Wm. A. Lamb.

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

WATER-SUPPLY PAPER 323

SURFACE WATER SUPPLY OF THE UNITED STATES

1912

PART III. OHIO RIVER BASIN

BY

A. H. HORTON, W. E. HALL
AND H. J. JACKSON

WASHINGTON
GOVERNMENT PRINTING OFFICE
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SURFACE WATER SUPPLY OF OHIO RIVER BASIN, 1912.

By A. H. HORTON, W. E. HALL, and H. J. JACKSON.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of twelve reports presenting results of measurements of flow made on streams in the United States during the calendar year 1912.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394) which 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 structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

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

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 to 1913, inclusive	150,000

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected, and of the second kind on page 13.

Measurements of stream flow have been made at about 2,000 points in the United States, and also at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1912 gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points, and many discharge measurements were made at other points. In connection with this work data were also collected 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 water-supply papers from time to time.

PUBLICATIONS.

A report has been prepared for each calendar year embodying the stream-flow data collected during that year. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119. Circulars are also available giving complete lists of the gaging stations maintained by the Survey to date, and a list of the reports relating to the water supply of the country.

Prior to 1902 gage heights and discharge measurements were published in water-supply papers or bulletins and estimates of monthly discharge in annual reports; since 1902 both classes of data have been published in water-supply papers and they are now being published in twelve parts, as shown in the following table:

Papers on surface water supply of the United States, 1912.

Part.[a]	No.	Title.
I	321	North Atlantic coast basins.
II	322	South Atlantic coast and eastern Gulf of Mexico basins.
III	323	Ohio River basin.
IV	324	St. Lawrence River basin.
V	325	Upper Mississippi River and Hudson Bay basins.
VI	326	Missouri River basin.
VII	327	Lower Mississippi River basin.
VIII	328	Western Gulf of Mexico basins.
IX	329	Colorado River basin.
X	330	Great Basin.
XI	331	Pacific coast basins in California.
XII	332	North Pacific coast basins.

[a] 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 natural drainage lines indicated by the parts of the report.

A list of reports containing stream-flow data is presented in the following table:

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

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

Report.	Character of data.	Year.
10th A, pt. 2	Description 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.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 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.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 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.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	....do	1903.
WS 124 to 135	....do	1904.
WS 165 to 178	....do	1905.
WS 201 to 214	....do	1906.
WS 241 to 252	....do	1907–8.
WS 261 to 272	....do	1909.
WS 281 to 292	....do	1910.
WS 301 to 312	....do	1911.
WS 321 to 332	....do	1912.

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

The table on page 8 gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1911. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for any station in the area covered by Part I are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, and 321, which contain records for the New England streams from 1903 to 1912. The year covered by the report is indicated at the head of the column in which the paper is listed.

Numbers of water-supply papers containing results of stream measurements, 1899–1912.

	[a] 1899	[b] 1900	1901	1902	1903	1904
North Atlantic coast (St. John River to York River)	35	47, [c] 48	65, 75	82	97	[d] 124, [e] 125, [f] 126
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[g] 35, 36	48	65, 75	[g] 82, 83	[g] 97, 98	[f] 126, 127
Ohio River basin	36	48, [h] 49	65, 75	83	98	128
St. Lawrence River and Great Lakes	36	49	65, 75	[i] 82, 83	97	129
Hudson Bay and upper Mississippi River	36	49	[j] 65, 66, 75	[j] 83, 85	[j] 98, 99, 100	[j] 128, 130
Missouri River	[k] 36, 37	49, [l] 50	66, 75	84	99	130, [m] 131
Lower Mississippi River	37	50	[j] 65, 66, 75	[j] 83, 84	[j] 98, 99	[j] 128, 131
Western Gulf of Mexico	37	50	66, 75	84	99	132
Colorado River	[n] 37, 38	50	66, 75	85	100	133
Great Basin	38, [o] 39	51	66, 75	85	100	133, [p] 134
Pacific coast in California	38, [q] 39	51	66, 75	85	100	134
North Pacific coast	38	51	66, 75	85	100	135

	1905	1906	1907–8	1909	1910	1911	1912
North Atlantic coast (St. John River to York River)	[d] 165, [e] 166, [f] 167	[d] 201, [e] 202, [f] 203	241	261	281	301	321
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[f] 167, 168	[f] 203, 204	242	262	282	302	322
Ohio River basin	169	205	243	263	283	303	323
St. Lawrence River and Great Lakes	170	206	244	264	284	304	324
Hudson Bay and upper Mississippi River	171	207	245	265	285	305	325
Missouri River	172	208	246	266	286	306	326
Lower Mississippi River	[j] 169, 173	[j] 205, 209	247	267	287	307	327
Western Gulf of Mexico	174	210	248	268	288	308	328
Colorado River	175, [r] 177	211	249	269	289	309	329
Great Basin	176, [p] 177	212, [p] 213	250, [p] 251	270, [p] 271	290	310	330
Pacific coast in California	177	213	251	271	291	311	331
North Pacific coast	[s] 177, 178	214	252	272	292	312	332

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Estimates for 1899 in Twenty-first Annual Report, part 4.
[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. Estimates for 1900 in Twenty-second Annual Report, part 4.
[c] Wissahickon and Schuylkill rivers to James River.
[d] New England rivers only.
[e] Hudson River to Delaware River, inclusive.
[f] Susquehanna River to Yadkin River, inclusive.
[g] James River only.
[h] Scioto River.
[i] Lake Ontario and tributaries to St. Lawrence River proper.
[j] Tributaries of Mississippi from east.
[k] Gallatin River.
[l] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[m] Platte and Kansas rivers.
[n] Green and Gunnison rivers and Grand River above junction with Gunnison.
[o] Mohave River only.
[p] Great Basin in California, excepting Truckee and Carson drainage basins.
[q] Kings and Kern rivers and south Pacific coast drainage basins.
[r] Below junction with Gila.
[s] Rogue, Umpqua, and Siletz rivers only.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below:

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Albany, N. Y., room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Newport, Ky., Federal Building.
St. Paul, Minn., Old Capitol Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 302 Chamber of Commerce Building.
Salt Lake City, Utah, Brooks Arcade.
Boise, Idaho, 615 Idaho Building.
Portland, Oreg., 416 Couch Building.
San Francisco, Cal., 505 Customhouse.
Santa Fe, N. Mex., Capitol Building.
Honolulu, Hawaii, Kapiolani Building.

A list of the Geological Survey's publications will be sent on application to the Director of the United States Geological Survey, Washington, D. C.

DEFINITION OF TERMS.

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

"Second-foot" is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot a 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 (depth 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.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Second-feet per square mile.	Run-off in inches.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.....	0.03719	1.041	1.079	1.116	1.153
2.....	.07438	2.083	2.157	2.231	2.306
3.....	.11157	3.124	3.236	3.347	3.459
4.....	.14876	4.165	4.314	4.463	4.612
5.....	.18595	5.207	5.393	5.578	5.764
6.....	.22314	6.248	6.471	6.694	6.917
7.....	.26033	7.289	7.550	7.810	8.070
8.....	.29752	8.331	8.628	8.926	9.223
9.....	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Second-feet.	Run-off in acre-feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.....	1.983	55.54	57.52	59.50	61.49
2.....	3.967	111.1	115.0	119.0	123.0
3.....	5.950	166.6	172.6	178.5	184.5
4.....	7.934	222.1	230.1	238.0	246.0
5.....	9.917	277.7	287.6	297.5	307.4
6.....	11.90	333.2	345.1	357.0	368.9
7.....	13.88	388.8	402.6	416.5	430.4
8.....	15.87	444.3	460.2	476.0	491.9
9.....	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply values for one day by the number of days.

1 second-foot equals 40 California miner's inches (law of March 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

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 equals 86,400 cubic feet.

1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.

1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.

1,000,000,000 cubic feet equals 399 second feet for one 29-day month.

1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.

1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.

100 California miner's inches equals 18.7 United States gallons per second.

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 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 of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1½ horsepower equal about 1 kilowatt.

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

EXPLANATION OF DATA.

For each regular current-meter gaging station the following data, so far as available, are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharge, table of monthly and yearly discharge 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 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, usually 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 tables of daily gage heights and daily discharge by plotting gage heights in feet as ordinates and discharge in second-feet as abscissas.

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 at "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 9, are based.

The base data presented in this report, unless otherwise stated in description of station, have been collected by the methods commonly used at current-meter gaging stations and described in standard textbooks.

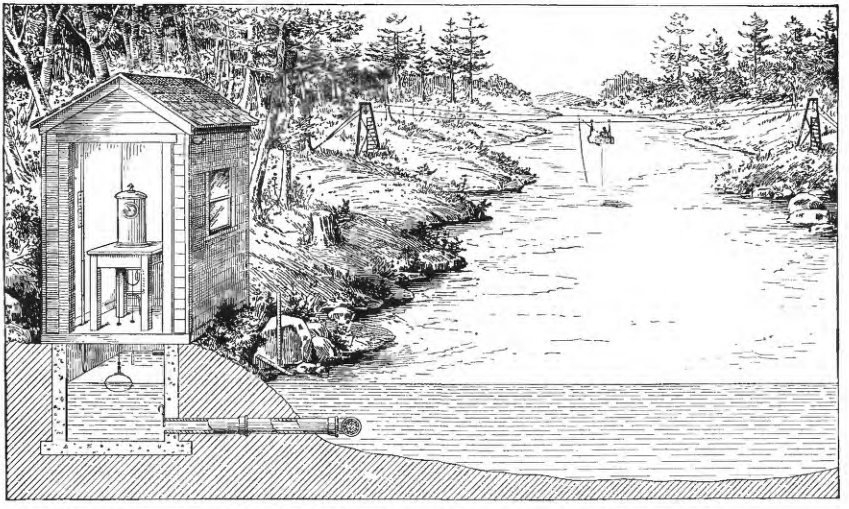
Plate I shows typical gaging stations. Plate II shows current meters used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

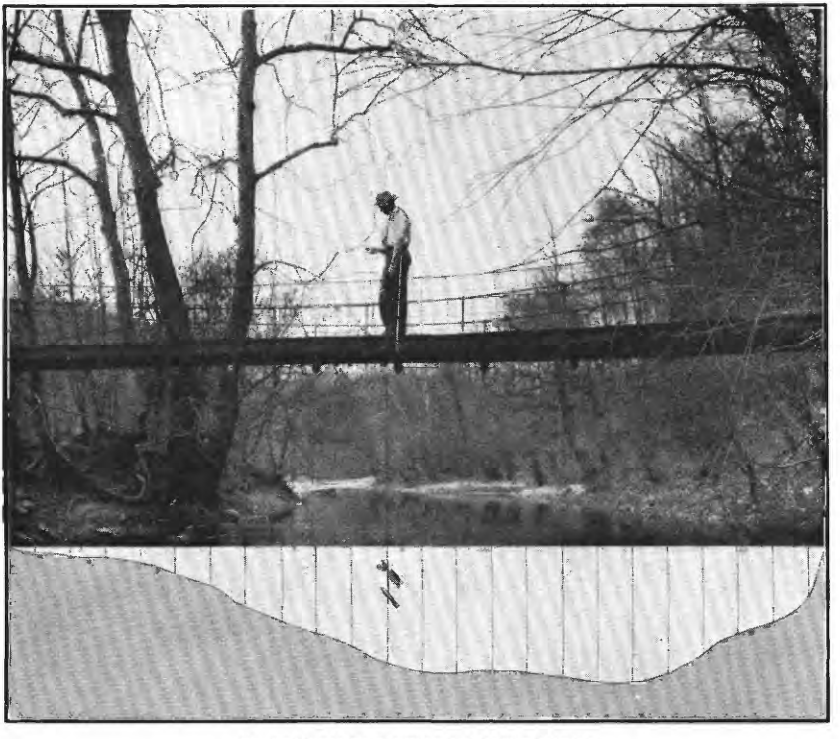
The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class 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.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the

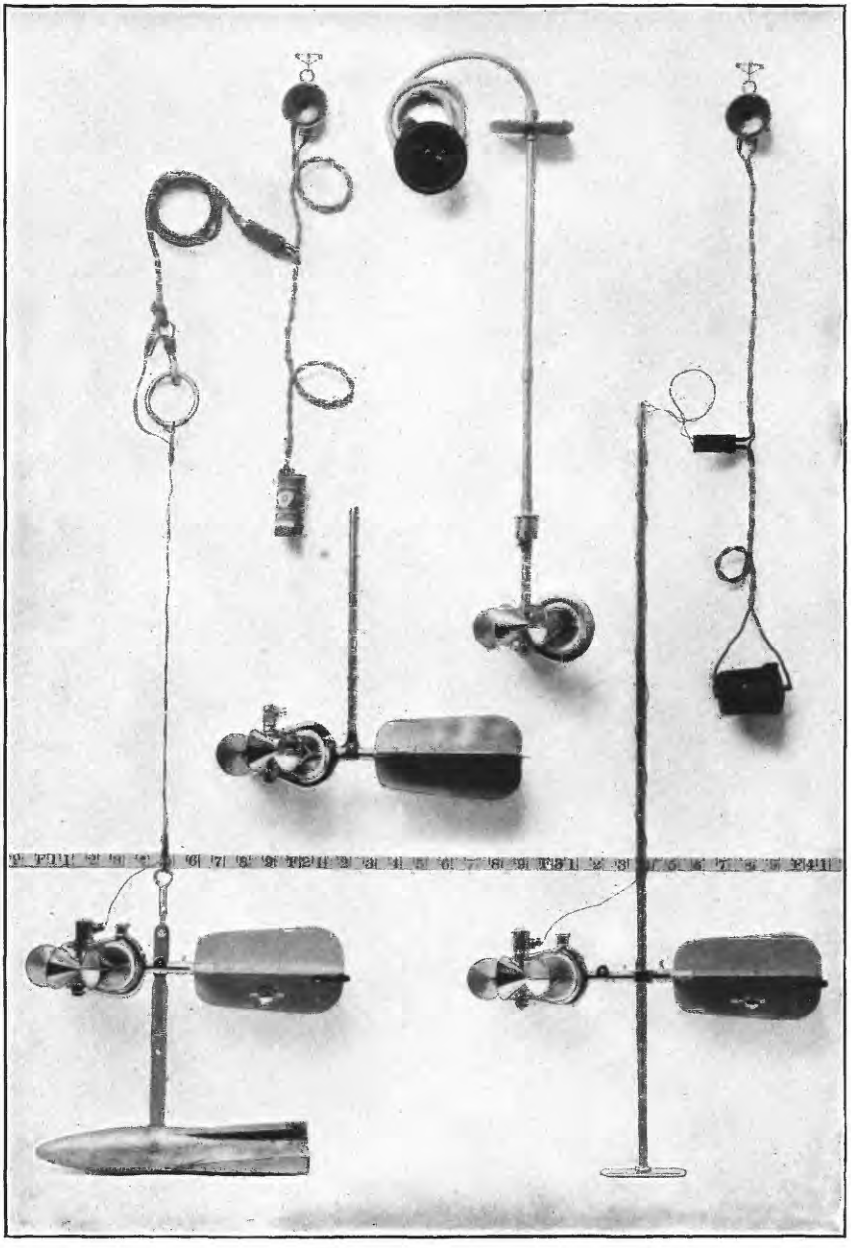


A. CABLE STATION WITH AUTOMATIC GAGE.



B. STATION FOR BRIDGE MEASUREMENT.

TYPICAL GAGING STATIONS.



PRICE CURRENT METERS.

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.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of runoff in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should, therefore, be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general, the base data collected each year by the Survey engineers are published, not only to comply with the law, but also to afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION.

The State of Illinois has paid for the stream gaging work in that State, the appropriation being in charge of the Rivers and Lakes Commission, Robert R. McCormick, chairman.

DIVISION OF WORK.

The field data for Allegheny River at Red House, N. Y., have been collected and the estimates prepared under the direction of C. C. Covert, district engineer, assisted by C. S. De Golyer and Frank Weber.

The field data for the Ohio River drainage basin, with the exception of Allegheny River at Red House, N. Y., and the Tennessee River drainage basin, have been collected under the direction of A. H. Horton, district engineer, assisted by C. T. Bailey, P. S. Monk, and L. S. Carr.

Stations in Pennsylvania are now maintained and the stream-flow data collected and furnished to the Survey by the Water Supply Commission of Pennsylvania.

The field data in the Tennessee River drainage basin have been collected by W. E. Hall, district engineer.

The ratings and studies of the completed data were made by A. H. Horton, W. E. Hall, and H. J. Jackson. The completed data were prepared for publication and the estimates of discharge during periods when the relation of gage height to discharge is believed to have been affected by ice (except for Allegheny River at Red House, N. Y.) were made by H. J. Jackson, assistant engineer. The computations were made by J. G. Mathers, H. D. Padgett, C. L. Batchelder, B. E. Jones, M. I. Walters, and G. A. Wallace.

The report was edited by Mrs. B. D. Wood.

STATION RECORDS.

ALLEGHENY RIVER BASIN.

ALLEGHENY RIVER AT RED HOUSE, N. Y.

Location.—At highway bridge at Red House, N. Y., on the road leading from the Pennsylvania Railroad station to the Erie Railroad station; about 5 miles below Salamanca and 13 miles above the State line between New York and Pennsylvania. Conewango Creek, the outlet of Chautauqua Lake, enters the Allegheny in the State of Pennsylvania.

Records available.—September 4,.1903, to December 31, 1912.

Drainage area—1,640 square miles.

Gage.—Standard chain, attached to the upstream side of bridge near left-hand end; datum unchanged.

Channel.—Practically permanent since establishment of station; broken by three bridge piers. Bed of stream, coarse gravel. Current good for medium and high stages; rather slow at low stages.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Ice affects the relation of gage height to discharge for periods during December, January, February, and March.

Artificial control.—Low-water flow may be slightly affected by the operation of several small power plants above Salamanca. At Olean, N. Y., a wasteway from Cuba reservoir enters the river through Olean Creek. This reservoir is on the

divide between Oil Creek, tributary to Allegheny River, and Genesee River, tributary to Lake Ontario. The stored water is commonly turned into Genesee River through the abandoned summit level of Genesee River canal, but may be diverted into Oil Creek through a guard lock at the head of the canal.

Discharge measurements of Allegheny River at Red House, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 15	C. S. De Golyer	4.37	[a] 509
July 15	Frank Weber	3.30	542
Dec. 6	C. S. De Golyer	6.67	6,670
6	....do	6.72	7,190

[a] Measurement made under complete ice cover.

Daily gage height, in feet, of Allegheny River at Red House, N. Y., for 1912.

[W. E. Coe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.4	.....	4.25	10.4	7.2	3.7	2.90	3.15	4.60	4.70	4.40	4.45
2	5.5	.....	4.35	11.0	6.7	3.65	2.90	3.25	5.00	5.00	4.50	4.80
3	5.4	.....	4.60	10.6	6.2	3.85	2.95	3.50	6.60	5.80	4.40	6.90
4	5.4	.....	4.6	9.9	5.4	3.55	2.90	3.30	6.20	5.40	4.40	6.85
5	5.5	.....	4.8	9.3	5.0	3.55	2.90	3.20	5.80	5.00	4.35	5.80
6	4.9	.....	4.8	9.5	4.9	3.55	2.95	3.20	5.60	4.00	4.45	6.70
7	4.9	.....	5.0	9.0	4.8	3.40	3.00	3.10	5.00	3.90	5.20	6.20
8	4.9	.....	5.0	8.6	4.7	3.35	3.00	3.30	4.80	3.95	5.80	6.20
9	4.9	.....	5.0	8.7	4.6	3.30	3.15	3.10	4.50	3.90	5.80	5.60
10	4.9	.....	4.9	8.1	4.5	3.25	3.10	3.05	4.10	3.80	5.50	5.10
11	4.9	.....	5.0	7.9	4.5	3.20	3.25	3.05	4.60	4.10	5.50	5.20
12	4.9	.....	5.0	7.5	4.6	3.20	3.30	3.05	5.00	4.20	5.50	5.40
13	4.9	.....	5.2	6.6	4.8	3.20	3.30	3.10	5.00	3.80	5.60	5.50
14	4.9	.....	5.2	6.5	5.0	3.20	3.35	3.40	5.40	3.90	5.90	5.40
15	4.9	4.35	5.2	6.4	5.0	3.20	3.30	3.30	5.40	3.80	5.80	4.80
16	4.9	4.35	7.8	6.0	5.4	3.25	3.35	3.25	4.35	3.80	5.50	4.40
17	4.9	4.35	7.0	6.0	6.3	3.20	3.45	3.15	4.10	3.65	5.20	4.40
18	4.9	4.35	7.8	5.8	6.8	3.10	3.40	3.55	4.10	3.60	5.20	4.25
19	4.9	4.30	8.3	5.5	6.6	3.15	3.50	3.45	4.00	3.60	4.80	4.20
20	4.9	4.30	9.5	5.4	5.4	3.10	3.75	3.55	4.00	3.60	4.20	4.10
21	4.9	4.30	8.7	5.3	5.0	3.10	3.60	3.55	3.90	3.65	4.20	4.00
22	4.9	7.30	7.3	5.2	5.2	3.05	3.35	3.60	3.95	3.60	4.00	4.10
23	4.9	4.30	6.4	5.1	4.8	3.00	3.30	3.65	4.00	4.30	4.00	4.00
24	4.9	4.30	6.1	5.0	4.5	3.00	3.25	3.70	4.00	6.20	4.20	4.20
25	4.7	4.35	5.5	5.1	4.6	2.90	3.20	3.65	4.40	5.80	4.00	4.10
26	4.7	4.35	5.0	5.2	4.4	2.95	3.20	4.10	4.45	5.70	3.95	4.00
27	4.7	4.30	5.0	5.2	4.25	2.90	3.20	4.00	4.70	5.40	3.90	4.20
28	4.7	4.30	5.4	5.4	3.95	2.90	3.20	4.20	4.60	5.00	3.95	4.60
29	4.7	4.30	7.9	5.8	3.9	2.90	3.20	4.20	4.80	4.80	3.90	4.60
30	4.7	.....	9.6	7.4	3.95	2.90	3.10	4.40	4.70	4.60	3.90	4.55
31	4.7	.....	9.8	.....	3.9	.....	3.10	4.15	.....	4.50	.....	4.55

NOTE.—Relation of gage height to discharge affected by ice about Jan. 4 to Mar. 16.

