25	1.6	1.75	4.2	2.7	2.6	1.9	1.35	1.3	6.4
7	2.7	1.9	2.25	1.6	1.8	3.3	3.4	2.0	1.75	1.45	1.3	2.9
8	2.95	1.85	2.15	1.55	4.2	2.7	3.2	3.5	1.7	1.45	1.3	2.4
9	2.5	1.8	2.1	1.5	4.9	2.65	3.0	2.5	1.7	1.65	1.3	1.9
10	2.2	1.8	2.05	1.5	4.4	2.5	2.7	2.2	1.7	1.65	1.25	1.8
11	2.05	2.0	2.1	1.5	2.85	2.75	2.6	2.05	1.7	1.6	1.25	1.7
12	1.95	2.15	2.3	1.5	2.55	2.65	2.55	2.95	1.6	1.45	1.25	1.6
13	1.85	2.0	2.1	1.6	2.4	3.1	2.6	1.95	1.65	1.4	1.25	1.55
14	1.8	1.85	2.0	1.75	2.3	2.8	2.7	2.5	1.65	1.4	1.25	1.5
15	1.9	1.85	1.95	1.65	2.2	2.8	2.6	1.9	1.55	1.35	1.25	1.5
16	1.8	1.85	1.85	1.9	2.1	2.8	2.6	1.9	1.5	1.35	1.25	1.55
17	1.8	1.9	1.95	2.9	2.2	2.4	2.45	1.95	1.4	1.3	1.25	1.45
18	1.7	4.1	1.85	3.3	2.4	2.35	2.35	1.85	1.4	1.3	1.2	1.45
19	2.05	3.2	1.8	2.75	2.5	2.3	2.25	1.8	1.45	1.3	1.25	1.55
20	2.0	2.65	1.8	2.2	2.6	2.35	2.25	2.0	1.45	1.3	1.2	1.5
21	2.1	2.45	1.85	2.0	4.6	2.35	2.25	2.0	1.45	1.3	1.2	1.45
22	2.55	2.4	1.8	1.9	3.9	2.25	2.1	1.85	1.45	1.35	1.2	1.45
23	2.25	2.4	1.8	1.9	3.9	2.35	2.05	1.8	1.4	1.25	1.2	1.45
24	2.25	2.3	1.75	1.9	4.1	2.4	2.05	1.8	1.4	1.25	1.25	1.6
25	2.2	2.15	1.75	1.9	4.9	2.5	2.1	1.8	1.4	1.25	1.3	1.9
26	2.1	2.1	1.75	1.95	3.7	2.3	2.0	1.75	1.5	1.25	1.3	1.4
27	2.05	2.15	1.7	2.0	3.2	2.1	2.15	1.8	1.5	1.25	1.25	1.3
28	2.0	2.0	1.7	2.1	2.85	2.05	2.2	1.8	1.6	1.35	1.55	1.6
29	2.0	.....	1.7	2.0	2.65	2.65	2.5	1.75	1.55	1.35	1.6	1.6
30	1.95	.....	1.65	1.9	2.5	2.6	2.4	1.65	1.5	1.35	1.4	1.8
31	1.9	.....	1.6	.....	2.45	.....	2.25	1.7	.....	1.35	.....	2.2