Daily discharge, in second-feet, of Allegheny River at Red House, N. Y., for 1912.

Day.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,060		22,900	8,750	940	256	423	2,160	2,320	1,850	1,920
2	4,310		26,200	7,080	884	256	500	2,860	2,860	2,000	2,490
3	4,060		24,000	5,630	1,120	287	722	6,780	4,610	1,850	7,720
4			20,300	3,690	775	256	540	5,630	3,690	1,850	7,560
5			17,300	2,860	775	256	460	4,610	2,860	1,780	4,610
6			18,300	2,670	775	287	460	4,140	1,300	1,920	7,080
7			15,900	2,490	626	318	386	2,860	1,180	3,260	5,630
8			14,100	2,320	583	318	540	2,490	1,240	4,610	5,630
9			14,550	2,160	540	423	386	2,000	1,180	4,610	4,140
10			12,050	2,000	500	386	352	1,440	1,060	3,910	3,060
11			11,250	2,000	460	500	352	2,160	1,440	3,910	3,260
12			9,800	2,160	460	540	352	2,860	1,570	3,910	3,690
13			6,780	2,490	460	540	386	2,860	1,060	4,140	3,910
14			6,480	2,860	460	583	626	3,690	1,180	4,850	3,690
15			6,190	2,860	460	540	540	3,690	1,060	4,610	2,490
16			5,100	3,690	500	583	500	1,780	1,060	3,910	1,850
17		8,050	5,100	5,910	460	674	423	1,440	884	3,260	1,850
18		10,850	4,610	7,390	386	626	775	1,440	828	3,260	1,640
19		12,850	3,910	6,780	423	722	674	1,300	828	2,490	1,570
20		18,300	3,690	3,690	386	1,000	775	1,300	828	1,570	1,440
21		14,550	3,470	2,860	386	828	775	1,180	884	1,570	1,300
22		9,100	3,260	3,260	352	583	828	1,240	828	1,300	1,440
23		6,190	3,060	2,490	318	540	884	1,300	1,710	1,300	1,300
24		5,360	2,860	2,000	318	500	940	1,300	5,630	1,570	1,570
25		3,910	3,060	2,160	256	460	884	1,850	4,610	1,300	1,440
26		2,860	3,260	1,850	287	460	1,440	1,920	4,370	1,240	1,300
27		2,860	3,260	1,640	256	460	1,300	2,320	3,690	1,180	1,570
28		3,690	3,690	1,240	256	460	1,570	2,160	2,860	1,240	2,160
29		11,250	4,610	1,180	256	460	1,570	2,490	2,490	1,180	2,160
30		18,800	9,450	1,240	256	386	1,850	2,320	2,160	1,180	2,080
31		19,800		1,180		386	1,500		2,000		2,080

NOTE.—Discharge Jan. 4 to Mar. 16 estimated because of ice.

Monthly discharge of Allegheny River at Red House, N. Y., for 1912.

[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 [a]	4,310		1,610	0.982	1.13	C.
February [a]			554	.338	.36	C.
March [a]	19,800		5,520	3.37	3.88	B.
April	26,200	2,860	9,480	5.78	6.45	A.
May	8,750	1,180	3,240	1.98	2.28	A.
June	1,120	256	497	.303	.34	B.
July	1,000	256	480	.293	.34	B.
August	1,850	352	765	.466	.54	B.
September	6,780	1,180	2,520	1.54	1.72	A.
October	5,630	828	2,070	1.26	1.45	A.
November	4,850	1,180	2,550	1.55	1.73	A.
December	7,720	1,300	3,020	1.84	2.12	A.
The year	26,200	256	2,690	1.64	22.34	

[a] Discharge Jan. 4 to Mar. 16 estimated because of ice.

ALLEGHENY RIVER AT KITTANNING, PA.

Location.—At the Market Street Bridge in the city of Kittanning, Pa., about 4 miles above the mouth of Crooked River and over 12 miles above the mouth of Kiskiminitas River.

Records available.—August 18, 1904, to December 31, 1912.

Drainage area.—9,010 square miles.

Gage.—Chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February.

Accuracy.—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.

Cooperation.—This station is now maintained by the Water Supply Commission of Pennsylvania, which has furnished all the records for 1912.

The following discharge measurement was made by the subsurface method by R. A. Boehringer, an engineer of the Pennsylvania Water Supply Commission:

December 8, 1912: Gage height, 9.93 feet; discharge, 34,400 second-feet.

Daily gage height, in feet, of Allegheny River at Kittanning, Pa., for 1912.

[Blaine Mast, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.15	8.85	8.90	15.50	11.60	3.95	2.00	3.10	9.30	5.25	6.55	4.60
2	9.03	8.90	8.60	18.50	10.40	3.70	1.90	3.00	11.20	5.10	5.80	6.10
3	8.05	8.80	8.10	[a]23.00	9.20	3.35	1.90	2.95	[b]16.20	4.85	5.40	5.80
4	7.45	8.85	7.30	17.80	8.00	3.20	1.80	2.80	12.10	4.60	5.15	8.80
5	6.75	8.75	6.60	15.10	7.30	3.15	1.85	2.55	9.30	4.40	4.90	9.25
6	6.20	8.60	5.80	13.80	6.80	3.40	2.40	2.35	8.20	4.10	4.60	9.10
7	6.40	8.35	5.60	13.10	6.60	3.55	2.35	2.20	7.80	3.90	5.80	8.20
8	7.05	8.20	5.70	12.40	6.60	3.50	2.25	2.45	7.30	3.70	6.60	7.45
9	6.80	8.05	5.90	12.30	6.40	3.20	2.10	2.60	7.05	3.45	7.90	7.40
10	6.55	7.90	5.90	11.60	6.40	2.95	2.00	2.80	6.40	3.20	8.60	7.30
11	6.85	7.80	5.70	11.05	6.20	2.80	2.05	3.20	5.90	3.30	8.90	6.90
12	6.75	7.65	5.50	10.60	6.10	2.65	2.40	3.30	5.30	3.90	8.00	6.40
13	6.55	7.55	5.40	10.40	6.20	2.50	3.30	3.25	4.60	4.30	7.30	5.95
14	6.50	7.50	7.20	9.70	6.30	2.45	3.10	3.10	4.10	4.20	6.50	5.60
15	6.30	7.50	9.05	8.95	6.90	2.60	2.80	2.90	3.90	4.05	6.10	5.25
16	6.35	7.50	9.50	9.30	7.40	4.20	2.70	2.70	4.20	3.90	6.90	5.05
17	6.60	7.50	16.40	9.30	7.80	3.80	3.15	2.55	4.00	4.20	6.40	5.40
18	7.25	7.70	13.70	9.05	8.30	3.65	[c]8.30	2.40	4.60	4.60	5.70	5.80
19	7.80	8.05	14.10	8.50	8.10	3.40	5.55	2.45	4.35	4.25	5.20	5.60
20	9.05	8.30	15.50	7.75	7.85	3.20	5.10	3.80	4.20	4.10	4.90	5.25
21	10.85	8.40	17.20	7.20	7.60	2.95	5.30	3.65	4.10	4.80	4.70	4.85
22	10.60	8.40	14.90	6.90	7.20	2.80	6.50	3.60	3.95	5.40	4.45	4.50
23	9.75	8.30	12.60	6.60	6.75	2.60	6.10	3.20	3.85	6.30	4.20	4.30
24	9.60	8.30	12.10	6.40	6.20	2.90	5.40	2.85	4.30	8.10	3.95	4.20
25	9.45	8.40	11.80	6.10	5.70	2.85	4.90	2.40	6.70	12.10	3.80	4.05
26	9.15	9.20	10.05	5.90	5.25	2.60	4.05	6.90	6.50	13.60	3.70	3.90
27	9.00	[d]13.25	9.55	5.80	4.80	2.40	3.70	10.40	5.60	12.05	3.55	3.80
28	8.85	9.90	9.10	5.70	4.40	2.25	3.45	8.20	4.95	10.20	3.45	4.00
29	8.90	9.30	11.30	6.00	4.00	2.15	3.20	7.40	4.80	9.00	3.30	4.30
30	8.75	.....	[e]17.35	10.75	3.90	2.10	3.05	8.40	4.65	8.10	3.20	5.40
31	8.80	.....	17.50	.....	4.05	.....	2.95	8.70	.....	7.40	.....	9.60

[a] Maximum, 23.4 feet at 9 a. m.; discharge, 169,000 second-feet.
[b] Maximum, 16.9 feet at 10 a. m.; discharge, 95,600 second-feet.
[c] Maximum, 9.2 feet at 11 a. m.; discharge, 33,000 second-feet.
[d] Maximum, 15.7 feet at 6 a. m.; discharge, 84,200 second-feet.
[e] Maximum, 17.9 feet at 5 p. m.; discharge, 106,000 second-feet.

NOTE.—River reported "frozen" Jan. 8 to Feb. 26. Floating ice Dec. 24 and 25.

Daily discharge, in second-feet, of Allegheny River at Kittanning, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	39,700	.....	31,000	82,400	50,000	5,710	1,600	3,720	33,700	10,300	16,500	7,600
2	31,900	.....	29,000	112,000	41,400	5,080	1,460	3,490	47,100	9,640	12,800	14,300
3	25,500	.....	25,800	164,000	33,000	4,280	1,460	3,380	88,900	8,580	11,000	12,800
4	21,700	.....	20,800	105,000	25,200	3,940	1,340	3,060	53,800	7,600	9,860	30,400
5	17,600	.....	16,800	78,800	20,800	3,830	1,400	2,540	33,700	6,960	8,780	33,400
6	14,800	.....	12,800	67,400	17,800	4,390	2,260	2,170	26,400	6,100	7,600	32,400
7	15,800	.....	11,900	61,600	16,800	4,740	2,170	1,920	23,900	5,580	12,800	26,400
8	(a)	.....	12,400	56,100	16,800	4,620	2,000	2,350	20,800	5,080	16,800	21,700
9	.....	.....	13,300	55,300	15,800	3,940	1,760	2,640	19,300	4,500	24,500	21,400
10	.....	.....	13,300	50,000	15,800	3,380	1,600	3,060	15,800	3,940	29,000	20,800
11	.....	.....	12,400	46,100	14,800	3,060	1,680	3,940	13,300	4,160	31,000	18,400
12	.....	.....	11,400	42,900	14,300	2,740	2,260	4,160	10,500	5,580	25,200	15,800
13	.....	.....	11,000	41,400	14,800	2,440	4,160	4,050	7,600	6,660	20,800	13,600
14	.....	.....	20,200	36,500	15,300	2,350	3,720	3,720	6,100	6,380	16,200	11,900
15	.....	.....	32,000	31,400	18,400	2,640	3,060	3,270	5,580	5,970	14,300	10,300
16	.....	.....	35,100	33,700	21,400	6,380	2,850	2,850	6,380	5,580	18,400	9,420
17	.....	.....	90,800	33,700	23,900	5,340	3,830	2,540	5,840	6,380	15,800	11,000
18	.....	.....	66,500	32,000	27,100	4,960	27,100	2,260	7,600	7,600	12,400	12,800
19	.....	.....	70,000	28,400	25,800	4,390	11,700	2,350	6,810	6,520	10,100	11,900
20	.....	.....	82,400	23,600	24,200	3,940	9,640	5,340	6,380	6,100	8,780	10,300
21	.....	.....	98,600	20,200	22,600	3,380	10,500	4,960	6,100	8,380	7,980	8,580
22	.....	.....	77,100	18,400	20,200	3,060	16,200	4,850	5,710	11,000	7,110	7,260
23	.....	.....	57,600	16,800	17,600	2,640	14,300	3,940	5,460	15,300	6,380	6,660
24	.....	.....	53,800	15,800	14,800	3,270	11,000	3,160	6,660	25,800	5,710	6,380
25	.....	.....	51,500	14,300	12,400	3,160	8,780	2,260	17,300	53,800	5,340	5,970
26	.....	(a)	39,000	13,300	10,300	2,640	5,970	18,400	16,200	65,700	5,080	5,580
27	.....	62,800	35,400	12,800	8,380	2,260	5,080	41,400	11,900	53,400	4,740	5,340
28	.....	37,900	32,400	12,400	6,960	2,000	4,500	26,400	8,990	40,000	4,500	5,840
29	.....	33,700	47,900	13,800	5,840	1,840	3,940	21,400	8,380	31,700	4,160	6,660
30	.....	.....	100,000	43,900	5,580	1,760	3,600	27,800	7,790	25,800	3,940	11,000
31	.....	.....	102,000	.....	5,970	.....	3,380	29,700	.....	21,400	.....	35,800

a Discharge Jan. 8 to Feb. 26 estimated because of ice from the flow of West Branch of Susquehanna River at Williamsport, Blacklick Creek, and Brokenstraw Creek, and from climatologic records. Mean discharge Jan. 8–31 estimated 9,900 second-feet. Mean discharge Feb. 1–26 estimated 8,100 second-feet.

NOTE.—Below gage height 15.0 feet, the rating curve used by the commission differs slightly from that used by the Survey in computation for 1911 published in Water-Supply Paper 303. See footnotes to table of daily gage height for crest discharges.

Monthly discharge of Allegheny River at Kittanning, Pa., for 1912.

[Drainage area, 9,010 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.a	Minimum.	Mean.	Per square mile.	
January	39,700	.....	13,100	1.454	1.676
February	84,200	.....	11,900	1.321	1.425
March	106,000	11,000	42,394	4.705	5.424
April	169,000	12,400	45,467	5.046	5.630
May	50,000	5,580	18,840	2.091	2.411
June	6,380	1,760	3,605	.400	.446
July	33,000	1,340	5,623	.624	.719
August	41,400	1,920	7,970	.885	1.020
September	95,600	5,460	17,799	1.975	2.204
October	65,700	3,940	15,532	1.724	1.987
November	31,000	3,940	12,585	1.397	1.559
December	35,800	5,340	14,571	1.617	1.864
The year	169,000	.....	17,400	1.937	26.365

a Crest discharge where available.

NOTE.—See footnotes to table of daily discharge.

KISKIMINITAS RIVER AT AVONMORE, PA.

Location.—At the highway bridge near Avonmore station on the Pennsylvania Railroad, about 4 miles below the mouth of Blacklegs Creek, about 1 mile above the mouth of Long Run, and about 5 miles below the junction of Conemaugh River with Loyalhanna Creek to form the Kiskiminitas.

Records available.—June 11, 1907, to December 31, 1912.

Drainage area.—1,720 square miles.

Gage.—Chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from the downstream side of the bridge.

Floods.—The flood of March 19, 1908, reached a height of 30.8 feet on the gage, and its discharge was estimated at 80,500 second-feet, or about 47 second-feet per square mile from a drainage area of 1,720 square miles.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February.

Cooperation.—This station is now maintained by the Water Supply Commission of Pennsylvania, which has furnished all the records and data for 1912.

The following discharge measurement was made by R. A. Boehringer, an engineer of the Water Supply Commission of Pennsylvania:

December 6, 1912: Gage height, 6.43 feet; discharge, 3,310 second-feet.

Daily gage height, in feet, of Kiskiminitas River at Avonmore, Pa., for 1912.

[Ralph Fickes, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.65	11.24	7.85	8.52	9.00	3.58	4.38	5.94	6.04	6.02	4.92	3.38
2	8.40	11.29	6.15	8.85	7.70	3.41	3.68	5.21	10.84	5.35	4.80	3.30
3	7.22	10.78	5.30	10.08	6.98	3.30	3.45	5.40	[a]19.06	4.92	4.55	3.68
4	6.50	10.51	4.90	8.54	6.14	3.35	3.88	5.32	15.46	4.65	4.24	4.30
5	5.92	10.05	4.64	7.59	5.70	3.24	3.74	4.68	10.08	4.22	3.96	3.80
6	[b]6.00	10.15	4.44	6.92	5.40	3.15	3.80	4.30	8.38	4.05	3.92	5.94
7	6.80	10.25	4.29	6.45	5.65	3.15	3.50	3.96	7.35	3.78	4.70	7.00
8	6.80	10.36	4.84	7.08	6.89	3.15	3.12	3.77	7.31	3.70	8.66	5.95
9	6.60	10.01	6.70	6.35	6.62	2.98	2.92	3.69	6.18	3.61	6.96	5.30
10	6.40	9.70	6.08	5.90	5.85	2.72	2.80	3.65	5.20	3.92	6.20	4.62
11	6.40	9.40	5.30	5.52	5.40	2.79	3.16	3.98	4.75	5.50	5.70	4.75
12	6.40	9.38	5.22	5.20	5.20	2.76	3.32	4.82	4.38	4.45	5.20	4.42
13	6.35	9.40	7.56	5.45	5.50	2.68	3.04	4.60	4.15	3.90	4.98	3.62
14	6.05	9.55	6.59	5.60	6.04	2.62	2.88	4.80	3.90	3.60	4.95	3.65
15	5.90	9.48	11.70	5.38	5.38	2.68	2.62	4.82	3.80	3.40	5.25	4.06
16	5.90	9.35	15.65	5.46	5.85	8.45	3.20	4.40	3.98	3.39	4.70	4.02
17	5.75	9.35	10.80	5.40	12.90	16.25	4.82	3.90	4.80	3.30	5.02	4.00
18	5.88	9.45	10.58	8.85	9.62	9.52	6.82	3.62	4.08	3.25	4.25	3.85
19	12.40	9.92	10.45	8.90	7.81	7.18	9.65	4.22	4.80	3.42	4.16	4.08
20	16.12	12.45	11.70	7.45	6.90	5.85	6.72	9.46	4.95	3.52	3.94	4.42
21	15.55	14.13	[c]23.87	6.65	6.14	5.32	12.10	7.68	4.20	3.72	3.98	4.02
22	14.80	16.18	19.74	6.10	5.52	4.96	16.60	6.33	3.72	3.44	3.86	3.70
23	13.90	13.18	12.46	6.10	5.12	4.55	9.88	6.75	3.68	5.80	3.76	3.40
24	15.02	12.58	12.30	6.04	4.75	4.32	11.75	6.75	7.40	8.46	3.74	3.55
25	14.20	12.45	13.35	5.52	4.42	4.20	13.08	5.55	9.60	9.54	3.60	3.74
26	13.22	[b]16.70	10.30	5.20	4.16	3.90	9.35	4.70	7.70	[d]10.60	3.68	3.70
27	12.95	[e]17.72	9.00	5.28	3.90	3.68	7.60	4.88	11.63	8.55	3.58	3.60
28	11.95	12.27	9.35	6.26	3.78	3.52	6.29	5.11	9.88	7.20	3.51	4.22
29	11.78	8.62	11.68	5.82	3.75	3.72	5.94	5.32	7.55	6.25	3.40	4.09
30	12.70	.....	12.58	9.12	3.85	4.20	6.94	4.88	6.80	5.65	3.15	4.75
31	11.95	.....	9.80	.....	3.90	.....	6.05	4.80	.....	5.22	.....	9.82

[a] Maximum, 22.3 feet at 5 p. m.; discharge, 47,400 second-feet.
[b] Frozen Jan. 6 to Feb. 26. Ice broke and gorged Jan. 19 and gorge remained until Feb. 27, when it went out at 1.30 a. m.
[c] Maximum, 28.0 feet during night; discharge, 69,400 second-feet.
[d] Maximum, 11.0 feet at 8.30 a. m.; discharge, 12,200 second-feet.
[e] Maximum, 19.2 feet at 8.30 a. m.; discharge, 36,500 second-feet.

Daily discharge, in second-feet, of Kiskiminitas River at Avonmore, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,360	.....	6,260	7,350	8,180	1,110	1,790	3,600	3,730	3,710	2,350	956
2	7,150	.....	3,880	7,920	6,020	978	1,190	2,690	11,800	2,860	2,220	900
3	5,310	.....	2,800	10,200	4,970	900	1,010	2,920	36,000	2,350	1,960	1,190
4	4,330	.....	2,330	7,390	3,860	935	1,360	2,820	24,400	2,060	1,670	1,720
5	3,580	.....	2,050	5,860	3,300	861	1,240	2,090	10,200	1,650	1,430	1,290
6	(a)	.....	1,850	4,890	2,920	802	1,290	1,720	7,120	1,500	1,390	3,600
7	.....	.....	1,710	4,260	3,230	802	1,040	1,430	5,500	1,270	2,110	5,000
8	.....	.....	2,260	5,110	4,850	802	783	1,200	5,440	1,200	7,590	3,620
9	.....	.....	4,600	4,140	4,490	692	653	1,200	3,910	1,130	4,950	2,800
10	.....	.....	3,780	3,550	3,480	540	580	1,160	2,680	1,390	3,940	2,030
11	.....	.....	2,800	3,070	2,920	575	809	1,440	2,160	3,040	3,300	2,160
12	.....	.....	2,700	2,680	2,680	560	914	2,240	1,790	1,860	2,680	1,830
13	.....	.....	5,810	2,980	3,040	520	731	2,010	1,590	1,380	2,420	1,140
14	.....	.....	4,450	3,170	3,730	490	628	2,220	1,380	1,120	2,390	1,160
15	.....	.....	14,000	2,900	2,900	520	490	2,240	1,290	970	2,740	1,510
16	.....	.....	25,000	3,000	3,480	7,240	835	1,810	1,440	963	2,110	1,480
17	.....	.....	11,800	2,920	17,200	26,800	2,240	1,380	2,220	900	2,470	1,460
18	.....	.....	11,300	7,920	9,310	9,120	4,760	1,140	1,530	868	1,680	1,330
19	.....	.....	11,000	8,000	6,200	5,250	9,370	1,650	2,220	985	1,600	1,530
20	.....	.....	14,000	5,640	4,860	3,480	4,620	9,010	2,390	1,060	1,410	1,830
21	.....	.....	53,300	4,530	3,860	2,820	15,000	5,990	1,630	1,220	1,440	1,480
22	.....	.....	38,400	3,810	3,070	2,400	27,900	4,110	1,220	1,000	1,340	1,200
23	.....	.....	16,000	3,810	2,580	1,960	9,820	4,660	1,190	3,420	1,260	970
24	.....	.....	15,600	3,730	2,160	1,740	14,100	4,660	5,570	7,250	1,240	1,080
25	.....	.....	18,400	3,070	1,830	1,630	17,600	3,110	9,280	9,160	1,120	1,240
26	.....	(a)	10,700	2,680	1,600	1,380	8,810	2,110	6,020	11,300	1,190	1,200
27	.....	31,600	8,180	2,780	1,380	1,190	5,870	2,310	13,800	7,400	1,110	1,120
28	.....	15,500	8,810	4,020	1,270	1,060	4,060	2,570	9,820	5,280	1,050	1,650
29	.....	7,520	13,900	3,450	1,250	1,220	3,600	2,820	5,800	4,000	970	1,540
30	.....	.....	16,300	8,390	1,330	1,630	4,920	2,310	4,730	3,230	802	2,160
31	.....	.....	9,660	.....	1,380	.....	3,740	2,220	.....	2,700	.....	9,700

a Discharge Jan. 6 to Feb. 26 estimated because of ice from flow of Blacklick Creek at Blacklick, Pa., and from climatologic records. Mean discharge Jan. 6–31 estimated 2,700 second-feet. Mean discharge Feb. 1–26 estimated 2,800 second-feet. The rating curve used by the Water Supply Commission of Pennsylvania differs slightly, below gage height 13.0 feet, from that used by the Survey in computing values for 1911 published in Water-Supply Paper 303. See footnotes to table of daily gage height for crest discharges.

Monthly discharge of Kiskiminitas River at Avonmore, Pa., for 1912.

[Drainage area, 1,720 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.a	Minimum.	Mean.	Per square mile.	
January	.....	.....	3,220	1.872	2.158
February	36,500	.....	4,390	2.552	2.752
March	69,400	1,710	11,100	6.453	7.440
April	10,200	2,680	4,770	2.773	3.094
May	17,200	1,250	3,980	2.314	2.668
June	26,800	490	2,670	1.552	1.731
July	27,900	490	4,900	2.849	3.285
August	9,010	1,140	2,670	1.552	1.789
September	47,400	1,190	6,260	3.640	4.061
October	12,200	868	2,850	1.657	1.910
November	7,590	802	2,130	1.238	1.381
December	9,700	900	2,000	1.163	1.341
The year	.....	.....	4,240	2.468	33.610

a Crest discharge used when available. See footnotes to table of daily gage height.

BLACKLICK CREEK AT BLACKLICK, PA.

Location.—At highway bridge about one-fourth mile from the railroad station at Blacklick, Pa., about 1 mile below the junction of Blacklick and Two Lick creeks and about 6 miles above the junction of Blacklick Creek with Conemaugh River.

Records available.—August 16, 1904, to July 15, 1906; January 8, 1907, to December 31, 1912.

Drainage area.—386 square miles.

Gage.—Chain gage attached to bridge; datum unchanged.

Channel.—Fairly permanent.

Discharge measurements.—At high and medium stages made from the upstream side of the highway bridge; at low stages made by wading at a section just above the bridge. Extreme high-water measurements are made from the coal tipple one-fourth mile above the bridge, but no measurements have been made from it in the last few years.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February.

Cooperation.—Since January 8, 1907, station has been maintained by the Water Supply Commission of Pennsylvania, which supplied all the records for 1912.

Remarks.—Changes in rating curves necessitated by the reconstruction of the highway bridge were discussed in Water-Supply Paper 263, page 43. The rating curve used in 1912 differs above 1,800 second-feet from that used in previous years as a result of 5 discharge measurements made during 1912 and 1913 (before the preparation of this report).

Discharge measurements of Blacklick Creek at Blacklick, Pa., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 1	R. A. Boehringer [a]	2.95	[b] 305
Dec. 6	do	5.30	[b] 2,370

[a] An engineer of the Water Supply Commission of Pennsylvania.
[b] Measurement made by the subsurface method.

Daily gage height, in feet, of Blacklick Creek at Blacklick, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.97	3.01	3.97	4.68	4.88	2.67	2.52	3.44	3.45	3.48	3.48	2.68
2	4.29	2.99	3.64	5.49	4.42	2.62	2.46	3.24	8.17	3.26	3.44	2.82
3	4.07	2.98	3.36	5.80	4.05	2.67	2.48	3.50	[a]11.86	3.16	3.28	3.53
4	3.73	2.82	3.32	4.78	3.82	2.61	2.46	3.22	7.98	3.06	3.14	3.18
5	3.28	2.76	3.26	4.44	3.58	2.56	2.60	2.98	5.49	2.96	3.04	3.04
6	[b] 3.29	2.74	3.16	4.14	3.54	2.55	2.62	2.86	4.65	2.87	2.98	4.98
7	3.29	2.72	3.13	4.08	3.60	2.55	2.57	2.78	4.20	2.78	3.58	4.88
8	3.37	2.70	3.42	4.33	4.10	2.48	2.40	2.72	3.96	2.69	4.14	4.11
9	3.39	2.98	4.38	3.92	3.94	2.40	2.31	2.68	3.56	3.16	3.69	3.72
10	3.44	2.84	3.80	3.72	3.71	2.33	2.52	2.84	3.32	3.24	3.60	3.44
11	3.31	[b] 2.77	3.55	3.58	3.46	2.26	2.76	2.98	3.16	2.92	3.53	3.68
12	3.23	2.62	3.62	3.48	3.42	2.22	2.60	3.63	3.06	2.80	3.46	3.83
13	3.09	2.66	4.56	3.94	3.76	2.22	2.50	3.48	2.96	2.74	3.41	[b] 3.78
14	3.16	2.56	3.95	3.74	3.61	2.20	2.44	3.37	2.88	2.72	3.40	3.51
15	3.01	2.50	7.89	3.60	3.38	2.56	2.90	3.28	2.86	2.70	3.31	3.16
16	2.97	2.43	6.91	3.64	[c] 5.84	[d] 8.10	2.86	3.09	3.11	2.62	3.20	3.14
17	2.97	2.44	5.44	3.61	6.04	6.46	3.53	2.88	2.99	2.60	3.10	3.10
18	3.03	2.46	5.48	[e] 5.99	5.08	4.70	5.70	2.80	2.87	2.58	3.04	3.16
19	[f] 4.47	2.72	5.40	4.74	4.46	3.97	4.32	2.82	3.18	2.82	3.00	3.28
20	4.53	[fg] 4.42	5.62	4.39	4.12	3.58	3.58	4.01	3.08	3.08	2.98	3.16
21	4.13	4.56	[h] 10.20	4.06	3.76	3.39	[i] 6.00	3.90	2.80	2.84	2.94	3.18
22	3.77	4.98	7.36	3.76	3.52	3.38	6.38	3.84	2.70	2.72	2.88	3.19
23	3.79	4.18	5.48	3.88	3.32	3.20	4.62	3.83	3.10	5.89	2.83	3.08
24	4.05	3.82	6.39	3.70	3.17	3.25	4.80	3.64	4.28	5.31	2.80	2.92
25	3.84	3.80	6.16	3.55	3.06	3.11	4.78	3.30	4.00	[j] 6.60	2.82	[k] 2.86

[a] Maximum, 12.9 feet at noon; discharge, 21,000 second-feet.
[b] Creek frozen across.
[c] Maximum, 7.36 at 6 p. m.; discharge, 6,240 second-feet.
[d] Maximum, 9.6 feet at 2 p. m.; discharge, 11,200 second-feet.
[e] Maximum, 6.42 feet at 1 p. m.; discharge, 4,300 second-feet.
[f] Ice going out.
[g] On Feb. 20 ice gorge about 15 feet high formed one-half mile above gage; went out on Feb. 26.
[h] Maximum, 11.1 feet at 1 p. m.; discharge, 15,200 second-feet.
[i] Maximum, 7.9 feet at 7 p. m.; discharge, 7,370 second-feet.
[j] Maximum, 7.1 feet at 6 p. m.; discharge, 5,690 second-feet.
[k] Ice all out of creek.

Daily gage height, in feet, of Blacklick Creek at Blacklick, Pa., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	3.55	[a] 6.69	5.14	3.54	2.92	2.88	4.02	3.20	3.66	6.20	2.79	2.80
27	3.35	[b] 8.40	4.71	3.59	2.82	2.82	3.68	3.88	4.38	5.04	2.76	2.92
28	3.18	5.58	5.40	3.48	2.78	2.66	3.38	3.49	3.78	4.45	2.73	2.91
29	3.18	4.54	6.98	3.91	2.81	2.62	3.50	3.42	3.66	4.06	2.66	2.75
30	3.25	.....	5.74	5.62	2.93	2.58	3.40	3.32	3.72	3.78	2.66	3.76
31	3.13	.....	5.16	.....	2.82	.....	3.14	3.29	.....	3.56	.....	5.38

[a] On Feb. 20 ice gorge about 15 feet high formed one-half mile above gage; went out on Feb. 26.
[b] Maximum, 9.6 feet at 7 a. m.; discharge, 11,200 second-feet.

Daily discharge, in second-feet, of Blacklick Creek at Blacklick, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,930	324	941	1,600	1,820	195	146	551	558	577	577	198
2	1,220	316	688	2,660	1,340	179	128	437	7,940	448	551	248
3	1,020	312	503	3,160	1,010	195	134	590	17,500	395	459	611
4	752	248	481	1,710	821	175	128	426	7,540	347	385	405
5	459	226	448	1,360	646	159	172	312	2,660	304	338	338
6	464	219	395	1,090	618	156	179	264	1,570	268	312	1,940
7	464	212	380	1,030	660	156	162	233	1,140	233	646	1,820
8	508	205	538	1,260	1,050	134	110	212	933	202	1,090	1,060
9	520	312	1,300	901	917	110	86	198	632	395	723	745
10	551	256	805	745	738	91	146	256	481	437	660	551
11	476	230	625	646	564	73	226	312	395	288	611	716
12	432	179	674	577	538	64	172	681	347	240	564	829
13	360	192	1,480	917	775	64	140	577	304	219	532	790
14	395	159	925	760	667	59	122	508	272	212	525	597
15	324	140	7,350	660	514	159	280	459	264	205	476	395
16	308	119	5,290	688	3,230	7,790	264	360	370	179	415	385
17	308	122	2,590	667	3,580	4,380	611	272	316	172	365	365
18	334	128	2,650	3,490	2,060	1,620	3,000	240	268	166	338	395
19	1,390	212	2,520	1,660	1,380	941	1,250	248	405	248	320	459
20	1,450	1,340	2,870	1,310	1,070	646	646	974	356	356	312	395
21	1,080	1,480	12,700	1,020	775	520	3,510	885	240	256	296	405
22	782	1,940	6,240	775	604	514	4,220	837	205	212	272	410
23	798	1,120	2,650	869	481	415	1,540	829	365	3,320	252	356
24	1,010	821	4,240	730	400	442	1,730	688	1,210	2,390	240	288
25	837	805	3,800	625	347	370	1,710	470	965	4,660	248	264
26	625	4,840	2,150	618	288	272	982	415	702	3,880	236	240
27	498	8,440	1,630	653	248	248	716	869	1,300	2,010	226	288
28	405	2,810	2,520	577	233	192	514	584	790	1,370	216	284
29	405	1,460	5,440	893	244	179	590	538	702	1,020	192	222
30	442	.....	3,070	2,870	292	166	523	481	745	790	192	775
31	380	.....	2,170	.....	248	.....	385	464	.....	632	.....	2,500

NOTE.—Open-water discharge rating curve used throughout year. See footnotes to table of daily gage height.

Monthly discharge of Blacklick Creek at Blacklick, Pa., for 1912.

[Drainage area, 386 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.[a]	Minimum.	Mean.	Per square mile.	
January	1,930	308	675	1.749	2.017
February	11,200	119	1,006	2.606	2.811
March	15,200	380	2,583	6.692	7.715
April	4,300	577	1,217	3.153	3.518
May	6,240	233	908	2.352	2.711
June	11,200	59	689	1.785	1.992
July	7,370	86	791	2.049	2.362
August	974	198	489	1.267	1.461
September	21,000	205	1,716	4.446	4.961
October	5,690	166	853	2.210	2.548
November	1,090	192	419	1.085	1.210
December	2,500	198	622	1.611	1.857
The year	21,000	59	997	2.584	35.163

[a] Crest discharge used where available. See footnotes to table of daily gage height.

MONONGAHELA RIVER BASIN.

TYGART RIVER AT BELINGTON, W. VA.

Location.—At highway bridge at Belington, W. Va., one-fourth mile above the mouth of Mill Creek.

Records available.—June 5, 1907, to December 31, 1912.

Drainage area.—390 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged. The elevation above sea level of the zero of the gage is 1,679.89 feet.

Channel.—Practically permanent.

Discharge measurements.—Made from upstream side of the bridge.

Floods.—The flood of July, 1912, reached a stage of 20.3 feet referred to the present gage.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February.

Accuracy.—The discharge rating curves for this station are poorly defined above 2,500 second-feet, being simply extensions, and all discharge values above that point should be used with due regard for this fact.

The following discharge measurement was made by C. T. Bailey:
September 4, 1912: Gage height, 2.98 feet; discharge, 194 second-feet.

Daily gage height, in feet, of Tygart River at Belington, W. Va., for 1912.

[S. A. Campbell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.8	5.6	5.0	5.7	3.95	2.73	3.24	4.1	3.41	2.99	2.50	2.64
2	6.4	4.8	4.4	5.0	3.95	2.69	3.0	4.5	3.75	2.90	2.53	2.51
3	5.2	4.25	4.0	5.4	3.85	2.63	3.0	3.95	3.21	2.82	2.53	2.80
4	4.6	4.9	3.95	5.5	3.60	2.62	3.43	3.6	3.00	2.72	2.53	2.81
5	4.1	4.9	3.8	5.1	3.55	2.58	4.3	3.37	2.82	2.54	2.52	3.20
6	3.9	.....	3.7	4.7	3.49	2.54	4.6	3.19	2.70	2.51	2.49	4.1
7	3.43	.....	3.65	4.45	3.44	2.53	3.11	3.07	2.64	2.48	2.64	4.8
8	2.94	.....	3.75	4.2	4.8	2.50	3.23	2.97	2.52	2.48	6.7	4.0
9	2.83	4.3	4.45	4.3	5.7	2.46	3.38	2.87	2.51	2.44	5.6	3.85
10	4.7	4.0	4.6	4.15	4.8	2.40	3.9	2.82	2.46	2.40	4.6	3.65
11	4.25	3.9	4.7	4.0	4.2	2.44	3.55	2.78	2.37	2.35	3.7	3.40
12	4.25	3.85	4.35	3.8	5.5	2.28	3.85	2.75	2.30	2.35	4.45	3.27
13	4.25	.....	5.0	3.44	10.3	2.18	3.42	2.68	2.30	2.30	3.28	3.27
14	.....	.....	6.9	3.42	7.3	2.19	3.28	2.67	2.23	2.27	3.20	3.20
15	.....	.....	6.3	3.47	6.8	2.18	3.23	2.62	2.20	2.26	3.22	2.91
16	.....	3.6	12.2	3.38	6.4	2.28	3.7	2.57	2.46	2.23	3.15	2.88
17	.....	.....	8.4	4.45	12.0	2.62	3.75	2.54	2.57	2.23	3.06	2.90
18	.....	.....	6.0	4.45	7.1	3.6	3.8	2.53	2.57	2.22	3.00	2.92
19	9.9	.....	5.1	5.9	5.7	4.0	11.1	2.52	2.57	2.22	2.92	2.95
20	9.1	a5.5	5.4	4.8	5.0	4.0	6.3	2.67	2.42	2.22	2.86	2.85
21	7.6	6.3	6.7	4.35	4.45	4.05	6.2	3.40	2.44	2.22	2.84	2.82
22	5.1	7.8	7.9	4.0	4.0	3.5	8.9	3.38	2.38	2.44	2.80	2.81
23	4.6	6.3	7.0	4.0	3.7	3.55	11.7	3.19	2.31	2.50	2.73	2.80
24	4.5	5.9	7.0	4.7	3.5	3.6	5.7	3.17	4.6	2.50	2.64	2.90
25	4.4	5.4	9.0	4.3	3.34	4.6	17.4	2.99	5.5	2.64	2.57	2.80
26	4.0	5.2	7.2	4.0	3.19	5.6	13.8	2.06	4.45	2.87	2.70	2.75
27	3.75	11.6	7.5	3.85	3.08	4.4	6.0	2.87	3.65	2.86	2.64	2.89
28	3.9	9.2	4.9	3.75	2.98	3.8	5.2	3.39	3.34	2.78	2.61	3.12
29	5.0	5.9	5.0	3.75	2.93	3.6	4.05	2.97	3.21	2.70	2.50	3.65
30	9.7	.....	8.4	3.80	2.95	3.39	5.0	2.88	3.05	2.62	2.50	3.9
31	7.4	.....	7.5	.....	2.88	.....	4.7	3.21	.....	2.55	.....	10.2

a Gage height Feb. 20 to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 9–19 and about Feb. 4–20. Observer reported as follows: "Jan. 12, river at gage and at control frozen over; average thickness of ice, 6 inches. Jan. 19, ice going out; average thickness of ice, 8 inches. Feb. 5 to 16 river at gage and at control frozen over; average thickness of ice, 4 to 6 inches."

Daily discharge, in second-feet, of Tygart River at Belington, W. Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,210	1,500	1,120	1,560	570	117	260	679	350	197	84	110
2	2,070	1,020	797	1,130	570	108	183	896	505	172	89	86
3	1,250	720	595	1,370	522	96	133	603	269	151	89	146
4	904	.....	570	1,440	407	94	334	435	200	128	89	149
5	644	.....	498	1,190	385	87	745	333	151	91	88	265
6	546	.....	452	959	359	80	904	262	123	86	82	679
7	334	.....	430	824	338	78	216	222	110	81	110	1,070
8	167	.....	475	694	1,020	73	257	192	88	81	2,390	628
9	.....	.....	824	745	1,560	67	313	164	86	74	1,580	554
10	.....	.....	904	669	1,020	59	546	151	78	68	954	458
11	.....	.....	959	595	694	65	385	141	64	61	481	346
12	.....	.....	771	498	1,440	45	522	134	54	61	868	292
13	.....	.....	1,130	338	5,840	34	329	119	54	54	296	292
14	.....	.....	2,460	329	2,790	35	275	117	45	50	265	265
15	.....	.....	2,000	350	2,380	34	257	106	41	49	273	175
16	.....	.....	8,070	313	2,070	45	452	97	78	45	248	167
17	.....	.....	3,810	824	7,830	94	475	91	97	45	219	172
18	.....	.....	1,780	824	2,620	407	498	89	97	44	200	178
19	.....	.....	1,190	1,700	1,560	595	6,760	88	97	44	178	186
20	4,520	.....	1,370	1,020	1,130	595	2,000	117	71	44	162	159
21	3,050	2,000	2,300	771	824	620	1,920	346	74	44	156	151
22	1,190	3,230	3,320	595	595	363	4,310	338	65	74	146	149
23	904	2,000	2,540	595	452	385	7,470	262	55	84	130	146
24	850	1,700	2,540	959	363	407	1,560	255	954	84	110	172
25	797	1,370	4,410	745	298	904	14,700	197	1,520	110	97	146
26	595	1,250	2,700	595	243	1,500	10,000	25	868	164	123	134
27	475	7,350	2,960	522	207	797	1,860	164	458	162	110	169
28	546	4,620	1,070	475	178	498	1,320	342	321	141	104	238
29	1,130	1,700	1,130	475	164	407	654	192	269	123	84	458
30	5,170	.....	3,810	498	170	317	1,200	167	216	106	84	578
31	2,870	.....	2,960	.....	151	.....	1,010	269	.....	93	.....	5,720

NOTE.—Daily discharge computed from two rating curves fairly well defined between 40 and 2,500 second-feet and poorly defined above 2,500 second-feet. The 1907–1911 rating curve was used Jan. 1 to July 25, 1912, and a new curve from July 26 to Dec. 31, 1912. The change in rating curve is based on two discharge measurements made Sept. 4, 1912, and Mar. 30, 1913 (before the preparation of this report). The new curve was made to coincide with the old above 4,900 second-feet. See "Accuracy."

Discharge Jan. 9–19 and Feb. 4–20 estimated, because of ice, from gage heights, observer's notes, climatologic records, and discharge of adjacent drainage areas, as follows: Jan. 9–19, 500 second-feet; Feb. 4–20, 400 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of Tygart River at Belington, W. Va., for 1912.

[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.		
January	5,170	.....	1,220	3.13	3.61	D.
February	7,350	.....	1,220	3.13	3.38	D
March	8,070	430	1,930	4.95	5.71	C.
April	1,700	313	787	2.02	2.25	B.
May	7,830	151	1,250	3.21	3.70	B.
June	1,500	34	300	.769	.86	B.
July	14,700	183	2,000	5.13	5.91	C.
August	896	25	245	.628	.72	B.
September	1,520	41	249	.638	.71	B.
October	197	44	90.7	.233	.27	C.
November	2,390	82	330	.846	.94	B.
December	5,720	86	466	1.19	1.37	B.
The year	14,700	.....	842	2.16	29.43	

NOTE.—See footnote to table of daily discharge.

TYGART RIVER AT FETTERMAN, W. VA.

Location.—At highway bridge at Fetterman, W. Va., three-fourths mile above mouth of Otter Creek.

Records available.—June 3, 1907, to December 31, 1912.

Drainage area.—1,340 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged. The elevation above sea level of the zero of the gage is 957.86 feet.

Channel.—Practically permanent; broken by one pier. Current sluggish at low stages.

Discharge measurements.—Made from downstream side of bridge.

Floods.—No records of floods previous to installation of gage are available. The flood of July, 1912, reached a stage of 29.1 feet, the highest recorded since the station was established.

Winter flow.—Ice probably does not affect the relation of gage height to discharge. It is said that the riffle below the gage usually remains open.

The following discharge measurement was made by C. T. Bailey:
September 2, 1912: Gage height, 5.06 feet; discharge, 1,860 second-feet.