Daily discharge, in second-feet, of Hiwassee River at Reliance, Tenn., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,050	1,940	5,560	1,450	1,940	2,950	3,330	2,260	5,560	1,190	960	960
2	1,840	1,840	6,590	1,450	1,840	2,710	3,600	2,050	3,870	1,190	960	890
3	2,050	1,940	4,910	1,450	1,740	3,730	3,330	2,050	2,710	1,110	960	820
4	1,840	2,260	4,010	1,450	1,640	3,080	4,600	2,160	2,480	1,110	890	820
5	1,740	2,950	3,460	1,360	1,640	3,460	4,010	3,730	2,370	1,040	890	1,450
6	1,640	2,260	2,830	1,450	1,740	9,160	4,010	3,730	2,050	1,040	960	18,500
7	4,010	2,050	2,830	1,450	1,840	5,900	6,240	2,260	1,740	1,190	960	4,600
8	4,760	1,940	2,600	1,360	9,160	4,010	5,560	6,590	1,640	1,190	960	3,200
9	3,460	1,840	2,480	1,270	12,000	3,870	4,910	3,460	1,640	1,540	960	2,050
10	2,710	1,840	2,370	1,270	9,940	3,460	4,010	2,710	1,640	1,540	890	1,840
11	2,370	2,260	2,480	1,270	4,450	4,160	3,730	2,370	1,640	1,450	890	1,640
12	2,160	2,600	2,950	1,270	3,600	3,870	3,600	4,760	1,450	1,190	890	1,450
13	1,940	2,260	2,480	1,450	3,200	5,230	3,730	2,160	1,540	1,110	890	1,360
14	1,840	1,940	2,260	1,740	2,950	4,300	4,010	3,460	1,540	1,110	890	1,270
15	2,050	1,940	2,160	1,540	2,710	4,300	3,730	2,050	1,360	1,040	890	1,270
16	1,840	1,940	1,940	2,050	2,480	4,300	3,730	2,050	1,270	1,040	890	1,360
17	1,840	2,050	2,160	4,600	2,710	3,200	3,330	2,160	1,110	960	890	1,190
18	1,640	8,780	1,940	5,900	3,200	3,080	3,080	1,940	1,110	960	820	1,190
19	2,370	5,560	1,840	4,160	3,460	2,950	2,830	1,840	1,190	960	890	1,360
20	2,260	3,870	1,840	2,710	3,730	3,080	2,830	2,260	1,190	960	820	1,270
21	2,480	3,330	1,940	2,260	10,700	3,080	2,830	2,260	1,190	960	820	1,190
22	3,600	3,200	1,840	2,050	8,030	2,830	2,480	1,940	1,190	1,040	820	1,190
23	2,830	3,200	1,840	2,050	8,030	3,080	2,370	1,840	1,110	890	820	1,190
24	2,830	2,950	1,740	2,050	8,780	3,200	2,370	1,840	1,110	890	890	1,450
25	2,710	2,600	1,740	2,050	12,000	3,460	2,480	1,840	1,110	890	960	2,050
26	2,480	2,480	1,740	2,160	7,300	2,950	2,260	1,740	1,270	890	960	1,110
27	2,370	2,600	1,640	2,260	5,560	2,480	2,600	1,840	1,270	890	890	960
28	2,260	2,260	1,640	2,480	4,450	2,370	2,710	1,840	1,450	1,040	1,360	1,450
29	2,260	.....	1,640	2,260	3,870	3,870	3,460	1,740	1,360	1,040	1,450	1,450
30	2,160	.....	1,540	2,050	3,460	3,730	3,200	1,540	1,270	1,040	1,110	1,840
31	2,050	.....	1,450	.....	3,330	.....	2,830	1,640	.....	1,040	.....	2,710

NOTE.—Daily discharge determined from rating curve fairly well defined between 820 and 6,240 second-feet (gage heights 1.2 and 3.4 feet), and poorly defined between 6,590 and 18,900 second-feet (gage heights 3.5 and 6.5 feet).

Monthly discharge of Hiwassee River at Reliance, Tenn., for 1910.

[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.		
January	4,760	1,640	2,400	2.03	2.34	A.
February	8,780	1,840	2,740	2.32	2.42	A.
March	6,590	1,450	2,530	2.14	2.47	A.
April	5,900	1,270	2,080	1.76	1.96	A.
May	12,000	1,640	4,890	4.14	4.77	A.
June	9,160	2,370	3,730	3.16	3.53	A.
July	6,240	2,260	3,480	2.95	3.40	A.
August	6,590	1,540	2,460	2.08	2.40	A.
September	5,560	1,110	1,710	1.45	1.62	A.
October	1,540	890	1,080	.916	1.06	B.
November	1,450	820	941	.797	.89	B.
December	18,500	820	2,100	1.78	2.05	B.
The year	18,500	820	2,510	2.13	28.90	

OCOEE RIVER AT COPPERHILL, TENN.[1]

This station, which is located at a suspension footbridge just below McCay's ferry at Copperhill, Tenn., near the Georgia-Tennessee boundary, half a mile below the Louisville & Nashville Railroad

[1] The name of this town was formerly McCays.

bridge, and half a mile above the mouth of Fightingtown Creek, was established March 21, 1903.

The total drainage area above the station is 374 square miles.

Gage readings are made twice a day in order to equalize fluctuations due to mills above, which, however, are very slight.

No change has occurred in the datum of the staff gage, which is located at the right end of the bridge. The lower section is a sloping timber.

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.