Daily gage height, in feet, of Tygart River at Fetterman, W. Va., for 1912.

[Joseph Gerken, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.4	7.0	6.1	7.2	5.25	3.88	4.75	5.4	6.2	4.3	3.70	3.68
2	7.4	6.0	5.8	6.4	5.3	3.83	4.5	5.2	5.3	4.2	3.68	3.72
3	6 4	5.7	5.6	7.4	5.2	3.68	4.25	5.0	4.65	4.1	3.58	3.78
4	5.8	5.4	5.2	7.1	4.95	3.68	4.15	4.8	5.05	4.0	3.50	3.88
5	5.5	5.1	4.9	6.3	4.7	3.66	5.05	4.4	4.7	3.98	3.50	4.15
6	4.9	a 5.0	4.75	5.8	4.55	3.70	5 3	4.25	4.2	3.78	3.50	5.6
7	4.75	5.0	4.7	5.3	4.55	3.90	5.2	4.1	4.0	3.60	4.2	6.1
8	4.7	a 4.7	4.55	5.5	4.7	3.76	4.25	4.05	3.95	3.50	8.6	5.7
9	4.5	a 4.55	5.0	5.4	5.7	3.70	4.25	3.99	3.85	3.42	7.6	5.5
10	4.95	a 4.4	5.7	5.3	5.7	3.56	4.35	3.97	3.72	3.40	6.0	5.4
11	5.3	4.3	5.7	5.15	5.2	3.48	4.65	3.95	3.60	3.40	5.25	4.6
12	5.25	a 4.3	5.6	4.95	5.15	3.46	4.25	4.0	3.58	3.40	4.8	4.2
13	a 4.9	a 4.3	6.7	4.8	10.6	3.28	4.15	4.2	3.52	3.38	4.6	4.1
14	4.8	4.5	8.8	4.6	8.2	3.13	4.1	3.92	3 45	3.35	4.5	4.0
15	4.8	a 4.2	12.0	4.65	6.8	3.23	3.95	4.0	3.38	3.50	4.4	4.0
16	4.7	a 4.0	14.8	4.5	8.9	3.36	3.87	3.97	3.35	3.48	4.3	4.0
17	4.5	a 4.3	11.6	4.35	12.8	3.70	4.1	3.95	3.18	3.42	4.3	4.05
18	4 5	a 4.6	8.1	6.3	9.1	4.0	5.6	3.87	3.25	3.40	4.2	4.15
19	10.7	4.9	6.7	6.2	7.3	4.7	9.0	3.87	4.1	3.42	4.1	4.05
20	12.1	6.3	8.8	5.7	6.3	4.8	7.2	4.7	4.1	3.38	4.0	3.95
21	8.4	8.5	10.2	5.15	5 45	4.75	5.7	4.5	3.85	3.35	4.0	3.9
22	7.2	10.0	11.2	5.05	5.1	4.55	9.7	4.45	3.78	3.30	4.0	3.85
23	6.0	7.9	9.2	4.9	4.8	4.75	12.3	4.45	4.3	3.42	3.98	3.95
24	5.6	7.0	10.4	4.95	4.55	4.85	7.2	4.4	6.2	3.52	3.95	4.0
25	5.45	6.2	10.8	4.95	4.4	5.05	24.4	4.25	6.4	3.65	3.95	4.05
26	5.4	7.5	7.7	4.75	4.25	5.8	15.4	4.15	5.9	3.68	4.0	4.1
27	5.1	14.0	6.8	5.05	4.05	5.7	7.5	4.5	5.3	3.95	3.98	4.25
28	4.85	10 7	6.1	5.2	3.96	5.35	5.8	4.4	4.8	4.0	3.90	4.6
29	5.8	7.1	6.0	5.1	3.93	5.0	5.3	4.45	4.6	3.90	3.90	4.8
30	11.7	.....	10.2	5.15	3.98	4.65	5.7	4.35	4.4	3.82	3.75	6.6
31	9.2	.....	9.0	.....	3.90	.....	5.8	4.2	.....	3.78	.....	12.2

a Gage height to top of ice.

NOTE.—Observer reported floating ice, shore ice, river partly frozen over, and control section open Jan. 5–17 and Feb. 3–10; average thickness of ice at gaging section 1 to 5 inches; and thin ice on the river Dec. 14–28. The relation of gage height to discharge was probably not materially affected by ice during 1912.

Daily discharge, in second-feet, of Tygart River at Fetterman, W. Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,860	5,370	3,740	5,740	2,250	438	1,400	2,510	3,920	802	323	312
2	6 110	3,560	3 210	4,280	2,330	404	1,040	2,160	2,330	699	312	335
3	4,280	3,030	2,850	6,110	2,160	312	750	1,820	1,250	607	258	372
4	3,210	2,510	2,160	5,550	1,740	312	653	1.480	1.900	525	218	438
5	2,680	1,990	1,650	4,100	1,320	301	1,900	916	1,320	510	218	653
6	1,650	1,820	1,400	3,210	1,110	323	2,330	750	699	372	218	2,850
7	1,400	1,820	1,320	2,330	1,110	451	2,160	607	525	268	699	3,740
8	1,320	1,320	1,110	2.680	1,320	360	750	566	488	218	8,340	3,030
9	1,040	1,110	1,820	2,510	3,030	323	750	518	418	181	6,480	2,680
10	1,740	916	3,030	2,330	3,030	248	859	503	335	172	3,560	2,510
11	2,330	802	3,030	2,080	2,160	210	1,250	488	268	172	2,250	1,180
12	2,250	802	2,850	1,740	2,080	200	750	525	258	172	1,480	699
13	1,650	802	4,820	1,480	12,100	128	653	699	228	164	1,180	607
14	1,480	1,040	8,720	1,180	7,590	87	607	466	195	153	1,040	525
15	1,480	699	15,100	1,250	5,000	112	488	525	164	218	916	525
16	1,320	525	21,400	1,040	8,910	157	431	503	153	209	802	525
17	1,040	802	14,200	859	16,900	323	607	488	98	181	802	566
18	1,040	1,180	7,410	4,100	9,290	525	2,850	431	118	172	699	653
19	12,300	1,650	4,820	3,920	5,920	1,320	9,100	431	607	181	607	566
20	15,300	4,100	8,720	3,030	4,100	1,480	5,740	1,320	607	164	525	488
21	7,970	8,160	11,400	2,080	2,590	1,400	3,030	1,040	418	153	525	451
22	5,740	11,000	13,300	1,900	1,990	1,110	10,400	978	372	134	525	422
23	3,560	7,030	9,480	1,650	1,480	1,400	15,700	978	802	181	510	488
24	2,850	5,370	11,800	1,740	1,110	1,570	5,740	916	3,920	228	488	525
25	2,590	3,920	12,500	1,740	916	1,900	45,300	750	4,280	296	488	566
26	2,510	6,290	6,660	1,400	750	3,210	22,900	653	3,380	312	525	607
27	1,990	19,600	5,000	1,900	566	3,030	6,290	1,040	2,330	488	510	750
28	1,570	12,300	3,740	2,160	495	2,420	3,210	916	1,480	525	451	1,180
29	3,210	5,550	3,560	1,990	473	1,820	2,330	978	1,180	451	451	1,480
30	14,400	.....	11,400	2,080	510	1,250	3,030	859	916	397	354	4,640
31	9,480	.....	9,100	.....	451	.....	3,210	699	.....	372	.....	15,500

NOTE.—Daily discharge determined from a rating curve well defined between 63 and 24,300 second-feet (gage heights 3.0 to 16.0 feet). The open-channel rating curve was applied throughout the year. See footnotes to table of daily gage height.

Monthly discharge of Tygart River at Fetterman, W. Va., for 1912.

[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	15,300	1,040	4,170	3.11	3.58	D.
February	19,600	525	3,970	2.96	3.19	D.
March	21,400	1,110	6,820	5.09	5.87	B.
April	6,110	859	2,610	1.95	2.18	A.
May	16,900	451	3,380	2.52	2.90	A.
June	3,210	87	904	.675	.75	A.
July	45,300	431	5,040	3.76	4.34	B.
August	2,510	431	888	.663	.76	A.
September	4,280	98	1,170	.873	.97	A.
October	802	134	312	.233	.27	B.
November	8,340	218	1,190	.888	.99	A.
December	15,500	312	1,610	1.20	1.38	A.
The year	45,300	87	2.680	2.00	27.18	

NOTE.—See footnote to table of daily discharge.

BUCKHANNON RIVER AT HALL, W. VA.

Location.—At highway bridge at Hall, W. Va.

Records available.—June 7, 1907, to May 25, 1909, when station was discontinued because of backwater from the dam at Boulder. Conditions fully described in Water-Supply Paper 263, pages 48–49.

Gage.—Chain gage attached to bridge; datum unchanged.

Discharge measurements.—On September 3, 1912, the station was visited and the following discharge measurement made by C. T. Bailey: Gage height, 3.60 feet; discharge, 195 second-feet. This measurement indicates backwater.

Flood levels.—On the same date (Sept. 3, 1912) the elevations of the bench marks were checked with a wye level and the elevations of the floods of 1888 and July, 1912, referred to gage datum were determined. The high water of 1888 reached a gage height of about 17.0 feet and that of July, 1912, about 16.0 feet.

WEST FORK RIVER AT ENTERPRISE, W. VA.

Location.—At highway bridge at Enterprise, W. Va., three-fourths mile above the mouth of Bingamon Creek.

Records available.—June 2, 1907, to December 31, 1912.

Drainage area.—750 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged. The elevation above sea level of the zero of the gage is 869.91 feet.

Channel.—Practically permanent; broken by one pier; smooth, rock bottom.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The flood of 1888 reached a stage of about 33 feet referred to the present gage datum. Maximum gage height recorded since establishment of station, 17.6 feet January 30, 1911.

Winter flow.—Ice may affect the relation of gage height to discharge for two or three weeks at a time during December, January, and February.

Accuracy.—The gage reader stated that during the summer of 1908 the only water running in the river was pumpage from numerous coal mines along the stream; otherwise the records are good.

The following discharge measurement was made by C. T. Bailey:
August 28, 1912: Gage height, 2.22 feet; discharge, 334 second-feet.

Daily gage height, in feet, of West Fork River at Enterprise, W. Va., for 1912.

[C. M. Tetrick, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.2	4.3	3.5	5 5	2.75	1.71	1.96	3.05	2.4	2.5	1.60	1.40
2	6.1	3.7	3.2	4.2	2.65	1.66	1.86	2.65	2.3	2.3	1.52	1.40
3	4.3	.....	2.9	7.3	2.6	1.61	1.81	2.25	2.2	1.00	1.51	1.38
4	3.7	.....	2.7	5.7	2.55	1.47	1.77	1.95	2.15	1.00	1.60	1.80
5	4.0	.....	2.4	5.2	2.5	1.46	1.74	1.80	2.0	1.90	1.60	2.05
6	.....	.....	2.3	4.7	2.35	1.36	1.72	1.70	1.82	1.70	1.55	3.0
7	.....	.....	2.2	4.0	2.4	1.36	1.71	1.70	1.72	1.64	1.70	5.6
8	.....	.....	2.1	3.7	2.6	1.26	1.66	1.69	1.70	1.60	3.2	4.5
9	.....	.....	3.9	3.25	2.55	1.26	1.67	1.69	1.60	1.55	4.2	3.0
10	.....	.....	3.4	3.05	2.5	1.26	1.85	1.67	1.52	1.50	3.3	2.4
11	.....	3.05	3.0	2.9	2.45	1.26	1.80	1.67	1.40	1.50	2.4	2.3
12	.....	.....	2.7	2.65	2.25	1.26	1.75	1.67	1.40	1.48	2.1	2.1
13	3.45	.....	9.9	2.65	2.3	1.18	1.70	1 67	1 42	1.45	2.0	1.90
14	.....	.....	9.0	2.6	2.15	1.06	1.65	1.66	1.35	1.40	2.0	1.85
15	.....	.....	11.8	2.6	2.05	0.96	1.73	1.65	1.31	1.40	1.98	1.80
16	.....	.....	12.2	6.2	2.05	.96	1.55	1.65	1.30	1.30	1.92	1.70
17	.....	.....	9.0	4.2	3.6	1.46	2.25	1.65	1.30	1.60	1.85	1.70
18	.....	.....	6.3	3.9	4.2	2.35	1.85	1.85	1.30	1.55	1.80	1.80
19	13.8	.....	4.0	3.25	3.7	2.35	1.75	6.6	1.25	1.40	1.80	1.90
20	9.2	.....	4.8	2.95	3.45	2.3	3.15	5.0	1.22	1.30	1.75	2.0
21	6.5	7.4	8.9	2.9	3.15	2.2	2.95	3.8	1.21	1.35	1.70	1.95
22	4.0	11.5	7.6	2.65	2.95	2.15	4.0	2.55	2.10	1.30	1.70	1.82
23	4.2	6.2	7.7	2.5	2.75	2.1	6.6	2.15	2.6	1.20	1.65	1.8
24	3.8	4.4	6.5	2.35	2.7	2.55	3.6	2.05	6.6	1.10	1.62	1.76
25	3.6	3.8	9.2	2.2	2.45	2.4	16.6	1.95	5.5	1.90	1.60	1.70
26	3.4	4.0	7.5	2.15	2.25	1.26	8.1	1.90	4.2	1.80	1.56	1.60
27	3.3	12.2	7.2	2.05	2.05	2.2	6.0	2.65	4.6	1.80	1.52	1.80
28	3.0	8.2	6.1	1.97	1.96	2.05	5.4	2.25	4.0	1.75	1.50	3.0
29	2.9	5.3	5.0	1.97	1.96	1.96	4.1	2.1	3.8	1.72	1.48	3.7
30	7.5	.....	8.0	2.8	1.88	1.96	3.6	2.0	3.4	1.70	1.42	4.2
31	5.4	.....	6.3	.....	1.76	.....	3.05	1.90	.....	1.60	.....	6.5

NOTE.—Relation of gage height to discharge affected by ice about Jan. 4–19 and about Feb. 2–20. Observer reported ice 10 inches thick Jan. 13 and 7 inches thick Feb. 11.

Daily discharge, in second-feet, of West Fork River at Enterprise, W. Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,420	1,600	1,030	2,650	566	127	212	737	395	441	99	64
2	3,250	.....	829	1,530	514	114	176	514	350	350	83	64
3	1,600	.....	649	4,520	489	102	158	328	307	30	81	62
4	.....	.....	540	2,850	465	74	146	208	286	30	99	155
5	.....	.....	395	2,360	441	73	136	155	227	190	99	246
6	.....	.....	350	1,920	372	59	130	124	162	124	89	707
7	.....	.....	307	1,380	395	59	127	124	130	109	124	2,750
8	.....	.....	266	1,160	489	48	114	122	124	99	829	1,760
9	.....	.....	1,300	861	465	48	116	122	99	89	1,530	707
10	.....	.....	959	737	441	48	172	116	83	79	893	395
11	.....	.....	707	649	418	48	155	116	64	79	395	350
12	.....	.....	540	514	328	48	140	116	64	76	266	266
13	.....	.....	7,550	514	350	42	124	116	67	72	227	190
14	.....	.....	6,460	489	286	34	112	114	58	64	227	172
15	.....	.....	9,900	489	246	28	133	112	53	64	220	155
16	.....	.....	10,400	3,360	246	28	89	112	52	52	197	124
17	.....	.....	6,460	1,530	1,090	73	328	112	52	99	172	124
18	.....	.....	3,460	1,300	1,530	372	172	172	52	89	155	155
19	.....	.....	1,380	861	1,160	372	140	3,780	48	64	155	190
20	6,700	.....	2,010	678	992	350	798	2,180	45	52	140	227
21	3,670	4,630	6,320	649	798	307	678	1,230	44	58	124	208
22	1,380	9,520	4,850	514	678	286	1,380	465	266	52	124	162
23	1,530	3,360	4,960	441	566	266	3,780	286	489	43	112	155
24	1,230	1,680	3,670	372	540	465	1,090	246	3,780	36	104	143
25	1,090	1,230	6,700	307	418	395	16,300	208	2,650	190	99	124
26	959	1,380	4,740	286	328	48	5,400	190	1,530	155	91	99
27	893	10,400	4,420	246	246	307	3,150	514	1,840	155	83	155
28	707	5,510	3,250	216	212	246	2,550	328	1,380	140	79	707
29	649	2,460	2,180	216	212	212	1,450	266	1,230	130	76	1,160
30	4,740	.....	5,290	593	183	212	1,090	227	959	124	67	1,530
31	2,550	.....	3,460	.....	143	.....	737	190	.....	99	.....	3,670

NOTE.—Daily discharge determined from a rating curve that is well defined between 0 and 2,180 second-feet (gage heights 0.0 to 5.0 feet) and fairly well defined above 2,270 second-feet (gage height 5.1 feet).

Discharge Jan. 4–19 and Feb. 2–20, estimated, because of ice, from gage heights, observer's notes, climatologic records, and discharge of adjacent drainage areas, as follows: Jan. 4–19, 1,000 second-feet; Feb. 2–20, 850 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of West Fork River at Enterprise, W. Va., for 1912.

[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.		
January	.....	.....	1,660	2.21	2.55	D.
February	10,400	.....	2,000	2.67	2.88	D.
March	10,400	266	3,400	4.53	5.22	C.
April	4,520	216	1,140	1.52	1.70	A.
May	1,530	143	503	.671	.77	A.
June	465	28	163	.217	.24	A.
July	16,300	89	1,330	1.77	2.04	A.
August	3,780	112	440	.587	.68	A.
September	3,780	44	563	.751	.84	A.
October	441	30	111	.148	.17	A.
November	1,530	67	235	.313	.35	A.
December	3,670	62	548	.731	.84	A.
The year	16,300	.....	1,010	1.35	18.28	

NOTE.—See footnotes to table of daily discharge.

ELK CREEK NEAR CLARKSBURG, W. VA.

Location.—At a footbridge about 6 miles above the mouth of the creek and 300 feet above Turkey Run, near Clarksburg, W. Va.

Records available.—October 11, 1910, to December 31, 1912.

Drainage area.—107 square miles (Pittsburgh Flood Commission).

Gage.—Wooden staff gage (during 1912) fastened to a tree near right abutment of footbridge. On November 1, 1913 (before the preparation of this report), a metal gage section (0 to 3 feet) was attached to the old gage, and the gage was then lowered 1.0 foot to avoid negative readings. The elevation above sea level of the zero of the gage is 955.01 feet. See "Accuracy."

Channel.—Rocky and practically permanent. Banks are high and do not overflow.

Discharge measurements.—Made from footbridge at high stages; low-water measurements made by wading at section about 200 feet below bridge.

Floods.—Flood of July, 1912, reached a height of 15 feet on present gage.

Point of zero flow.—Gage height at which flow past the gage will cease is about 0.9 foot, as determined August 30, 1912.

Winter flow.—Records may be affected by ice for short periods in December, January, and February.

Accuracy.—On November 1, 1913 (before the preparation of this report), when the gage was lowered 1.0 foot as noted above, the old gage was found to be inclined a sufficient amount to cause errors in readings taken from the upper portion of the gage. The gage was reset in a vertical position. It is not known how long the gage was in this inclined condition, and no corrections have been applied to gage heights prior to December 31, 1912. All gage heights published in this report refer to the new datum and are therefore 1.0 foot greater than those published in the report of the Pittsburgh Flood Commission.

Cooperation.—This station was established by the Pittsburgh Flood Commission. The station was taken over by the United States Geological Survey on July 1, 1912. Records previous to this date were obtained from the commission.

Discharge measurements of Elk Creek near Clarksburg, W. Va., in 1910–1912.

Date.	Hydrographer.	Gage height.[a]	Discharge.
		Feet.	*Sec.-ft.*
1910. Oct. 11	H. P. Drake[b]	1.48	8.7
1912. Aug. 28	C. T. Bailey	2.25	[c] 84

[a] Referred to new datum.
[b] An engineer of the Pittsburgh Flood Commission.
[c] Measurement made by wading at section about 400 feet below the gage.

Daily gage height, in feet, of Elk Creek near Clarksburg, W. Va., for 1910–1912.

[E. H. Smith, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1910.				1910.				1910.			
1	.....	1.5	2.3	11	1.5	1.5	2.1	21	1.5	1.4	2.5
2	.....	1.6	2.1	12	1.4	1.5	2.1	22	1.7	1.5	2.3
3	.....	1.6	2.0	13	1.4	1.5	2.0	23	1.7	1.5	2.1
4	.....	1.6	1.9	14	1.4	1.5	1.9	24	1.6	1.5	4.2
5	.....	1.6	1.9	15	1.4	1.5	2.1	25	1.5	1.5	3.1
6	.....	1.6	2.0	16	1.4	1.5	2.0	26	1.5	1.6	2.6
7	.....	1.6	2.3	17	1.4	1.5	1.9	27	1.5	1.6	2.3
8	.....	1.5	2.3	18	1.4	1.5	1.9	28	1.5	2.4	2.2
9	.....	1.5	2.2	19	1.4	1.5	2.8	29	1.5	3.7	2.4
10	.....	1.5	2.2	20	1.4	1.5	2.9	30	1.6	2.7	3.5
								31	1.6	.....	3.2

Daily gage height, in feet, of Elk Creek near Clarksburg, W. Va., for 1910–1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	2.8	2.9	2.2	2.9	2.0	1.5	1.4	1.0	3.3	2.2	1.8	2.3
2	3.2	2.8	2.2	2.8	2.3	1.5	1.4	1.0	2.5	4.7	1.8	2.2
3	3.5	2.6	2.1	2.7	2.1	1.5	1.3	1.0	2.1	4.7	1.7	2.1
4	3.4	2.6	2.0	3.8	1.9	1.4	1.3	1.1	2.0	3.0	1.7	2.1
5	2.8	2.6	2.0	4.8	1.9	1.4	1.3	1.1	2.0	2.7	1.7	2.1
6	2.8	2.5	2.1	3.6	1.8	1.4	1.2	1.1	2.0	2.3	1.7	2.0
7	2.5	2.6	2.6	3.2	1.8	1.4	1.2	1.1	2.0	2.8	3.3	2.0
8	2.5	2.5	3.4	3.2	1.7	1.3	1.3	1.1	1.9	4.7	2.6	2.0
9	2.8	2.5	3.8	4.7	1.7	1.3	1.4	1.0	1.9	3.1	2.4	2.0
10	2.5	2.5	3.2	3.4	1.7	1.3	1.4	1.0	2.1	2.7	2.2	1.9
11	2.4	2.3	2.8	2.8	1.7	1.3	1.3	1.0	3.4	3.7	2.0	1.9
12	2.3	2.2	2.6	2.5	1.6	1.3	1.3	.9	2.8	3.1	2.0	1.9
13	6.0	2.2	2.5	2.5	1.6	1.3	1.2	.9	2.5	2.7	2.5	1.9
14	4.7	2.1	2.8	2.4	1.6	1.6	1.2	.9	2.4	2.4	2.3	2.0
15	3.9	2.1	2.7	4.3	1.5	1.6	1.2	.9	6.0	2.7	2.3	2.9
16	3.7	2.0	2.5	3.1	1.5	1.6	1.1	.9	6.2	2.7	2.2	4.4
17	2.9	1.9	2.4	2.8	1.5	1.5	1.1	.9	4.0	2.6	2.1	3.4
18	2.6	2.0	2.4	2.5	1.5	2.7	1.1	.9	2.8	5.2	3.2	2.8
19	2.5	2.5	2.5	2.4	1.5	2.5	1.0	.9	2.4	3.4	3.0	2.4
20	2.4	2.9	3.5	3.0	1.4	2.1	1.0	.9	2.2	2.8	2.6	2.3
21	2.4	3.1	2.8	2.9	1.4	1.8	1.0	.8	2.1	2.5	2.4	2.8
22	3.8	2.9	2.6	2.8	1.4	1.7	1.0	.8	6.3	2.3	2.2	2.7
23	3.3	2.7	2.5	3.4	1.3	1.6	1.0	.8	3.1	2.3	2.1	2.6
24	2.8	2.6	2.3	2.9	2.2	1.6	.9	.8	2.5	2.2	2.3	2.5
25	2.4	2.6	2.2	2.6	1.9	1.5	1.1	.9	2.2	2.2	2.9	2.8
26	2.9	2.5	2.1	2.5	1.7	1.5	1.1	1.0	2.0	2.1	2.7	2.7
27	3.5	2.4	2.1	2.4	1.6	1.4	1.1	1.0	1.9	2.0	2.5	4.8
28	3.9	2.3	2.1	2.2	1.5	1.6	1.1	1.0	2.7	2.0	2.4	3.4
29	3.2	.....	2.0	2.1	1.4	1.5	1.1	1.1	2.4	1.9	2.4	2.7
30	8.1	.....	2.8	2.1	1.4	1.4	1.0	4.0	2.3	1.9	2.4	2.6
31	3.5	.....	3.1	.....	1.4	.....	1.0	4.9	.....	1.8	.....	3.5
1912.												
1	3.4	2.8	2.5	2.8	2.3	1.7	1.5	2.5	2.49	2.24	1.52	1.50
2	2.8	2.5	2.3	2.6	2.2	1.7	2.7	2.2	2.30	2.15	1.58	1.50
3	2.5	2.5	2.2	3.6	2.1	1.6	2.0	2.4	2.00	2.00	1.54	1.70
4	2.4	2.4	2.2	2.9	2.0	1.6	1.9	2.1	2.00	1.90	1.52	1.72
5	2.3	2.6	2.2	2.6	1.9	1.5	2.0	1.9	1.90	1.80	1.50	1.72
6	2.3	2.3	2.2	2.5	1.9	1.5	1.8	1.8	1.80	1.70	1.49	3.10
7	2.3	2.2	2.2	2.6	1.9	1.5	1.6	1.7	1.70	1.60	1.60	2.60
8	2.3	2.1	2.3	2.5	1.9	1.5	1.5	1.7	2.90	1.60	3.20	2.40
9	2.7	2.0	2.9	2.4	1.9	1.4	1.5	1.6	2.10	1.59	2.60	2.20
10	2.5	1.9	3.0	2.3	1.8	1.4	1.4	.....	1.83	1.58	2.10	2.00
11	2.3	1.9	2.6	2.2	1.8	1.4	1.4	.....	1.67	1.58	1.90	1.90
12	2.2	1.9	2.3	2.1	2.1	1.4	1.4	.....	1.60	1.57	1.82	1.80
13	2.2	1.9	5.8	2.0	2.5	1.3	1.4	.....	1.50	1.59	1.80	1.72
14	2.2	1.8	3.9	1.9	2.3	1.3	1.4	.....	1.50	1.60	1.82	1.64
15	2.1	1.8	4.8	1.9	2.2	1.3	1.3	.....	1.45	1.60	1.76	1.62
16	2.1	1.8	4.7	1.9	2.3	1.4	1.3	.....	1.60	1.59	1.72	1.65
17	2.1	1.8	3.4	1.9	2.8	2.1	1.3	.....	1.80	1.65	1.68	1.68
18	2.3	2.2	2.8	2.9	2.7	2.2	1.3	1.5	1.75	1.62	1.64	1.68
19	6.2	2.4	2.6	2.4	2.5	2.1	1.4	1.5	2.38	1.58	1.62	1.80
20	3.3	3.0	3.7	2.2	2.3	1.9	1.4	4.2	1.92	1.60	1.60	1.75
21	2.8	3.1	3.8	2.1	2.1	1.8	2.0	3.2	1.73	1.60	1.59	1.70
22	2.5	5.0	4.3	2.0	2.0	1.7	3.3	2.3	1.60	1.58	1.58	1.64
23	2.5	3.2	3.3	2.0	1.9	1.6	3.0	2.2	2.10	1.87	1.58	1.60
24	2.5	2.7	4.9	1.9	1.8	1.5	2.1	2.1	3.75	1.80	1.57	1.60
25	2.5	2.5	3.9	1.9	1.7	1.5	15.0	1.9	2.95	1.70	1.56	1.60
26	2.6	3.4	3.4	1.8	1.6	1.5	3.2	1.9	2.48	1.75	1.55	1.60
27	2.3	5.0	3.0	2.3	1.5	1.6	2.5	3.0	2.70	1.72	1.54	1.90
28	2.3	3.0	2.6	2.3	1.5	1.6	2.2	2.4	2.38	1.68	1.53	2.80
29	2.5	2.7	3.4	2.2	1.6	1.5	2.0	2.0	2.68	1.65	1.52	2.78
30	3.8	.....	3.7	2.2	1.9	1.5	2.3	1.9	2.61	1.62	1.51	3.20
31	3.1	.....	3.1	.....	1.8	.....	2.3	1.8	.....	1.56	.....	4.30

NOTE.—Daily gage heights Oct. 11, 1910, to Dec. 31, 1911, obtained from the published report of the Pittsburgh Flood Commission. See "Gage," "Accuracy," and "Cooperation" in station description.

BUFFALO CREEK AT BARRACKVILLE, W. VA.

Location.—At iron highway bridge about one-third mile above the covered wooden bridge at Barrackville, W. Va., 2¾ miles from Fairmont, and about 4 miles above mouth of creek.

Records available.[1]—June 3, 1907, to December 31, 1908, when station was discontinued because the creek goes dry in summer.

Estimates of discharge.—For the purpose of obtaining data to make estimates of discharge from the gage-height record June 3, 1907, to December 31, 1908, the station was visited by C. T. Bailey, August 31, 1912, and the following discharge measurement made by wading at a section about 50 feet above the highway bridge: Gage height 0.96 foot; discharge 6.3 second-feet. The sea-level elevation of the zero of the gage was determined by wye levels from Baltimore & Ohio Railroad's permanent bench mark to be 884.40 feet, and the elevation of the bench marks and reference point at the gaging station was checked. The high water of July, 1912, reached a stage of approximately 16 feet referred to the gage datum. Levels on August 31, 1912, indicated that there would be no flow past the gage if the stream were to fall to a stage of 0.6 foot ±0.1 foot, referred to gage datum.

CHEAT RIVER NEAR MORGANTOWN, W. VA.

Location.—At highway bridge at Uneva, W. Va., 7 miles northeast of Morgantown and 10 miles above mouth of river. Parallel of latitude 39° 40′ crosses the river at this bridge.

Records available.—July 8 to December 30, 1899; July 1 to December 29, 1900; August 21, 1902, to December 31, 1905; November 18, 1908, to December 31, 1912.

Drainage area.—1,380 square miles.

Gage.—Standard chain gage attached to bridge.[2]

Channel.—Probably permanent.

Discharge measurements.—Made from upstream side of bridge or, at low water, by wading.

Winter flow.—Ice forms sometimes to a thickness of several inches and large ice jams may affect the relation of gage height to discharge during short periods in December, January, and February.

Accuracy.—This station was not inspected by United States Geological Survey engineers during 1910, 1911, and 1912. On November 3 and 4, 1913 (before the publication of this report), the station was visited by engineers of the Survey, the bench marks and elevation of the zero of the gage were checked with a wye level and two discharge measurements were made. A new discharge curve above 3,620 second-feet has been drawn for 1912. Discharge values above 7,000 second-feet, of which there are relatively few, published in previous reports are in error from 10 to 20 per cent referred to the 1912 rating table, because of what now appears to have been an erroneous extension of the rating curve based upon the discharge measurement made June 9, 1906, the published values being too low by these amounts and the percentage error increasing with the stage. Those using the back records for this station should revise them by means of the rating table here published. For use with gage heights 1902–1909, published in Water-Supply Paper 263, the table must be converted to refer to the second staff gage by using the table of relation of gages published in Water-Supply Paper 263, page 51.

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[1] See Water-Supply Paper 243, pp. 55–56.

[2] See history of this station in Water-Supply Papers 263 and 283.

The new discharge rating table differs from the table used 1902 to 1911 above 3,620 second-feet only, the change being based on 4 discharge measurements made during 1912 and January, 1913 (before the preparation of this report), by H. P. Drake, an engineer of the West Virginia Development Co. of Pittsburgh, Pa. The curve is well defined between discharges 115 and 47,800 second-feet. The two discharge measurements made November 3 and 4, 1913, verify the new curve.

Discharge measurements of Cheat River near Morgantown, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 22	H. P. Drake[a]	8.18	22,800
July 25	do	12.27	42,300

[a] An engineer of the West Virginia Development Co. of Pittsburgh, Pa.

Daily gage height, in feet, of Cheat River near Morgantown, W. Va., for 1912.

[C. F. Baker, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.7	4.45	4.5	4.9	4.25	2.75	3.85	4.4	3.75	3.7	2.9	2.55
2	5.4	4.1	4.0	4.6	4.15	2.65	3.55	4.2	5.0	3.55	2.9	2.65
3	4.7	3.75	3.9	5.2	3.85	2.6	3.25	3.9	4.4	3.35	2.85	3.2
4	4.35	3.3	3.65	5.1	3.7	2.65	3.8	3.7	3.95	3.2	2.85	3.3
5	4.05	2.95	3.45	4.5	3.5	2.6	4.8	3.3	3.6	3.05	2.75	3.35
6	3.65	3.15	4.4	4.3	3.4	2.5	5.0	3.25	3.35	3.0	2.75	3.5
7	3.3	2.95	3.3	4.05	3.45	2.5	4.1	3.15	3.15	2.9	.....	5.0
8	3.1	2.95	3.35	4.05	3.6	2.5	3.55	3.05	3.1	2.8	6.9	4.4
9	3.35	2.65	4.0	4.1	4.15	2.6	3.3	3.0	2.95	2.75	5.4	3.95
10	3.2	.....	4.3	3.85	3.85	2.4	3.2	3.05	2.85	2.75	4.5	3.65
11	3.1	2.55	3.95	3.7	3.6	2.35	3.1	3.05	2.7	2.7	4.05	3.45
12	3.05	2.65	3.8	3.6	3.6	2.25	4.0	3.1	2.65	2.6	3.9	3.35
13	3.0	2.75	4.15	3.5	6.2	2.15	3.85	3.0	2.65	2.6	3.65	3.2
14	2.9	2.85	5.0	3.5	5.6	2.15	3.45	2.9	2.65	2.6	3.65	3.15
15	2.9	2.9	7.8	3.5	4.7	2.2	3.3	3.35	2.55	2.55	3.6	3.2
16	2.85	.....	9.3	3.45	6.0	2.5	4.0	3.2	2.6	2.5	3.5	3.15
17	2.8	2.7	6.3	3.85	7.5	3.0	4.5	3.1	2.65	2.45	3.35	3.1
18	2.95	2.75	5.4	4.6	5.7	3.65	4.5	2.9	3.25	2.45	3.25	3.0
19	.....	3.05	5.0	4.8	5.0	4.4	7.2	3.05	3.3	2.45	3.2	3.05
20	5.6	3.95	6.1	4.25	4.45	4.3	5.0	3.95	3.2	2.5	3.1	3.15
21	4.7	9.2	9.4	3.95	4.05	4.05	4.9	3.95	2.9	2.45	3.05	3.1
22	4.15	8.8	8.3	3.75	3.8	3.6	7.7	3.6	2.8	2.6	2.95	3.1
23	4.0	6.6	6.2	3.7	3.55	3.65	6.0	3.6	3.3	2.65	2.9	2.85
24	4.0	5.5	7.1	3.7	3.4	3.9	8.7	3.35	6.1	2.85	2.9	.....
25	3.85	4.2	7.0	3.6	3.35	3.7	12.0	3.2	6.2	3.95	2.9	2.8
26	3.65	5.7	5.8	3.45	3.1	3.9	7.2	3.25	5.3	3.9	2.85	2.8
27	3.65	9.9	5.0	4.2	3.0	3.65	5.3	3.25	5.4	3.65	2.8	2.85
28	3.4	6.6	4.5	4.35	2.95	3.5	4.5	3.4	4.5	3.45	2.7	3.1
29	3.45	5.2	5.0	4.1	2.9	3.5	4.3	3.6	4.1	3.25	2.65	3.25
30	5.7	.....	6.9	4.2	3.05	4.8	6.2	4.15	3.9	3.1	2.6	4.05
31	5.1	.....	5.7	.....	2.9	.....	4.9	3.85	.....	3.0	.....	6.9

NOTE.—Relation of gage height to discharge probably not materially affected by ice during 1912. The observer reported ice averaging from 1 to 8 inches in thickness Jan. 4–19 and from 1 to 6 inches from Feb. 4–21, but the river was entirely frozen over only on Jan. 17 and 18 and the control was reported open at all times. The ice went out Jan. 19 and during the night of Feb. 21.

Daily discharge, in second-feet, of Cheat River near Morgantown, W. Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	15,700	4,510	4,700	6,500	3,790	668	2,580	4,320	2,320	2,200	805	512
2	9,040	3,300	3,000	5,110	3,460	585	1,840	3,620	7,000	1,840	805	585
3	5,550	2,320	2,710	8,020	2,580	545	1,260	2,710	4,320	1,430	758	1,180
4	4,140	1,340	2,080	7,510	2,200	585	2,450	2,200	2,860	1,180	758	1,340
5	3,150	860	1,620	4,700	1,730	545	6,020	1,340	1,960	980	668	1,430
6	2,080	1,120	4,320	3,960	1,520	480	7,000	1,260	1,430	915	668	1,730
7	1,340	860	1,340	3,150	1,620	480	3,300	1,120	1,120	805	[a]8,680	7,000
8	1,040	860	1,430	3,150	1,960	480	1,840	980	1,040	710	16,700	4,320
9	1,430	585	3,000	3,300	3,460	545	1,340	915	860	668	9,040	2,860
10	1,180	548[a]	3,960	2,580	2,580	425	1,180	980	758	668	4,700	2,080
11	1,040	512	2,860	2,200	1,960	400	1,040	980	625	625	3,150	1,620
12	980	585	2,450	1,960	1,960	352	3,000	1,040	585	545	2,710	1,430
13	915	668	3,460	1,730	13,100	310	2,580	915	585	545	2,080	1,180
14	805	758	7,000	1,730	10,100	310	1,620	805	585	545	2,080	1,120
15	805	805	21,300	1,730	5,550	330	1,340	1,430	512	512	1,960	1,180
16	758	[a]715	28,900	1,620	12,100	480	3,000	1,180	545	480	1,730	1,120
17	710	625	13,600	2,580	19,800	915	4,700	1,040	585	452	1,430	1,040
18	860	668	9,040	5,110	10,600	2,080	4,700	805	1,260	452	1,260	915
19	[a]5,480	980	7,000	6,020	7,000	4,320	18,200	980	1,340	452	1,180	980
20	10,100	2,860	12,600	3,790	4,510	3,960	7,000	2,860	1,180	480	1,040	1,120
21	5,550	28,400	29,400	2,860	3,150	3,150	6,500	2,860	805	452	980	1,040
22	3,460	26,400	23,800	2,320	2,450	1,960	20,800	1,960	710	545	860	1,040
23	3,000	15,200	13,100	2,200	1,840	2,080	12,100	1,960	1,340	585	805	758
24	3,000	9,550	17,700	2,200	1,520	2,710	25,900	1,430	12,600	758	805	[a]734
25	2,580	3,620	17,200	1,960	1,430	2,200	42,700	1,180	13,100	2,860	805	710
26	2,080	10,600	11,100	1,620	1,040	2,710	18,200	1,260	8,530	2,710	758	710
27	2,080	32,000	7,000	3,620	915	2,080	8,530	1,260	9,040	2,080	710	758
28	1,520	15,200	4,700	4,140	860	1,730	4,700	1,520	4,700	1,620	625	1,040
29	1,620	8,020	7,000	3,300	805	1,730	3,960	1,960	3,300	1,260	585	1,260
30	10,600	.....	16,700	3,620	980	6,020	13,100	3,460	2,710	1,040	545	3,150
31	7,510	.....	10,600	.....	805	.....	6,500	2,580	.....	915	.....	16,700

[a] Interpolated.

NOTE.—See "Accuracy" in station description.

Monthly discharge of Cheat River near Morgantown, W. Va., for 1912.

[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	15,700	710	3,550	2.57	2.96	C.
February	32,000	512	6,020	4.36	4.70	C.
March	29,400	1,340	9,510	6.89	7.94	A.
April	8,020	1,620	3,480	2.52	2.81	A.
May	19,800	805	4,110	2.98	3.44	A.
June	6,020	310	1,510	1.09	1.22	A.
July	42,700	1,040	7,710	5.59	6.44	A.
August	4,320	805	1,710	1.24	1.43	A.
September	13,100	512	2,940	2.13	2.38	A.
October	2,860	452	1,010	.732	.84	B.
November	16,700	545	2,320	1.68	1.87	A.
December	16,700	512	2,020	1.46	1.68	A.
The year	42,700	310	3,820	2.77	37.71	

NOTE.—See "Accuracy" in station description.

Rating table for Cheat River at chain gage near Morgantown, W. Va., for 1912.[a]

Gage height.	Discharge.	Difference.	Gage height.	Discharge.	Difference.	Gage height.	Discharge.	Difference.	Gage height.	Discharge.	Difference.
Feet.	*Sec.-feet.*	*Sec.-feet.*	*Feet.*	*Sec.-feet.*	*Sec.-feet.*	*Feet.*	*Sec.-feet.*	*Sec.-feet.*	*Feet.*	*Sec.-feet.*	*Sec.-feet.*
1.50	115	25	3.80	2,450	260	6.10	12,610	510	8.40	24,340	510
1.60	140	25	3.90	2,710	290	6.20	13,120	510	8.50	24,850	510
1.70	165	25	4.00	3,000	300	6.30	13,630	510	8.60	25,360	510
1.80	190	30	4.10	3,300	320	6.40	14,140	510	8.70	25,870	510
1.90	220	35	4.20	a3,620	340	6.50	14,650	510	8.80	26,380	510
2.00	255	35	4.30	3,960	360	6.60	15,160	510	8.90	26,890	510
2.10	290	40	4.40	4,320	380	6.70	15,670	510	9.00	27,400	510
2.20	330	45	4.50	4,700	410	6.80	16,180	510	9.10	27,910	510
2.30	375	50	4.60	5,110	440	6.90	16,690	510	9.20	28,420	510
2.40	425	55	4.70	5,550	470	7.00	17,200	510	9.30	28,930	510
2.50	480	65	4.80	6,020	480	7.10	17,710	510	9.40	29,440	510
2.60	545	80	4.90	6,500	500	7.20	18,220	510	9.50	29,950	510
2.70	625	85	5.00	7,000	510	7.30	18,730	510	9.60	30,460	510
2.80	710	95	5.10	7,510	510	7.40	19,240	510	9.70	30,970	510
2.90	805	110	5.20	8,020	510	7.50	19,750	510	9.80	31,480	510
3.00	915	130	5.30	8,530	510	7.60	20,260	510	9.90	31,990	510
3.10	1,045	140	5.40	9,040	510	7.70	20,770	510	10.00	32,500	5,100
3.20	1,185	155	5.50	9,550	510	7.80	21,280	510	11.00	37,600	5,100
3.30	1,340	180	5.60	10,060	510	7.90	21,790	510	12.00	42,700	5,100
3.40	1,520	210	5.70	10,570	510	8.00	22,300	510	13.00	47,800	5,100
3.50	1,730	225	5.80	11,080	510	8.10	22,810	510	14.00	52,900	5,100
3.60	1,955	245	5.90	11,590	510	8.20	23,320	510	15.00	58,000	.....
3.70	2,200	250	6.00	12,100	510	8.30	23,830	510			

[a] Below gage height 4.2 feet this table is the same as the 1910–11 table. This table applies to all years, 1902–1912, with proper change of gage heights, 1902–1909 by curve of relation as explained in Water-Supply Paper 263, pp. 51–62, and Water-Supply Paper 283, pp. 50–53. See "Accuracy."

NOTE.—The above table is not applicable for periods during which ice existed or the channel was obstructed. It is based on 21 discharge measurements made during 1902–1913 and the curve is well defined between gage heights 1.5 and 13.0 feet. Above gage height 5.0 feet the rating curve is a tangent, the difference being 510 per tenth.

Use this table to three significant figures only.

SHAVERS FORK RIVER AT PARSONS, W. VA.

Location.—At steel highway bridge 600 feet northwest of the railroad station at Parson, W. Va., one-third mile above its confluence with Dry Fork.