Discharge measurements of Ocoee River at Copperhill, Tenn., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 9	M. R. Hall	153	460	1.25	631
10	do	153	464	1.25	676
July 22	F. P. Thomas	153	591	1.65	915
23	do	153	581	1.60	909
Sept. 17	M. R. Hall	140	438	1.07	534

Daily gage height, in feet, of Ocoee River at Copperhill, Tenn., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.95	0.98	2.1	0.95	1.2	1.6	2.2	1.7	4.0	1.0	0.7	1.1
2	1.0	.95	1.95	.9	1.05	1.6	2.4	1.7	3.1	.95	.7	1.0
3	1.0	.98	1.75	.9	1.0	3.1	3.3	1.5	2.8	.9	.7	.....
4	.9	1.2	1.5	.9	1.0	2.1	2.95	2.2	1.5	.95	.7	.....
5	.85	1.0	1.5	.9	1.0	3.5	2.8	2.55	1.4	1.0	.7	.....
6	1.45	.95	1.4	.98	1.0	3.7	2.7	2.1	1.4	1.2	.7	.....
7	2.65	.9	1.4	.9	1.3	2.55	2.8	2.5	1.4	1.4	.7	.....
8	2.45	.9	1.3	.88	3.2	2.15	2.7	2.1	1.3	1.2	.7	.....
9	1.8	.95	1.25	.85	2.95	2.0	2.85	1.9	1.3	1.15	.65	.....
10	1.2	1.0	1.4	.85	1.9	2.0	2.7	1.65	1.3	1.15	.65	.....
11	1.05	1.1	1.6	.85	1.25	3.2	2.3	1.8	1.2	1.05	.6	.....
12	1.0	1.4	1.4	.85	1.7	3.0	2.0	1.65	1.3	.9	.6	.....
13	1.0	1.1	1.3	1.05	1.65	2.5	2.55	1.55	1.25	.95	.6	.....
14	1.0	1.1	1.25	.92	1.45	2.4	2.65	1.5	1.25	1.0	.65	.....
15	1.0	1.05	1.2	.9	1.3	2.2	2.25	1.5	1.2	.9	.65	.....
16	.9	1.0	1.15	1.2	1.35	2.1	2.25	1.5	1.2	.9	.6	.....
17	.95	1.8	1.15	3.0	1.6	2.0	2.0	1.6	1.05	.8	.65	.....
18	1.0	3.2	1.1	1.65	1.65	1.75	1.95	1.7	1.05	.8	.65	.....
19	1.1	1.7	1.1	1.25	1.6	1.7	1.9	1.3	1.05	.7	.65	.....
20	1.0	1.5	1.1	1.2	3.9	1.7	1.85	1.45	1.05	.7	.65	.....
21	1.35	1.5	1.1	1.15	4.2	2.65	1.9	1.3	1.05	.7	.65	.....
22	1.2	1.65	1.1	1.0	3.6	2.7	1.7	1.3	1.05	.7	.65	.....
23	1.2	1.5	1.05	1.0	2.75	2.75	1.6	1.5	1.05	.7	.65	.....
24	1.2	1.4	1.05	1.05	3.1	1.8	1.65	1.5	1.05	.7	.65	.....
25	1.2	1.25	1.0	1.1	3.2	2.0	1.6	1.35	1.05	.7	.65	.....
26	1.1	1.2	1.0	1.2	2.9	1.5	1.6	1.6	1.05	.65	.65	.....
27	1.1	1.2	1.0	1.2	2.75	1.6	1.8	1.9	1.0	.65	.68	.....
28	1.1	1.6	1.0	1.2	1.95	1.7	1.9	1.8	1.0	.65	1.2	.....
29	1.05	.....	1.0	1.2	1.85	2.1	3.4	1.5	1.0	.7	1.1	.....
30	1.15	.....	.95	1.2	1.8	2.05	2.55	1.4	1.55	.7	1.1	.....
31	1.0	.....	.95	.....	1.7	.....	1.6	3.2	.....	.7	.....	.....

NOTE.—Gage heights Dec. 3 to 31 are missing, as observer was unable to read gage because of fire at the ferry Dec. 2.