Records available.—October 14, 1910, to December 31, 1912. Established October 14, 1910, as a Pittsburgh Flood Commission station and was maintained by them until taken over by the United States Geological Survey July 1, 1912.

Drainage area.—210 square miles. (Pittsburgh Flood Commission.)

Gage.—Standard chain gage attached to bridge. Datum unchanged. The elevation above sea level of the zero of the gage is 1,631.70 feet.

Channel.—Rocky; probably permanent.

Discharge measurements.—Made from downstream side of bridge or, at low stages, by wading.

Floods.—High waters of 1888 and 1907 reached a height of approximately 12.5 feet referred to the present gage datum.

Point of zero flow.—Levels run September 4, 1912, indicate that there would be no flow past the gage were the river to fall to a stage of 1.8 feet ± 0.2 foot.

Winter flow.—Affected by ice during severe winters.

Accuracy.—Most of the discharge measurements at this station were made by the subsurface method and the coefficients used in computing them vary from 0.88 to 0.95; measurements made this way are not considered by the Survey engineers to be as accurate as those made by the six-tenths or two-tenths and eight-tenths methods. Estimates of daily and monthly discharge are withheld from publication for the present because values computed from data now available appear to be excessive. The gage-height record is not thoroughly reliable as noted in the footnote to the table of daily gage height. Anyone using these data should do so with caution and should compare any estimates of discharge made with those for other gaging stations in the locality and with records of precipitation.

Discharge measurements of Shavers Fork River at Parsons, W. Va., in 1910–1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
1910.		*Feet.*	*Sec.-ft.*	1912.		*Feet.*	*Sec.-ft.*
Oct. 14	H. P. Drake[a]	2.89	76	July 20	H. P. Drake[a]	4.41	[b]1,110
				20	do	4.37	1,070
1911.				22	do	8.02	[b]7,740
Oct. 13	H. P. Drake[a]	4.22	958	Aug. 22	do	3.32	[b]196
Dec. 12	do	3.40	[b]312	22	do	3.32	[b]195
				Sept. 4	C. T. Bailey	3.05	117
				Dec. 24	H. P. Drake[a]	3.18	[b]144

[a] An engineer of the Pittsburgh Flood Commission.
[b] Velocity determined by subsurface method and coefficient used to reduce subsurface to mean velocity.

Daily gage height, in feet, of Shavers Fork River at Parsons, W. Va., for 1910–1912.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1910.				1910.				1910.			
1		2.97	4.54	11		2.97	3.14	21	2.89	2.77	2.94
2		2.97	3.54	12		2.97	3.14	22	2.89	2.87	3.04
3		3.07	3.54	13		2.97	3.14	23	3.10	2.87	3.14
4		2.97	3.74	14	2.89	2.77	2.94	24	3.20	2.87	3.74
5		2.97	3.54	15	2.89	2.97	2.94	25	3.00	2.97	3.74
6		3.07	3.24	16	2.80	2.97	2.94	26	3.00	3.77	3.54
7		2.97	3.24	17	2.89	2.77	2.94	27	3.00	3.57	3.24
8		2.97	3.14	18	2.89	2.87	2.94	28	3.00	3.67	3.24
9		2.97	2.94	19	2.80	2.87	3.14	29	3.03	4.87	3.84
10		2.97	3.04	20	2.89	2.87	3.04	30	3.01	3.97	5.94
								31	3.00		4.84

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	3.90	5.78	3.06	3.94	3.62	3.60	3.38	2.76	4.64	5.72	3.20	3.90
2	4.50	4.48	3.26	4.44	3.62	3.60	3.08	2.76	3.74	5.12	3.40	3.90
3	5.90	4.18	3.26	4.54	3.42	3.60	2.78	2.96	3.54	4.72	3.30	3.80
4	5.30	4.08	3.26	4.64	3.52	3.40	2.78	2.86	3.44	4.72	3.20	3.70
5	4.70	3.88	3.26	6.24	3.62	3.40	2.78	2.76	3.34	4.62	3.10	3.80
6	3.90	3.88	3.36	5.64	3.52	3.60	2.78	2.66	3.34	4.32	4.20	3.60
7	3.70	3.78	4.56	5.64	3.42	3.80	2.68	1.86	3.14	4.72	5.50	3.40
8	3.60	3.68	4.46	5.44	3.52	4.00	2.78	2.56	3.24	5.32	4.20	3.50
9	3.50	3.88	2.96	5.24	3.42	3.90	2.78	2.66	2.94	4.72	4.00	3.40
10	3.20	3.78	4.16	5.04	3.32	3.80	2.68	2.56	2.74	4.92	3.90	3.30
11	3.20	3.68	4.06	4.84	3.02	3.90	2.88	2.46	3.74	5.02	3.80	3.20
12	3.50	3.78	3.96	4.64	3.12	3.80	3.38	2.46	4.34	3.82	3.60	3.30
13	7.20	3.48	4.46	4.84	3.02	3.80	3.18	2.36	3.74	4.22	3.50	3.40
14	6.50	3.48	4.96	5.04	3.12	4.00	3.08	2.46	3.74	3.90	3.40	3.50
15	5.50	3.38	5.26	5.64	3.22	3.90	2.98	2.56	2.84	4.10	3.40	3.60
16	5.60	3.38	5.06	4.74	2.92	3.80	2.98	2.66	6.74	4.70	3.50	4.00
17	4.50	3.48	3.96	4.44	3.02	3.70	2.98	2.66	5.44	4.00	3.40	4.60
18	4.10	3.58	3.86	4.44	2.92	4.40	2.78	2.56	4.34	7.40	.....	4.20
19	3.90	3.48	4.06	4.04	2.82	4.00	2.88	2.56	3.74	5.00	.....	4.30
20	3.80	3.68	4.66	4.64	2.82	4.00	2.68	2.56	3.94	4.60	.....	4.20
21	3.60	3.58	4.46	4.84	2.92	3.80	2.78	2.66	4.04	4.20	.....	4.10
22	4.50	3.48	4.36	5.04	2.82	3.80	2.78	2.66	3.94	4.50	.....	3.70
23	4.50	3.20	4.06	4.84	1.92	3.70	2.98	2.86	3.84	4.60	.....	4.00
24	4.40	3.28	3.96	4.24	2.62	3.80	2.88	2.66	3.74	4.40	3.70	4.20
25	4.60	3.08	3.86	4.04	2.62	4.00	2.78	2.86	3.74	4.00	3.60	4.60
26	4.80	3.28	3.56	4.14	2.72	3.80	2.78	2.56	3.84	4.00	3.50	5.00
27	5.70	3.28	3.46	4.04	4.22	4.00	2.78	2.46	3.94	3.50	3.60	5.10
28	5.60	3.18	3.46	3.84	4.02	3.80	2.68	2.66	4.04	3.40	3.40	5.00
29	5.30	.....	3.66	4.04	3.82	3.70	2.58	2.86	3.94	3.30	3.30	4.90
30	9.90	.....	3.86	3.64	3.72	3.40	2.68	2.96	3.74	3.40	3.40	4.60
31	5.90	.....	4.06	.....	3.72	.....	2.88	6.36	.....	3.30	.....	5.00

Daily gage height, in feet, of Shavers Fork River at Parsons, W. Va., for 1910–1912—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1912.												
1	5.4	4.2	5.4	5.0	3.2	3.0	3.4	4.1	3.4	3.30	3.23	2.87
2	5.0	4.1	5.4	5.1	3.1	3.1	3.3	3.2	3.3	3.22	3.08	2.97
3	4.9	3.6	5.2	4.9	3.2	3.0	3.3	3.3	3.2	3.25	3.00	3.07
4	4.6	3.2	5.0	4.6	3.2	3.1	4.8	3.3	3.01	3.02	2.83	3.02
5	4.3	3.2	4.8	4.5	3.1	3.0	4.4	3.2	3.02	3.10	2.70	3.07
6	4.0	3.0	4.7	4.6	3.4	2.1	4.3	3.1	3.01	3.05	2.88	3.87
7	4.0	3.0	5.0	4.2	3.5	3.1	4.2	3.2	2.81	3.00	3.03	3.72
8	3.6	3.1	5.2	4.1	3.4	3.0	3.1	3.2	2.81	3.10	6.2	3.87
9	.....	3.0	5.3	4.0	3.3	2.1	3.6	3.2	2.72	2.95	6.0	3.77
10	.....	3.1	5.4	4.2	4.0	2.8	3.3	3.1	2.10	2.92	4.18	3.72
11	.....	3.2	5.2	4.1	3.8	2.8	3.3	3.0	2.01	2.85	3.98	3.57
12	.....	3.3	5.3	3.6	7.0	2.8	3.3	3.0	2.02	2.75	3.73	3.47
13	.....	3.2	4.6	3.4	6.3	2.6	3.5	3.1	2.03	3.00	3.78	3.42
14	.....	3.1	4.8	3.5	6.0	2.8	3.4	3.0	2.02	3.10	3.93	3.12
15	.....	3.0	5.3	3.4	5.8	2.8	4.2	3.0	2.82	2.85	3.78	3.02
16	.....	3.1	7.3	3.3	6.1	2.8	4.0	3.1	3.00	2.90	3.73	3.17
17	.....	3.0	.....	3.6	5.9	2.9	4.0	3.0	3.02	2.80	3.58	3.07
18	.....	3.2	.....	3.5	5.0	4.4	6.3	2.9	3.01	2.92	3.68	3.17
19	.....	3.5	.....	4.0	4.6	4.5	6.0	3.0	2.90	3.10	3.63	3.12
20	5.2	3.7	.....	4.0	4.0	4.6	4.4	3.1	3.02	2.95	3.48	3.07
21	5.3	3.8	.....	3.8	3.7	3.1	4.0	3.3	3.00	2.80	3.38	3.02
22	5.0	3.9	6.1	3.7	3.7	3.9	7.6	3.2	3.00	2.95	3.40	2.97
23	5.1	4.3	5.7	3.6	3.6	4.0	6.6	3.6	3.22	3.02	3.33	2.77
24	5.0	4.4	4.8	3.4	3.5	4.0	5.0	3.4	4.80	3.45	3.30	2.87
25	4.9	4.6	4.7	3.5	3.4	3.0	8.0	3.2	5.00	3.60	3.38	.....
26	4.8	6.1	4.7	3.6	3.2	3.1	4.2	3.4	4.05	3.55	3.33	.....
27	4.6	7.4	4.6	3.4	3.4	3.9	4.4	3.6	4.05	3.50	3.18	3.27
28	4.5	6.5	5.0	3.5	3.1	3.7	4.0	3.4	3.82	2.95	3.28	3.17
29	4.8	5.6	5.2	3.6	3.2	3.9	3.9	3.3	3.55	2.83	3.12	3.07
30	5.1	.....	6.0	3.5	3.1	3.6	4.2	3.3	3.42	3.30	2.87	5.15
31	4.8	.....	5.0	.....	3.1	.....	4.1	3.4	.....	3.25	.....	5.25

NOTE.—Gage heights Oct. 14, 1910, to Dec. 31, 1911, obtained from published report of the Pittsburgh Flood Commission. Gage heights for May 23, Aug. 7, 1911; June 6, 9, 21, and Sept. 10–14, 1912, appear to be 1.0 foot too low as result of errors in observations. Gage heights Mar. 9, 17, 18, Sept. 15, Oct. 12, 1911; June 25, 26, and July 8, 1912, may also be 1 foot too low. Gage heights at other times, such as Nov. 29, 1910, and Nov. 7, 1911, may be 1.0 foot too high. Two errors of a foot each during the fourth quarter of 1912 were found by correspondence with the observer. It appears, therefore, that this gage-height record is not thoroughly reliable.

Relation of gage height to discharge probably affected by ice about Dec. 3–23, 1910; Jan. 7–19, Feb. 5–20, and Dec. 25–31, 1912. During 1912 the observer reported river frozen over Jan. 9–19 and Dec. 25–26, "ice going out" Dec. 30, and "ice backing up" Dec. 31.

YOUGHIOGHENY RIVER AT CONFLUENCE, PA.

Location.—At highway bridge about half a mile from the railroad station at Confluence, Pa., and about half a mile above the mouth of Casselman River.

Records available.—September 15, 1904, to December 31, 1912.

Drainage area.—435 square miles.

Gage.—Chain gage attached to bridge; datum unchanged since established.

Channel.—Probably permanent.

Discharge measurements.—Made from upstream side of bridge.

Winter flow.—Relation of gage height to discharge is occasionally affected by ice.

Accuracy.—Discharge measurements made during 1911 and 1912 indicate marked effect from backwater at this station, and estimates of discharge are withheld until this effect can be more fully investigated. For a statement of general conditions at this station see Water Supply Papers 263 and 283.

Cooperation.—This station is now maintained by the Water Supply Commission of Pennsylvania, which supplied all records for 1912.

The following discharge measurement was made by R. A. Boehringer, an engineer of the Water Supply Commission of Pennsylvania:

December 4, 1912: Gage height, 2.50 feet; discharge, 414 second-feet.

Daily gage height, in feet, of Youghiogheny River at Confluence, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.80	4.30	4.00	4.50	4.05	2.30	4.15	3.39	2.93	3.12	2.16	2.01
2	4.80	4.20	3.70	4.30	3.90	2.20	3.85	3.04	4.83	2.92	2.16	2.06
3	4.05	4.20	3.50	4.20	3.70	2.10	3.70	2.84	5.43	2.77	2.11	2.56
4	3.70	4.15	3.25	4.10	3.65	2.00	3.65	2.69	4.73	2.62	2.11	2.46
5	3.40	4.10	3.10	3.85	3.45	2.05	3.90	2.59	4.33	2.52	2.06	2.41
6	3.15	4.05	3.00	3.85	3.35	1.95	3.50	2.49	4.03	2.42	2.06	3.80
7	3.00	4.00	3.00	3.70	3.30	1.95	3.05	2.44	3.83	2.32	3.61	3.90
8	2.95	3.70	3.20	3.60	3.10	1.95	2.80	2.39	3.53	2.22	5.16	3.40
9	2.95	3.50	3.90	3.50	3.10	1.90	2.65	2.29	3.33	2.12	4.01	3.15
10	3.05	3.40	3.40	3.30	3.05	1.95	2.65	2.44	3.13	2.12	3.31	2.95
11	3.70	3.30	3.30	3.30	2.95	1.85	3.00	2.34	2.83	2.12	3.06	2.70
12	3.45	3.25	3.35	3.20	2.95	1.85	4.20	2.24	2.63	2.12	2.96	2.50
13	3.15	3.20	3.20	3.10	2.85	1.80	3.20	2.19	2.48	2.12	2.86	2.35
14	3.15	3.20	3.10	3.00	2.85	1.80	2.80	2.24	2.33	2.07	2.96	[a] 2.35
15	3.20	3.20	[b] 11.32	2.90	2.80	1.95	2.60	2.44	2.23	2.07	2.81	2.40
16	3.15	3.15	9.55	2.95	8.25	4.95	3.45	2.39	2.23	2.07	2.71	2.40
17	[c] 3.70	3.10	6.10	2.90	6.10	3.95	3.75	2.34	2.23	2.02	2.61	2.40
18	3.85	3.20	5.50	3.70	4.95	3.05	3.55	2.34	2.23	2.02	2.56	2.50
19	7.25	3.35	5.30	3.90	4.80	2.65	3.35	2.34	2.18	2.02	2.46	2.80
20	7.60	4.95	7.15	3.50	4.45	2.50	3.15	3.24	2.18	1.97	2.41	3.00
21	6.25	5.85	15.30	3.40	4.20	2.35	4.40	2.69	2.18	1.97	2.36	2.90
22	5.75	5.80	10.25	3.20	4.05	2.25	6.35	2.69	2.23	1.97	2.31	2.80
23	5.15	5.60	6.50	3.10	3.85	2.30	4.15	2.64	3.68	2.32	2.26	2.85
24	5.15	5.40	7.50	3.00	3.60	2.50	14.95	2.59	6.93	2.72	2.21	2.50
25	5.15	5.20	6.60	2.90	3.35	2.55	10.65	2.54	5.03	2.72	2.16	2.25
26	4.65	12.85	5.50	2.90	3.10	2.75	6.20	2.49	4.33	2.82	2.11	2.00
27	4.20	9.60	5.20	3.10	3.00	2.65	4.85	2.44	5.23	2.67	2.11	2.10
28	3.85	6.00	4.90	4.30	2.75	2.50	4.05	2.44	4.43	2.52	2.06	2.40
29	4.05	4.60	5.85	4.00	2.70	2.55	3.75	2.89	3.83	2.37	2.01	2.65
30	4.20	.....	5.10	4.40	2.50	4.70	4.80	3.09	3.43	2.27	2.01	4.50
31	4.35	.....	4.80	.....	2.45	.....	3.70	2.94	.....	2.17	.....	5.70

[a] Ice formed along banks.
[b] Maximum 11.75 feet during night of Mar. 15.
[c] Ice gorge at Casselman River, causing backwater.

CASSELMAN RIVER AT CONFLUENCE, PA.

Location.—At highway bridge about 500 yards from the railroad station and a few hundred yards above the junction of Casselman and Youghiogheny rivers.

Records available.—September 15, 1904, to December 31, 1912.

Drainage area.—450 square miles.

Gage.—Chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from upstream side of bridge.

Winter flow.—Relation of gage height to discharge is affected by ice at times.

Accuracy.—Estimates of discharge are withheld for the present. For a discussion of the general conditions at this station see Water Supply Papers 263 and 283.

Cooperation.—Station maintained by the Water Supply Commission of Pennsylvania, which furnished all records for 1912.

The following discharge measurement was made by R. A. Boehringer, an engineer of the Water Supply Commission of Pennsylvania:

December 4, 1912: Gage height, 2.48 feet; discharge, 429 second-feet.

Daily gage height, in feet, of Casselmen River at Confluence, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.89	6.20	3.20	3.85	4.00	2.30	3.25	2.60	3.00	3.80	2.20	2.10
2	4.04	6.00	2.90	3.70	3.85	2.20	2.90	2.50	4.50	3.50	2.20	2.20
3	3.64	5.60	2.75	3.55	3.70	2.10	2.80	2.40	7.20	3.10	2.15	2.60
4	3.34	5.30	2.65	3.45	3.60	2.00	2.70	2.35	4.70	2.90	2.15	2.40
5	3.04	5.10	2.60	3.30	3.50	2.00	2.70	2.30	4.10	2.70	2.15	2.40
6	2.84	4.90	2.55	3.20	3.40	1.95	3.05	2.25	3.90	2.60	2.10	3.25
7	2.64	4.80	2.50	3.10	3.30	1.95	2.75	2.25	3.80	2.50	4.10	3.10
8	2.54	5.00	2.60	3.00	3.10	1.95	2.55	2.20	3.55	2.40	4.35	2.80
9	2.49	5.40	3.20	2.90	3.00	1.90	2.40	2.10	3.40	2.30	3.40	2.55
10	2.44	5.20	2.85	2.85	2.95	1.90	2.35	2.30	3.25	2.30	3.20	2.40
11	2.54	5.10	2.60	2.80	2.90	1.85	2.50	2.20	2.95	2.30	3.00	2.30
12	2.54	5.00	2.60	2.75	2.85	1.85	2.40	2.15	2.75	2.25	2.80	2.20
13	2.59	4.90	2.55	2.70	2.85	1.80	2.30	2.10	2.65	2.25	2.70	2.15
14	2.59	4.90	2.50	2.65	2.80	1.80	2.20	2.20	2.55	2.20	2.90	[a]2.25
15	2.74	4.90	10.50	2.65	2.80	2.20	2.10	2.55	2.50	2.20	2.75	2.40
16	2.94	4.80	8.75	2.60	7.80	6.20	4.00	2.45	2.45	2.15	2.65	2.40
17	3.74	4.80	5.10	2.60	5.00	3.20	3.20	2.40	2.45	2.15	2.60	2.35
18	3.94	4.90	4.90	3.70	4.10	2.80	3.00	2.50	2.45	2.10	2.55	2.35
19	[b]8.89	5.30	4.75	3.30	3.90	2.70	2.80	2.60	2.40	2.10	2.50	2.65
20	8.94	6.85	7.00	3.00	3.75	2.60	2.70	4.50	2.40	2.05	2.45	2.60
21	7.94	7.10	17.00	2.75	3.60	2.50	4.40	3.65	2.35	2.05	2.40	2.40
22	7.54	7.00	9.60	2.75	3.50	2.45	6.00	3.55	2.40	2.05	2.35	2.25
23	[c]5.74	6.80	5.65	2.75	3.40	2.40	3.80	3.45	3.50	3.20	2.25	2.15
24	4.74	6.70	7.00	2.70	3.20	2.45	12.75	3.35	6.85	2.75	2.25	2.10
25	4.74	6.70	5.60	2.70	3.10	2.40	9.15	3.30	4.70	2.70	2.20	2.10
26	4.74	13.10	4.90	2.65	2.95	2.50	4.85	3.25	4.30	2.60	2.20	2.20
27	[d]5.14	9.90	4.70	2.70	2.80	2.35	3.70	3.20	5.30	2.55	2.15	2.20
28	6.54	4.85	4.60	3.60	2.60	2.25	3.20	3.15	4.80	2.45	2.15	2.30
29	7.34	3.60	5.60	3.30	2.60	2.40	3.10	3.45	4.40	2.35	2.10	2.35
30	6.74	.....	5.05	4.60	2.50	4.20	3.10	3.30	4.10	2.25	2.10	3.35
31	6.34	.....	4.05	.....	2.40	.....	2.75	3.10	.....	2.20	.....	4.70

[a] Ice along shores.
[b] Ice went out about 11 a. m. and gorged below the confluence, causing backwater.
[c] Channel open through gorge.
[d] Channel frozen and starting to gorge.

LAUREL HILL CREEK AT CONFLUENCE, PA.

Location.—At highway bridge about one-fourth mile from the railroad station and only a few hundred yards above the junction of the creek with Youghiogheny River.

Records available.—September 15, 1904, to December 31, 1912.

Drainage area.—126 square miles.

Gage.—Chain gage attached to bridge; datum unchanged.