Daily discharge, in second-feet, of Ocoee River at Copperhill, Tenn., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	484	498	1,170	484	614	850	1,240	913	2,530	508	370	560
2	508	484	1,080	459	534	850	1,380	913	1,860	484	370	508
3	508	498	945	459	508	1,860	2,010	788	1,650	459	370	.....
4	459	614	788	459	508	1,170	1,760	1,240	788	484	370	.....
5	436	508	788	459	508	2,150	1,650	1,480	728	508	370	.....
6	758	484	728	498	508	2,300	1,580	1,170	728	614	370	.....
7	1,550	459	728	459	670	1,480	1,650	1,440	728	728	370	.....
8	1,410	459	670	450	1,940	1,210	1,580	1,170	670	614	370	.....
9	977	484	642	436	1,760	1,110	1,690	1,040	670	587	350	.....
10	614	508	728	436	1,040	1,110	1,580	882	670	587	350	.....
11	534	560	850	436	642	1,940	1,310	977	614	534	330	.....
12	508	728	728	436	913	1,790	1,110	882	670	459	330	.....
13	508	560	670	534	882	1,440	1,480	819	642	484	330	.....
14	508	560	642	469	758	1,380	1,550	788	642	508	350	.....
15	508	534	614	459	670	1,240	1,270	788	614	459	350	.....
16	459	508	587	614	699	1,170	1,270	788	614	459	330	.....
17	484	977	587	1,790	850	1,110	1,110	850	534	413	350	.....
18	508	1,940	560	882	882	945	1,080	913	534	413	350	.....
19	560	913	560	642	850	913	1,040	670	534	370	350	.....
20	508	788	560	614	2,450	913	1,010	758	534	370	350	.....
21	699	788	560	587	2,680	1,550	1,040	670	534	370	350	.....
22	614	882	560	508	2,230	1,580	913	670	534	370	350	.....
23	614	788	534	508	1,620	1,620	850	788	534	370	350	.....
24	614	728	534	534	1,860	977	882	788	534	370	350	.....
25	614	642	508	560	1,940	1,110	850	699	534	370	350	.....
26	560	614	508	614	1,720	788	850	850	534	350	350	.....
27	560	614	508	614	1,620	850	977	1,040	508	350	362	.....
28	560	850	508	614	1,080	913	1,040	977	508	350	614	.....
29	534	.....	508	614	1,010	1,170	2,080	788	508	370	560	.....
30	587	.....	484	614	977	1,140	1,480	728	819	370	560	.....
31	508	.....	484	.....	913	.....	850	1,940	.....	370	.....	.....

NOTE.—Daily discharge determined from a discharge rating curve well defined between 292 and 670 second-feet (gage heights 0.5 and 1.3 feet), fairly well defined between 728 and 2,150 second-feet (gage heights 1.4 and 3.5 feet), and poorly defined above discharge 2,150 second-feet (gage height 3.5 feet).

Monthly discharge of Ocoee River at Copperhill, Tenn., for 1910.

[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.		
January	1,550	436	621	1.66	1.91	A.
February	1,940	459	678	1.81	1.88	A.
March	1,170	484	656	1.75	2.02	A.
April	1,790	436	575	1.54	1.72	A.
May	2,680	508	1,160	3.10	3.57	A.
June	2,300	788	1,290	3.45	3.85	A.
July	2,080	850	1,300	3.50	4.04	A.
August	1,940	670	942	2.52	2.90	A.
September	2,530	508	750	2.01	2.24	A.
October	728	350	453	1.21	1.40	A.
November	614	330	376	1.01	1.13	A.

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous discharge measurements were made in the Allegheny River basin during 1910. The measurements and the computations of the results were made under the direction of Geo. M. Lehman, engineer in charge, Flood Commission of Pittsburgh, Pittsburgh, Pa. The results were furnished by the commission to the United States Geological Survey. The velocity determinations were made with a large Price current meter:

Miscellaneous measurements in Allegheny River basin in 1910 by representatives of the Flood Commission of Pittsburgh, Pittsburgh, Pa.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Feb. 5	Tionesta Creek	Allegheny River	Nebraska, Pa.	[a] 1,081.6	494
7	do	do	do	[b] 1,081.1	341
11	do	do	do	[c] 1,081.3	326
16	do	do	do	[d] 1,081.4	434
23	do	do	do	[e] 1,083.1	775
Mar. 2	do	do	do	[f] 1,087.1	6,400
7	do	do	do	[g] 1,088.4	8,010
14	do	do	do	[h] 1,088.6	2,120
21	do	do	do	[i] 1,085.4	3,960
28	do	do	do	[j] 1,083.9	2,540
Apr. 11	do	do	do	[k] 1,080.6	201
May 7	do	do	do	[l] 1,082.6	1,220
Feb. 4	Oil Creek	do	Rouseville, Pa.	1.95	572
12	do	do	do	1.30	[m] 215
22	do	do	do	1.90	[n] 665
28	do	do	do	4.80	5,390
Mar. 4	do	do	do	3.90	4,030
11	do	do	do	2.30	1,320
Apr. 7	do	do	do	1.50	326
Mar. 1	French Creek	do	Carlton, Pa.	9.45	10,200
12	do	do	do	5.00	4,410
Apr. 8	do	do	do	2.00	977
May 5	do	do	do	6.60	5,660