Channel.—Shifts as result of refuse dumped into the creek from a tannery a short distance above the bridge.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Ice may affect the relation of gage height to discharge during short periods.

Accuracy.—Relation of gage height to discharge is affected by backwater from the Youghiogheny and by shift of channel at bridge. As a result the records of flow at this station are not so good as at the other two stations at Confluence. Estimates of discharge are withheld for the present. For a discussion of general conditions at this station, see Water Supply Papers 263 and 283.

Cooperation.—This station is now maintained by the Water Supply Commission of Pennsylvania, which furnished the records for 1912.

The following discharge measurement was made by R. A. Boehringer, an engineer of the Water Supply Commission of Pennsylvania:

December 4, 1912: Gage height, 2.17 feet; discharge, 147 second-feet.

Daily gage height, in feet, of Laurel Hill Creek at Confluence, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.80	2.90	3.10	3.15	3.55	2.09	2.83	2.41	2.80	2.88	2.27	1.87
2	3.30	2.80	2.80	3.15	3.40	2.04	2.43	2.31	4.40	2.68	2.27	1.97
3	3.05	2.80	2.70	3.05	3.30	1.94	2.43	2.21	6.65	2.53	2.22	2.32
4	2.90	2.75	2.55	3.00	3.20	1.89	2.33	2.11	4.40	2.43	2.17	2.02
5	2.70	2.70	2.45	2.90	3.20	1.89	2.63	2.01	4.00	2.38	2.12	2.20
6	2.60	2.65	2.45	2.85	3.05	1.84	2.48	1.96	3.70	2.28	2.12	3.00
7	2.50	2.65	2.40	2.85	2.95	1.84	2.33	1.96	3.60	2.23	3.27	2.80
8	2.50	2.65	2.50	2.75	2.90	1.84	2.23	1.91	3.40	2.13	3.47	2.55
9	2.45	2.60	3.10	2.80	2.85	1.79	2.18	1.91	3.20	2.03	2.83	2.40
10	2.40	2.60	2.65	2.70	2.85	1.79	2.13	1.91	3.05	2.03	2.72	2.30
11	2.20	2.60	2.50	2.70	2.75	1.74	2.23	1.91	2.70	2.03	2.62	2.15
12	2.20	2.55	2.60	2.70	2.70	1.74	2.13	1.86	2.60	2.03	2.52	2.05
13	2.20	2.55	2.50	2.65	2.70	1.74	2.03	1.86	2.50	2.03	2.42	1.95
14	2.10	2.55	2.50	2.65	2.65	1.74	1.98	2.11	2.40	1.98	2.57	[a]2.15
15	2.10	2.55	8.00	2.60	2.70	1.94	1.93	2.51	2.30	1.98	2.42	2.30
16	2.10	2.55	7.05	2.55	6.75	4.94	3.28	2.31	2.30	1.98	2.32	2.20
17	2.20	2.55	4.10	2.60	4.65	3.04	2.93	2.11	2.30	1.93	2.27	2.10
18	2.65	2.65	4.00	3.35	3.55	2.64	2.73	2.31	2.25	1.93	2.22	2.10
19	[b]4.30	2.80	3.80	3.10	3.40	2.54	2.53	2.51	2.25	1.88	2.22	2.60
20	5.00	3.65	5.15	2.85	3.30	2.44	2.53	3.66	2.25	1.88	2.17	2.40
21	4.00	3.65	14.40	2.70	3.15	2.39	3.93	3.56	2.25	1.83	2.12	2.25
22	3.45	3.60	7.20	2.75	3.05	2.44	4.63	3.41	2.40	1.83	2.12	2.15
23	3.20	3.30	4.15	2.70	3.00	2.34	3.13	3.31	5.15	3.23	2.07	2.05
24	3.20	3.15	5.00	2.70	2.90	2.19	9.93	3.21	5.80	2.93	2.07	2.05
25	3.15	3.10	4.20	2.65	2.85	2.14	6.18	3.11	4.25	2.88	2.02	2.00
26	3.15	9.25	3.80	2.60	2.65	2.29	3.58	3.01	4.00	2.83	2.02	2.00
27	3.10	9.55	3.50	2.70	2.45	2.24	3.13	2.91	4.90	2.73	1.97	2.00
28	3.10	4.00	3.40	3.45	2.35	2.19	2.93	2.91	3.80	2.63	1.92	2.05
29	3.00	3.50	4.05	3.20	2.25	2.29	2.83	3.21	3.30	2.53	1.92	2.20
30	3.00	.....	3.55	3.95	2.20	3.19	2.83	2.91	3.00	2.43	1.92	4.25
31	3.00	.....	3.40	.....	2.20	.....	2.53	2.81	.....	2.33	.....	3.55

[a] Ice along shores. [b] Backwater from ice gorge on Casselman River.

MUSKINGUM RIVER BASIN.

MUSKINGUM RIVER AT ZANESVILLE, OHIO.

Location.—At lower pool at Lock No. 10, Zanesville, Ohio, and 4,000 feet below the mouth of Licking River.

Records available.—June 4, 1887, to December 31, 1912. The United States Geological Survey began making measurements at this station in March, 1905.

Drainage area.—5,820 square miles.

Gage.—Staff gage in lower pool at Lock No. 10; datum probably unchanged since established.

Channel.—The crest of the dam at Lock No. 9, 9 miles below Lock No. 10, acts as a point of control for the gage. As the dams on the Muskingum are fixed dams, the relation between gage height and discharge would be permanent, and once determined would apply indefinitely if conditions at the dams remained unchanged. See notes under "Accuracy."

Discharge measurements.—Made from upstream side of Sixth Street Bridge, 1,000 feet above Lock No. 10.

Floods.—The maximum flood gage height, according to the United States Weather Bureau, was 36.8 feet March 24, 1898.

Point of zero flow.—The crest of dam No. 9 acts as a point of control except as the water may be drawn off by openings in the lock or leakage through the dam. The elevation of the crest is 7.0 feet, referred to gage datum.

Winter flow.—The relation of gage height to discharge is sometimes affected during the winter months by ice cover and occasionally by ice jams.

Artificial control.—The operation of two power plants at Dam No. 9 modifies the flow past the lower gage at Dam No. 10 to an unknown extent.

Accuracy.—Investigations and studies made during 1912 show that the records at this station are practically worthless as a means of making accurate determinations of discharge, because of leakage through Dam No. 9 prior to 1907 and the operation of the two power plants at Dam No. 9. All estimates of discharge previously published for this station should therefore be used with great caution, as they are in error an unknown amount; the lower the flow the greater the possible error.

Cooperation.—Gage readings are furnished by the United States Engineer Corps.

Discharge measurements of Muskingum River at Zanesville, Ohio, in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 5	P. S. Monk	20.64	39,000	May 4	C. T. Bailey	12.9	13,900
8	do	15.48	19,900	24	do	8.82	3,570
May 2	C. T. Bailey	15.9	22,300				

Daily gage height, in feet, of Muskingum River at Zanesville, Ohio, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	15.8	13.8	15.0	21.6	16.6	9.3	8.4	9.5	9.7	8.4	8.4	8.0
2	15.3	13.2	12.5	21.1	15.9	9.0	8.7	9.0	9.0	8.4	8.4	8.0
3	14.0	12.5	11.4	22.8	14.4	8.8	8.5	8.8	9.4	8.2	8.3	8.0
4	12.4	12.1	10.8	21.6	12.6	8.7	8.7	8.6	10.8	8.2	8.3	8.1
5	11.0	11.4	10.2	20.6	11.2	8.7	8.6	8.5	11.2	8.1	8.3	8.2
6	10.0	10.9	9.8	18.6	10.8	8.6	8.6	8.4	10.4	8.1	8.2	8.7
7	9.9	10.6	9.5	15.8	10.4	8.4	8.4	8.3	10.0	8.1	8.2	9.0
8	9.7	10.4	9.8	15.4	10.2	8.4	8.4	8.3	10.2	8.0	8.7	10.6
9	9.6	10.2	11.0	14.6	10.0	8.3	8.2	8.6	9.8	8.0	8.8	9.8
10	9.6	10.0	10.8	13.8	9.8	8.3	8.4	9.8	9.5	8.0	9.0	9.0
11	9.5	9.9	10.6	12.6	9.5	8.2	8.5	9.8	9.2	8.0	8.8	8.6
12	9.5	9.8	10.2	11.8	9.7	8.2	8.6	9.9	8.8	8.1	8.5	8.4
13	9.4	9.4	10.9	11.2	10.0	8.2	8.6	9.8	8.6	8.1	8.4	8.2
14	9.4	9.2	11.2	11.2	10.0	8.2	8.5	9.5	8.6	8.0	8.4	8.2
15	9.4	9.2	16.4	12.2	9.8	8.2	8.6	9.1	8.6	8.0	8.3	8.4
16	9.4	9.6	19.3	13.9	10.2	8.5	8.5	8.8	8.8	7.9	8.3	8.2
17	9.3	10.0	17.8	14.5	11.6	15.2	9.1	8.6	8.8	7.9	8.2	8.2
18	9.9	10.5	17.2	14.1	11.2	14.6	8.7	8.5	8.9	7.9	8.2	8.1
19	15.4	11.8	16.2	14.2	10.6	13.5	8.4	8.4	8.9	8.0	8.2	8.1
20	17.6	18.8	15.4	13.8	10.0	11.4	8.8	8.6	9.1	8.1	8.2	8.1
21	17.7	18.6	16.6	12.4	9.6	10.3	9.2	8.6	8.8	8.4	8.2	8.2
22	17.7	16.7	18.4	11.4	9.2	9.7	10.2	9.0	8.5	8.4	8.2	8.2
23	16.7	15.8	16.8	10.8	9.0	9.4	12.4	8.8	8.5	8.8	8.2	8.1
24	15.7	15.2	17.7	10.4	8.9	9.1	11.8	8.6	9.3	9.8	8.1	8.1
25	14.2	15.1	19.2	10.1	8.8	8.9	11.0	8.7	10.1	11.6	8.0	8.1
26	13.8	18.8	18.0	9.9	8.7	8.8	11.1	8.6	9.8	10.4	8.0	8.0
27	13.2	22.4	17.8	10.5	8.6	8.7	11.0	8.5	9.2	9.4	8.0	8.0
28	12.1	20.4	18.3	10.2	8.5	8.6	10.2	9.0	9.0	9.0	8.0	8.0
29	11.6	18.1	20.0	11.8	8.8	8.5	9.4	9.0	8.6	8.6	8.0	7.9
30	14.0	.....	22.2	15.2	9.6	8.5	9.4	8.8	8.6	8.6	8.0	8.4
31	13.8	.....	22.6	.....	9.6	.....	10.0	9.5	.....	8.5	.....	9.6

NOTE.—Daily gage heights are means of two readings per day furnished by United States Engineer Corps and therefore differ from those published by the United States Weather Bureau, which represent one reading each day. Relation of gage height to discharge probably affected by ice during a part of January and February.

MOHICAN RIVER BASIN.

MOHICAN RIVER AT POMERENE, OHIO.

Location.—At highway bridge at Pomerene, Ohio, 4 miles from Walhonding, Ohio, and 5 miles below the mouth of Owl Creek.

Records available.—December 1, 1910, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Coarse gravel; apparently permanent.

Discharge measurements.—Made from upstream side of bridge.

Winter flow.—The relation of gage height to discharge is sometimes affected by ice cover and ice gorges during the winter months.

Diversions.—A feeder for the Ohio Canal formerly took water from the river at Cavallo, some distance above Pomerene, but this feeder has not been in use for some time.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be made.

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

May 6, 1912: Gage height, 4.40 feet; discharge, 1,470 second-feet. This discharge measurement indicates a change in the relation of gage height to discharge.

Daily gage height, in feet, of Mohican River at Pomerene, Ohio, for 1912.

[F. L. Rodehaver, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.1	5.0	5.9	8.5	6.5	4.6	3.65	4.5	4.1	3.47	3.65	2.83
2	6.2	4.6	5.5	10.0	5.4	4.6	3.6	3.8	3.95	3.41	4.0	3.34
3	5.8	4.4	5.1	9.0	4.9	4.0	4.05	3.65	3.9	3.16	3.85	3.85
4	5.3	4.0	4.8	8.4	4.8	3.55	3.85	3.4	3.44	3.02	3.8	3.85
5	5.2	.....	4.5	7.4	4.6	3.55	3.85	3.37	3.25	2.97	3.75	3.85
6	5.2	.....	3.9	6.3	4.4	3.55	3.8	3.30	4.05	2.95	3.65	4.35
7	[a] 5.4	.....	3.8	7.0	4.3	3.5	3.75	3.27	3.75	2.96	4.05	4.8
8	[a] 5.5	.....	4.0	6.4	4.2	3.43	3.34	3.27	3.6	2.98	3.95	4.6
9	5.2	.....	5.1	5.9	4.05	3.22	3.43	3.25	3.6	3.25	3.85	4.15
10	[a] 4.8	.....	5.1	5.6	3.9	3.18	3.43	3.37	3.35	3.26	3.85	3.75
11	[a] 4.6	3.85	4.4	5.4	3.85	3.13	3.75	3.5	3.04	3.21	3.8	3.6
12	[a] 4.4	.....	4.4	5.3	4.05	3.12	3.95	4.05	2.85	3.22	3.75	3.55
13	[a] 4.3	.....	5.1	5.2	4.4	3.10	4.6	3.95	2.81	3.20	3.65	3.55
14	.....	.....	5.0	5.8	4.45	3.12	4.5	3.65	2.98	3.19	3.65	3.47
15	.....	.....	10.9	6.9	4.05	3.20	4.45	3.6	3.8	2.93	3.6	3.43
16	4.0	.....	8.8	7.0	4.2	5.6	5.4	3.55	4.05	2.88	3.38	3.39
17	.....	3.6	6.8	6.9	5.3	10.2	4.9	3.45	4.0	2.86	3.21	3.37
18	.....	4.15	6.1	7.4	5.1	7.4	5.4	3.32	3.85	2.86	3.12	3.33
19	9.3	5.4	5.9	6.5	4.8	6.1	5.0	3.22	3.85	3.47	3.09	3.31
20	6.4	8.2	5.7	5.5	4.7	5.2	4.3	3.17	3.8	3.45	3.06	3.25
21	6.3	5.6	7.8	4.9	4.6	4.9	4.8	3.15	3.5	3.41	3.03	3.15
22	5.8	6.0	7.1	4.6	4.4	4.8	4.8	3.14	3.65	3.27	2.97	3.11
23	5.4	6.3	6.6	4.6	4.35	4.7	4.9	3.27	4.05	3.22	2.96	3.30
24	4.8	6.6	7.8	4.4	4.0	4.35	4.5	3.34	3.95	4.8	2.94	3.31
25	4.6	6.1	6.8	4.3	3.6	3.9	6.4	3.30	3.65	4.8	2.92	3.28
26	4.4	11.2	5.8	3.9	3.5	3.65	5.5	3.27	3.75	4.8	2.90	3.25
27	4.2	7.4	5.3	4.3	3.49	3.6	5.3	3.23	3.85	4.6	2.90	3.20
28	4.4	6.9	6.6	4.2	3.47	3.55	4.8	3.22	3.65	4.2	2.88	3.17
29	4.8	6.6	11.1	4.2	4.25	3.55	4.8	3.65	3.65	3.85	2.87	3.13
30	5.4	.....	12.4	7.4	4.8	3.5	4.6	3.95	3.6	3.65	2.86	3.39
31	5.8	.....	9.2	.....	4.7	.....	5.3	4.3	.....	3.46	.....	4.4

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–19 and about Feb. 2–20. The observer reported as follows: "Jan. 7 and 8, river frozen over and holds water back. Jan. 9–16, river entirely frozen over. Jan. 8–16, control frozen over; ice from 3 to 9 inches thick. Jan. 19, ice breaking up and running out. Jan. 20, ice gone. Feb. 4–17, river at gage and control frozen over, ice from 2 to 11 inches thick. Feb. 17, thawing. Feb. 19, raining; ice beginning to back up. Feb. 20, raining; ice gorge holding water back. Feb. 21, raining; ice all gone.

KANAWHA RIVER BASIN.

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

Location.—About 1.6 miles above the confluence of North and South forks of New River and about 4 miles from Crumpler, N. C.

Records available.—August 12, 1908, to December 31, 1912.

Drainage area.—325 square miles.

Gage.—Standard chain gage attached to trees on left bank; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from a boat at a section about half a mile below the gage or by wading at a section about 500 feet below the gage.

Winter flow.—Ice usually does not form in sufficient quantity to cause backwater at the gage.

Accuracy.—The gage-height record is considered very reliable. Sufficient data have not been obtained to permit estimates of discharge to be made. This gaging station was not visited by engineers of the Geological Survey during 1912, but on December 16, 1913, the station was visited and the elevations of bench marks and zero of gage were checked with a wye level and a discharge measurement was made.

Daily gage height, in feet, of South Fork of New River near Crumpler, N. C., for 1912.

[J. J. Garvey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.8	1.48	1.65	2.0	1.7	1.48	1.40	1.48	1.10	1.35	1.17	1.28
2	1.7	1.42	1.6	2.25	1.65	1.55	1.42	1.40	1.10	1.31	1.20	1.30
3	1.55	1.44	1.65	2.15	1.6	1.6	1.55	1.36	1.10	1.28	1.18	1.30
4	1.43	1.34	1.6	1.95	1.55	1.65	1.48	1.40	1.09	1.24	1.16	1.28
5	1.38	1.36	1.65	1.85	1.6	1.5	1.6	1.42	1.06	1.22	1.15	1.32
6	1.30	1.7	1.7	1.8	1.65	1.65	1.85	1.40	1.12	1.20	1.14	1.38
7	2.05	1.65	1.7	1.8	1.6	1.7	1.65	1.34	1.23	1.20	1.95	1.44
8	2.0	1.75	1.8	1.8	1.55	1.6	1.5	1.30	1.48	1.18	2.25	1.35
9	2.1	1.6	1.85	1.75	1.49	1.5	1.48	1.46	1.39	1.18	1.65	1.28
10	2.0	1.55	1.75	1.7	1.47	1.44	1.5	1.48	1.23	1.15	1.45	1.25
11	2.0	1.6	1.7	1.65	1.5	1.41	1.55	1.44	1.08	1.14	1.36	1.21
12	1.9	1.46	1.75	1.65	2.7	1.39	2.0	1.34	1.10	1.14	1.32	1.18
13	1.8	1.55	2.0	1.65	2.5	1.38	1.75	1.30	1.22	1.14	1.30	1.31
14	1.65	1.49	2.0	1.6	2.05	1.55	1.7	1.28	1.32	1.29	1.39	1.28
15	1.75	1.36	3.0	1.6	1.9	1.7	1.7	1.28	1.34	1.40	1.34	1.22
16	1.75	1.47	3.1	1.6	2.2	1.75	1.55	1.32	1.30	1.36	1.30	1.34
17	1.8	1.55	2.6	1.6	2.4	1.55	1.55	1.28	1.28	1.26	1.26	1.24
18	1.95	1.48	2.15	1.7	2.05	1.46	1.6	1.28	1.22	1.18	1.22	1.20
19	2.15	1.38	2.0	1.55	1.85	1.35	1.9	1.27	1.19	1.22	1.21	1.22
20	2.15	1.41	1.9	1.55	1.75	1.30	2.15	1.34	1.26	1.25	1.20	1.21
21	2.05	1.85	1.8	1.5	1.7	1.30	1.95	1.36	1.18	1.24	1.18	1.19
22	1.9	2.9	1.75	1.75	1.65	1.30	1.8	1.29	1.13	1.30	1.18	1.19
23	1.8	1.95	1.7	1.8	1.6	1.33	1.7	1.24	2.05	1.37	1.18	1.24
24	1.8	1.85	2.0	1.7	1.6	1.32	1.6	1.18	2.3	1.34	1.18	1.25
25	1.7	1.8	2.1	1.6	1.55	1.95	1.6	1.17	1.7	1.26	1.18	1.20
26	1.5	1.9	1.9	1.55	1.55	1.65	1.6	1.17	1.5	1.20	1.18	1.38
27	1.44	2.15	1.8	1.75	1.5	1.55	1.5	1.17	1.7	1.18	1.14	1.5
28	1.30	2.0	1.75	1.7	1.5	1.5	1.43	1.14	1.6	1.15	1.24	1.38
29	1.49	1.85	2.7	1.7	1.8	1.42	1.4	1.14	1.5	1.15	1.42	1.40
30	1.75	.....	2.5	1.75	1.6	1.5	1.85	1.12	1.37	1.15	1.37	1.7
31	1.65	.....	2.1	.....	1.55	.....	1.65	1.11	.....	1.14	.....	1.7

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–19 and about Feb. 3–16. Observer made full notes relative to ice, reporting the river frozen over Jan. 6–19 with ice from 4 to 12 inches thick. Ice began to break up Jan. 19 and was all gone Jan. 29. Ice formed again Feb. 3 and remained until about Feb. 17, thickness varying from 4 to 5 inches.

NEW RIVER NEAR GRAYSON, VA.

Location.—At Norfolk & Western Railway bridge at Fries Junction, 1 mile from Grayson, Va., immediately above the mouth of Chestnut Creek.

Records available.—August 7, 1908, to December 31, 1912. Station was discontinued January 4, 1913, because of backwater from the Appalachian Power Co.'s dam No. 2.

Drainage area.—1,160 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Irregular but practically permanent. The river at the measuring section is wide, with an irregular, rocky bottom; current rough and rapid.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Gage heights are little, if any, affected by ice.

Artificial control.—The operation of a large cotton mill, run by water power, about 4 miles above the gage, affects the flow of the river during low water.

Accuracy.—The characteristics noted under "Channel" made this a rather poor station, but with careful work accurate discharge measurements can be made. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by Bailey and Carr:

September 25, 1912: Gage height, 4.62 feet; discharge, 3,070 second-feet.

Daily gage height, in feet, of New River near Grayson, Va., for 1912.