[a] Feb. 5, regular gage 2.05 feet.
[b] Feb. 7, regular gage, 1.60 feet. Measurement affected by ice.
[c] Feb. 11, regular gage, 1.82 feet. Measurement affected by ice. Flow in mill race about 9 second-feet, not included in value given in table.
[d] Feb. 16, regular gage, 2 feet. Measurement affected by ice. Flow in mill race about 10 second-feet, not included in value given in table.
[e] Feb. 23, regular gage, 2.62 feet. Measurement affected by ice. Flow in mill race about 13 second-feet, not included in value given in table.
[f] Mar. 2, regular gage 5.68 feet. Mill race shut off.
[g] Mar. 7, regular gage 6.80 feet. Current too swift to properly place meter; above discharge probably too large.
[h] Mar. 14, regular gage 3.15 feet.
[i] Mar. 21, reading at regular gage not recorded.
[j] Mar. 28, regular gage 3.50 feet.
[k] Apr. 11, reading at permanent gage not recorded.
[l] May 7, permanent gage 2.68 feet. Mill race and log race not running.
[m] Feb. 12, measurement affected by ice.
[n] Feb. 22, measurement affected by ice.

The following miscellaneous discharge measurements were made in the Ohio River basin during 1910 by A. H. Horton, H. J. Jackson, C. T. Bailey, and J. C. Dort.

Miscellaneous measurements in Ohio River basin in 1910.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Sept 13	Raccoon Creek, Pa.	Ohio River	One mile above mouth, which is about ¼ mile below Dam No. 6 on the Ohio River.	(*a*)	16
13	Little Beaver River	do	At highway bridge just above trolley bridge at Smiths Ferry, Ohio.	(*b*)	44
Oct. 22	New River	Kanawha River	At Vielé, Blackwell, and Buck's gage at Grayson, Va.	*c* 2.56	1,688
Nov. 29	Mohican River	Muskingum River.	At highway bridge at Greer, Ohio	(*d*)	609
29	do	do	Cavallo, Ohio	(*e*)	639
Apr. 11	Embarrass River	Wabash River	At highway bridge at north edge of Lawrenceville, Ill.	(*f*)	412
8	North Fork Creek	Embarrass River	At highway bridge near Oblong, Ill.	(*g*)	37
July 25	Cumberland River	Ohio River	At highway bridge, at Carthage, Tenn.	*h* 4.88	9,650
26	do	do	do	*h* 4.22	8,140

a Water surface 26.84 feet below crack about 50 feet from right abutment, between two boards marked with white paint on downstream side of covered bridge.
b Water surface 46.12 feet below top of hand rail at third post from left end on downstream side of highway bridge.
c Vielé, Blackwell, and Buck's gage, about 1 mile below the railroad bridge at Fries Junction, Va.
d Water surface 21.28 feet below file mark about 2 feet above handrail on fourth upright from right end on downstream side of bridge.
e Water surface not referenced.
f Water surface 22.12 feet below top edge of lowest horizontal cross plate on right side of center vertical on downstream side of bridge. Reference point is 82 feet from right abutment and 2.2 feet above top of floor beam.
g Water surface 23.91 feet below top of upper channel of handrail 16 feet from face of right abutment on downstream side of bridge.
h United States Weather Bureau gage.

SUMMARY OF DISCHARGE PER SQUARE MILE.

The following summary of discharge per square mile is given to allow ready comparison of relative rates of run-off from different areas in the Ohio River drainage basin. It shows 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 streams. 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 1910.

Station.	Drainage area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	Sq. m.													
Allegheny River at Red House, N. Y	1,640	1.52	1.34	8.35	3.21	3.01	0.82	0.38	0.20	0.61	0.44	1.76	1.10	1.90
Allegheny River at Kittanning, Pa	8,690	2.20	1.62	6.58	2.00	1.60	.83	.23	.15	.50	.46	2.21	1.43	1.66
Kiskiminitas River at Avonmore, Pa	1,750	5.50	6.40	3.95	1.54	1.04	1.63	.40	.11	.40	.13	.21	1.33	1.86
Blacklick Creek at Blacklick, Pa	403	5.46	3.52	3.92	1.69	1.14	1.06	.45	.12	.77	.20	.35	1.67	1.69
Tygart River at Belington, W. Va	390	5.41	3.49	1.12	1.43	1.74	6.28	1.03	.17	.29	.16	.38	1.46	1.90
Tygart River at Fetterman, W. Va	1,340	5.54	3.21	.93	1.02	1.42	4.05	.73	.12	.22	.08	.35	2.36	1.57
West Fork River at Enterprise, W. Va	750	5.13	2.76	.54	.18	.66	1.03	.43	.04	.58	.07	.34	1.51	1.10
Cheat River near Morgantown, W. Va	1,380	5.52	3.31	1.88	1.45	1.32	5.39	1.04	.23	.37	.21	.46	1.11	1.85
Youghiogheny River at Confluence, Pa	435	6.32	3.89	2.78	1.49	1.40	4.67	.55	.15	.24	.09	.16	1.11	1.89
New River at Radford, Va	2,720	1.14	1.72	1.26	1.02	1.01	2.51	1.28	.68	.94	.85	.58	.71	1.14
Greenbrier River at Alderson, W. Va	1,340	2.35	2.21	1.78	1.40	1.01	4.29	.93	.20	.46	.21	.17	.75	1.31
Miami River at Hamilton, Ohio	3,580	2.79	1.77	2.47	.54	.67	.24	.32	.10	.28	2.33	.48	.73	1.06
Dix River at Burgin, Ky	416	....	....	....	....	....	....	2.29	.78	3.66	.85	.67	1.92	....
Embarrass River near Oakland, Ill	535	1.93	.45	1.11	.24	1.15	.27	.75	.10	.17	.43	.07	.11	.57
Embarrass River at St. Marie, Ill	1,540	1.31	.66	1.13	.36	.95	.24	1.18	.25	.17	.87	.33	.33	.65
East Branch White River at Shoals, Ind	4,900	2.39	1.34	2.18	.64	.96	.26	1.24	.26	.29	2.55	.31	.44	1.08
Skillet Fork near Wayne City, Ill	481	1.93	1.36	2.20	.22	.25	.02	.30	.002	.59	2.39	.13	.06	.79
French Broad River at Asheville, N. C	987	1.81	2.03	2.18	1.46	2.20	1.91	2.30	2.22	3.52	1.58	1.03	1.43	1.98
Tennessee River at Chattanooga, Tenn	21,400	1.64	1.81	1.69	1.11	2.10	1.83	1.98	1.17	1.09	.56	.39	.98	1.36
South Fork of Holston River at Bluff City, Tenn	828	1.46	1.41	1.13	.95	1.13	1.45	1.75	.66	.70	.37	.49	1.27	1.06
Holston River near Rogersville, Tenn	3,060	1.42	1.49	1.20	.80	1.24	1.34	1.53	.86	.99	.50	.48	1.10	1.08
Little Tennessee River at Franklin, N. C	297	2.49	2.52	2.98	2.18	4.28	3.25	....	....	....	....	....	....	....
Little Tennessee River at Judson, N. C	675	2.86	2.67	3.22	2.08	4.30	3.26	3.11	2.46	1.43	1.28	.95	1.53	2.44
Little Tennessee River at McGhee, Tenn	2,470	2.47	2.60	2.68	1.91	3.49	3.21	3.12	1.89	1.49	1.07	.82	1.68	2.21
Tuckasegee River at Bryson, N. C	662	2.18	2.36	2.49	1.90	3.26	3.04	2.93	1.83	1.56	1.24	.92	1.66	2.11
Hiwassee River at Murphy, N. C	410	2.25	2.39	2.32	1.67	3.93	3.02	2.40	1.53	1.31	.94	.80	1.57	2.01
Hiwassee River at Reliance, Tenn	1,180	2.03	2.32	2.14	1.76	4.14	3.16	2.95	2.08	1.45	.92	.80	1.78	2.13
Ocoee River at Copperhill, Tenn	374	1.66	1.81	1.75	1.54	3.10	3.45	3.50	2.52	2.01	1.21	1.01	....	....

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