[Oscar Williams, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.5	4.4	4.45	4.9	4.45	4.05	4.2	4.05	3.66	3.82	3.60	3.69
2	4.35	4.25	4.35	5.1	4.4	4.0	4.0	3.96	3.66	3.80	3.67	3.82
3	4.3	4.05	4.2	5.6	4.35	4.2	4.05	3.86	3.62	3.72	3.67	3.78
4	4.15	3.78	4.25	5.3	4.2	4.2	.....	3.93	3.60	3.75	3.65	3.85
5	3.89	3.81	4.3	4.8	4.2	4.1	4.4	4.0	3.63	3.71	3.61	3.92
6	3.77	3.94	4.4	4.65	4.25	4.05	4.9	3.90	3.66	3.68	3.78	3.88
7	3.68	4.1	4.35	4.6	4.25	4.15	4.6	3.83	3.62	3.67	4.0	3.90
8	4.3	4.1	4.55	4.6	4.25	4.05	4.35	3.79	3.74	3.74	4.5	3.86
9	4.4	4.05	4.75	4.45	4.15	4.0	4.1	3.82	4.0	3.65	4.3	3.81
10	4.35	4.05	4.8	4.35	4.1	3.93	4.1	3.92	3.80	3.63	3.99	3.72
11	4.35	4.05	4.65	4.3	4.1	3.89	4.15	3.98	3.67	3.62	3.86	3.70
12	4.25	3.94	4.6	4.25	5.5	3.86	4.35	3.88	3.60	3.62	3.86	3.75
13	4.35	3.79	4.85	4.25	5.1	3.82	4.4	3.8	3.98	3.65	3.85	3.60
14	4.3	3.96	4.95	4.2	4.7	3.90	4.3	3.78	3.78	3.68	3.84	3.78
15	4.65	3.9	6.0	4.2	4.5	4.1	4.2	3.77	3.72	3.79	3.88	3.66
16	4.5	3.87	7.0	4.2	4.9	4.2	4.1	3.76	3.75	3.87	3.80	3.72
17	4.25	3.98	5.8	4.25	5.4	4.05	3.99	3.78	3.68	3.76	3.71	3.83
18	4.2	3.98	5.2	4.25	4.9	3.96	4.05	3.74	3.75	3.69	3.76	3.73
19	4.25	4.1	4.85	4.2	4.6	3.92	4.2	3.74	3.98	3.72	3.68	3.71
20	4.35	4.1	4.75	4.7	4.45	3.84	4.4	3.78	3.94	3.75	3.67	3.76
21	4.55	4.4	4.6	4.1	4.35	3.81	4.35	4.55	3.74	3.76	3.56	3.65
22	4.4	5.8	4.5	4.2	4.3	3.79	4.2	4.1	3.67	3.76	3.70	3.60
23	4.2	5.0	4.4	4.5	4.2	3.86	4.1	3.94	4.15	3.79	3.68	3.68
24	4.05	4.6	4.6	4.4	4.2	3.84	4.0	3.83	5.3	3.78	3.64	3.58
25	4.1	4.65	5.2	4.2	4.1	4.5	3.98	3.78	4.7	3.75	3.56	3.65
26	4.05	4.8	4.9	4.15	4.1	4.4	4.1	3.75	4.2	3.69	3.61	3.65
27	4.05	5.4	4.65	4.2	4.05	4.3	3.98	3.84	4.1	3.67	3.77	3.84
28	4.05	5.1	4.6	4.4	4.15	4.0	3.86	3.74	4.15	3.65	3.65	3.85
29	4.1	4.7	5.1	4.4	4.25	4.1	3.83	3.68	4.1	3.65	3.59	3.75
30	4.9	.....	5.9	4.5	4.3	4.4	4.25	3.68	3.96	3.64	3.61	4.0
31	4.8	.....	5.2	.....	4.15	.....	4.2	3.69	.....	3.60	.....	[a] 5.9

[a] Observer reported backwater from Appalachian Power Co.'s dam below gaging station.

NOTE.—Observer made no notes relative to ice in the river, simply reporting "snow and ice" Jan. 8 and "sleet and rain" Jan. 29. Relation of gage height to discharge probably affected by ice about Jan. 6–19 and about Feb. 5–17.

NEW RIVER AT RADFORD, VA.

Location.—At toll highway bridge near the Norfolk & Western Railway station at Radford, Va., 1½ miles below Norfolk & Western Railway bridge and 6 miles below the mouth of Little River.

Records available.—August 1, 1898, to July 15, 1906; May 6, 1907, to December 31, 1912.

Drainage area.—2,720 square miles.

Gage.—Standard chain gage attached to bridge. 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.

Channel.—Practically permanent.

Discharge measurements.—Made from the downstream side of the highway bridge.

Floods.—Maximum gage height, according to United States Weather Bureau, was 37.4 feet September 15, 1879.

Point of zero flow.—A determination by leveling July 17, 1911, indicates that there would be no flow past the gage if the river stage were to fall to 1.0 foot±0.3 foot.

Winter flow.—The relation of gage height to discharge is only occasionally affected by ice.

Artificial control.—Power plants about 50 miles above station may affect flow to a small extent.

Accuracy.—A good discharge rating curve for this station has been obtained as a result of numerous discharge measurements. No discharge measurements were made at this station during 1912. Five discharge measurements made during 1913 indicate a change in the rating curve such that the new curve will give results about 6 per cent smaller than the curve used in this report.

Daily gage height, in feet, of New River at Radford, Va., for 1912.

[R. B. Harvey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.5	4.2	4.8	5.5	4.7	4.1	4.15	3.75	3.31	3.6	3.34	3.34
2	4.5	4.3	4.45	5.6	4.6	3.9	4.15	3.65	3.23	3.55	3.34	3.20
3	4.3	4.05	.....	6.7	4.4	4.0	3.9	3.5	3.41	3.55	3.38	3.65
4	4.2	3.6	.....	5.9	4.25	4.2	4.05	4.2	3.27	3.55	3.12	3.6
5	3.8	3.46	.....	5.3	4.2	4.0	4.3	4.2	3.23	3.40	3.45	3.6
6	3.29	3.65	.....	5.0	4.25	3.9	5.0	4.4	3.19	3.38	3.37	3.85
7	3.30	3.8	.....	4.9	4.3	3.9	4.5	4.6	3.18	3.38	3.5	3.7
8	3.55	3.95	.....	4.9	4.3	3.9	4.20	4.7	3.39	3.47	4.5	3.65
9	3.8	3.95	.....	4.7	4.2	3.8	3.95	4.25	3.49	3.42	4.35	3.6
10	4.0	3.8	5.3	4.6	4.1	3.75	3.95	3.85	3.55	3.36	4.05	3.55
11	4.05	3.8	5.1	4.5	4.05	3.75	4.0	3.65	3.42	3.28	3.7	3.46
12	4.0	3.8	4.9	4.4	9.2	3.7	4.15	3.75	3.33	3.29	3.65	3.42
13	4.0	3.65	6.0	4.3	6.8	3.65	4.15	3.45	3.29	3.28	3.6	3.5
14	3.85	3.8	5.9	4.25	5.4	3.65	4.05	3.45	3.37	3.41	3.55	3.55
15	3.85	3.75	7.6	4.25	5.0	3.85	3.95	3.5	3.39	3.6	3.65	3.55
16	4.0	3.65	9.6	4.25	6.3	3.95	3.85	3.6	3.31	3.6	3.7	3.26
17	3.95	3.65	6.8	4.25	6.9	4.0	3.7	3.7	3.45	3.42	3.55	3.55
18	3.65	3.85	5.9	4.35	5.6	3.8	3.7	3.55	3.65	3.42	3.28	3.55
19	3.95	3.9	5.3	4.25	5.2	3.85	3.95	3.48	3.75	3.5	3.6	3.49
20	4.35	4.05	5.0	4.15	4.8	3.7	3.9	3.42	3.85	3.42	3.6	3.36
21	4.35	4.2	4.9	4.1	4.6	3.6	3.95	3.43	3.6	3.18	3.48	3.42
22	4.35	7.3	4.7	4.45	4.45	3.55	3.95	3.7	3.39	3.5	3.30	3.47
23	4.05	5.7	4.6	4.45	4.35	3.65	3.75	3.65	4.15	3.49	3.32	3.28
24	4.0	4.9	4.8	4.4	4.25	3.9	3.65	3.5	6.1	3.38	3.38	3.55
25	3.95	5.1	5.7	4.3	4.15	4.1	3.65	3.39	5.3	3.49	3.38	3.28
26	3.95	5.2	5.5	4.1	4.1	4.5	3.6	3.37	4.8	3.45	3.38	3.20
27	3.95	6.5	5.1	4.1	4.05	4.25	3.7	3.37	4.05	3.45	3.55	3.20
28	3.9	5.7	4.8	4.15	4.05	4.5	3.6	3.44	3.95	3.36	3.40	3.31
29	3.95	5.1	8.5	4.35	4.2	3.9	3.44	3.30	3.95	3.38	3.32	3.6
30	4.8	.....	7.5	4.8	4.25	3.95	3.42	3.37	3.75	3.42	3.44	3.39
31	5.3	.....	6.1	.....	4.2	.....	3.44	3.38	.....	3.41	.....	3.8

NOTE.—Observer made no report relative to ice. Relation of gage height to discharge probably affected by ice about Jan. 7–20 and about Feb. 6–13. Gage-height record Mar. 3–9 lost in fire at toll house.

Daily discharge, in second-feet, of New River at Radford, Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,930	3,890	6,020	8,750	5,650	3,560	3,720	2,490	1,380	2,080	1,450	1,450
2	4,930	4,230	4,760	9,150	5,290	2,930	3,720	2,220	1,210	1,950	1,450	1,150
3	4,230	3,400	4,600	13,800	4,580	3,240	2,930	1,820	1,600	1,950	1,540	2,220
4	3,890	2,080	4,200	10,400	4,060	3,890	3,400	3,890	1,300	1,950	998	2,080
5	2,630	1,720	4,200	7,950	3,890	3,240	4,230	3,890	1,210	1,580	1,700	2,080
6	1,340	.....	6,000	6,780	4,060	2,930	6,780	4,580	1,130	1,540	1,510	2,780
7	.....	.....	5,300	6,400	4,230	2,930	4,930	5,290	1,110	1,540	1,820	2,350
8	.....	.....	4,900	6,400	4,230	2,930	3,890	5,650	1,560	1,750	4,930	2,220
9	.....	.....	7,200	5,650	3,890	2,630	3,080	4,060	1,800	1,630	4,400	2,080
10	.....	.....	7,950	5,290	3,560	2,490	3,080	2,780	1,950	1,490	3,400	1,950
11	.....	.....	7,170	4,930	3,400	2,490	3,240	2,220	1,630	1,320	2,350	1,720
12	.....	.....	6,400	4,580	25,400	2,350	3,720	2,490	1,430	1,340	2,220	1,630
13	.....	.....	10,800	4,230	14,200	2,220	3,720	1,700	1,340	1,320	2,080	1,820
14	.....	2,630	10,400	4,060	8,350	2,220	3,400	1,700	1,510	1,600	1,950	1,950
15	.....	2,490	17,800	4,060	6,780	2,780	3,080	1,820	1,560	2,080	2,220	1,950
16	.....	2,220	27,300	4,060	12,100	3,080	2,780	2,080	1,380	2,080	2,350	1,280
17	.....	2,220	14,200	4,060	14,700	3,240	2,350	2,350	1,700	1,630	1,950	1,950
18	.....	2,780	10,400	4,400	9,150	2,630	2,350	1,950	2,220	1,630	1,320	1,950
19	.....	2,930	7,950	4,060	7,560	2,780	3,080	1,770	2,490	1,820	2,080	1,800
20	.....	3,400	6,780	3,720	6,020	2,350	2,930	1,630	2,780	1,630	2,080	1,490
21	4,400	3,890	6,400	3,560	5,290	2,080	3,080	1,650	2,080	1,110	1,770	1,630
22	4,400	16,400	5,650	4,760	4,760	1,950	3,080	2,350	1,560	1,820	1,360	1,750
23	3,400	9,560	5,290	4,760	4,400	2,220	2,490	2,220	3,720	1,800	1,400	1,320
24	3,240	6,400	6,020	4,580	4,060	2,930	2,220	1,820	11,200	1,540	1,540	1,950
25	3,080	7,170	9,560	4,230	3,720	3,560	2,220	1,560	7,950	1,800	1,540	1,320
26	3,080	7,560	8,750	3,560	3,560	4,930	2,080	1,510	6,020	1,700	1,540	1,150
27	3,080	12,900	7,170	3,560	3,400	4,060	2,350	1,510	3,400	1,700	1,950	1,150
28	2,930	9,560	6,020	3,720	3,400	4,930	2,080	1,680	3,080	1,490	1,580	1,380
29	3,080	7,170	22,000	4,400	3,890	2,930	1,680	1,360	3,080	1,540	1,400	2,080
30	6,020	.....	17,400	6,020	4,060	3,080	1,630	1,510	2,490	1,630	1,680	1,560
31	7,950	.....	11,200	.....	3,890	.....	1,680	1,540	.....	1,600	.....	2,630

NOTE.—Daily discharge computed from a rating curve well defined between 800 and 17,000 second-feet. Above 20,000 second-feet the curve is based on flood-discharge comparisons with records at Hinton, Kanawha Falls, and Charleston, W. Va. See "Accuracy."

Discharge Jan. 7–20 and Feb. 6–13 estimated, because of ice, from climatologic records, as follows: Jan. 7–20, 1,500 second-feet; Feb. 6–13, 1,800 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Daily discharge Mar. 3–9 estimated from Weather Bureau gage readings.

Monthly discharge of New River at Radford, Va., for 1912.

[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	7,950	.....	2,830	1.04	1.20	D.
February	16,400	.....	4,450	1.64	1.77	C.
March	27,300	4,200	9,030	3.32	3.83	C.
April	13,800	3,560	5,530	2.03	2.26	B.
May	25,400	3,400	6,310	2.32	2.68	C.
June	4,930	1,950	2,990	1.10	1.23	B.
July	6,780	1,630	3,060	1.12	1.25	B.
August	5,650	1,360	2,420	.890	1.03	B.
September	11,200	1,110	2,560	.941	1.05	B.
October	2,080	1,110	1,670	.614	.70	B.
November	4,930	998	1,990	.732	.82	B.
December	2,780	1,150	1,800	.662	.76	B.
The year	27,300	.....	3,720	1.37	18.63	

NOTE.—See footnotes to table of daily discharge.

NEW RIVER AT FAYETTE, W. VA.

Location.—At highway bridge connecting Fayette and South Fayette, W. Va., 850 feet above the mouth of Wolf Creek.

Records available.—July 29, 1895, to May 22, 1901; August 11, 1902, to December 31, 1904; July 16, 1908, to December 31, 1912.

Drainage area.—6,800 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged. The elevation of the zero of the gage is 838.44 feet above sea level.

Channel.—Rock bed strewn with large bowlders which cause boils and eddies at high stages.

Discharge measurements.—Made from upstream side of bridge.

Floods.—The flood of 1878 reached a height of about 53 feet by the present gage datum.

Winter flow.—The relation of gage height to discharge is little if at all affected by ice.

Accuracy.—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 in making accurate measurements, all estimates of discharge heretofore published are only fair. Estimates of discharge for 1912 are withheld from publication for the present.

Discharge measurements of New River at Fayette, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 26	C. T. Bailey	13.15	35,100
Sept. 10	do	0.48	2,070

Daily gage height, in feet, of New River at Fayette, W. Va., for 1912.

[C. J. Henry, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.6	8.9	8.6	12.2	8.4	3.7	7.0	2.1	1.4	2.5	0.7	0.8
2	8.6	7.4	7.8	15.0	7.8	3.5	5.2	1.9	1.4	2.2	.5	.9
3	8.0	5.9	8.0	17.8	6.7	3.1	5.2	2.2	1.5	1.6	.5	1.0
4	6.6	3.6	9.0	14.9	6.0	2.9	4.8	2.0	1.5	1.5	.5	1.0
5	5.3	3.0	8.2	11.2	5.4	3.1	4.7	1.9	1.5	1.4	.6	1.7
6	4.1	2.6	4.7	9.3	5.2	3.1	6.3	1.9	1.4	1.3	.6	2.0
7	2.6	2.9	5.0	8.2	5.8	2.9	6.5	2.2	1.3	1.4	1.3	2.7
8	2.1	2.8	5.8	7.7	6.4	2.6	5.2	2.0	1.1	1.4	3.4	3.2
9	2.1	3.4	8.1	7.2	6.2	2.6	5.0	1.6	.9	1.3	8.0	3.6
10	2.1	3.4	10.6	6.7	5.7	2.6	4.4	1.4	.8	1.2	5.6	3.1
11	2.1	3.2	9.5	6.2	5.2	2.4	4.0	1.5	.5	1.1	4.5	2.9
12	2.2	3.1	9.2	5.8	10.2	2.0	4.0	1.5	.7	1.0	4.0	2.2
13	3.1	3.0	17.3	5.3	19.1	1.9	4.1	1.5	.6	.9	2.8	2.0
14	2.9	3.2	15.6	5.2	14.2	1.8	4.1	1.4	.4	.5	3.2	1.9
15	2.9	2.6	15.2	5.0	10.4	1.8	4.3	1.4	.3	.4	2.4	1.6
16	2.2	2.6	24.7	5.0	12.3	1.9	4.0	1.2	.3	.5	1.9	1.5
17	1.8	2.6	19.2	5.0	17.8	2.3	3.6	1.0	.5	.5	1.9	1.2
18	1.7	2.9	14.0	5.6	14.6	2.6	3.5	1.1	.8	.5	1.7	1.2
19	3.5	3.1	11.6	6.1	10.2	2.9	2.9	1.3	1.0	.6	1.4	1.4
20	9.7	3.8	9.8	6.3	8.7	2.9	2.5	1.5	1.5	.8	1.4	1.4
21	6.5	5.1	8.8	5.7	7.5	2.8	2.5	1.5	1.9	.8	1.4	1.3
22	5.8	11.3	8.4	5.1	6.6	2.3	3.0	2.2	1.8	1.1	1.4	1.2
23	5.7	15.2	9.6	5.0	5.8	2.1	3.2	2.2	2.2	1.4	1.2	1.3
24	5.6	10.5	9.8	5.2	5.2	2.4	2.8	2.0	3.8	1.6	1.2	1.2
25	5.5	8.6	13.0	5.4	4.8	3.8	3.8	1.6	8.0	1.5	.9	1.2
26	5.2	8.5	13.2	5.0	4.5	5.8	3.7	1.5	7.0	1.3	.9	1.3
27	5.2	10.6	11.0	5.7	4.3	5.6	5.6	1.4	5.5	1.0	1.0	1.3
28	5.3	14.4	9.2	9.6	4.0	8.3	4.6	1.4	4.9	.8	1.0	1.5
29	5.6	10.8	14.0	8.6	3.9	7.7	4.2	1.4	3.0	.8	.9	2.0
30	10.4	.....	23.2	8.6	3.6	6.0	3.4	1.2	2.7	.8	.9	2.2
31	10.4	.....	16.1	.....	3.7	.....	2.0	1.3	.....	.8	.....	.....

NOTE.—Observer made no report relative to ice. Relation of gage height to discharge probably not materially affected by ice during 1912.

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

Location.—Half a mile above the confluence of North and South forks of New River, about 2½ miles north of Crumpler, N. C.

Records available.—August 13, 1908, to December 31, 1912.

Drainage area.—279 square miles.

Gage.—Staff gage attached to posts on right bank. The chain gage in use from August 13, 1908, was replaced by the present staff gage July 23, 1911. The staff gage is at the same location and reads to same datum as former chain gage.

Channel.—Practically permanent.

Discharge measurements.—Made from a boat at a section one-eighth mile below the gage, or by wading. The boat cable section was formerly at a ford one-fourth mile above the gage, but was moved July 23, 1911, to a point one-eighth mile below gage.

Floods.—The flood of April 20, 1901, reached a height of about 16.4 feet referred to the datum of the present gage.

Winter flow.—Flow little if at all affected by ice.

Accuracy.—The gage-height record is considered very reliable. Sufficient data have not been obtained to permit estimates of discharge to be made. This gaging station was not visited by engineers of the Survey during 1912, but on December 17, 1913, the station was visited and the elevations of bench marks and zero of gage were checked with a wye level and a discharge measurement was made.

Daily gage height, in feet, of North Fork of New River near Crumpler, N. C., for 1912.

[J. J. Garvey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.55	2.9	2.5	3.0	2.65	1.92	1.86	2.1	1.64	1.66	1.47	1.66
2	2.4	2.6	2.35	4.3	2.5	2.5	2.05	1.78	1.56	1.62	1.53	1.58
3	2.35	2.45	2.4	4.1	2.45	2.5	2.45	1.70	1.56	1.59	1.47	1.72
4	2.25	2.1	2.3	3.4	2.35	2.0	2.55	2.1	1.54	1.60	1.42	1.61
5	2.05	1.97	2.45	3.1	2.4	1.97	3.2	1.94	1.56	1.56	1.46	1.78
6	1.84	2.1	2.4	2.85	2.4	1.90	3.5	1.76	1.52	1.55	1.44	1.82
7	2.75	2.05	2.55	2.75	2.55	2.05	2.7	1.71	1.52	1.52	2.15	1.75
8	2.65	2.15	2.9	2.70	2.45	1.90	2.35	1.68	2.35	1.50	2.30	1.64
9	2.65	2.0	2.4	2.5	2.4	1.78	2.25	1.76	1.67	1.48	1.83	1.60
10	2.6	2.0	3.2	2.4	2.25	1.72	2.15	2.05	1.52	1.47	1.70	1.53
11	2.65	1.86	2.85	2.35	2.2	1.70	2.1	1.82	1.46	1.46	1.65	1.56
12	2.6	1.92	2.8	2.3	2.5	1.68	2.25	1.74	1.44	1.46	1.60	1.52
13	2.6	1.90	3.3	2.25	2.3	1.66	1.99	1.70	1.54	1.46	1.60	1.33
14	2.3	1.88	3.2	2.20	2.15	1.77	1.98	1.69	1.54	1.66	1.78	1.62
15	2.35	1.86	5.1	2.2	2.3	2.0	2.05	1.65	1.54	1.87	1.67	1.54
16	2.4	1.86	5.0	2.2	3.2	2.2	1.84	1.62	1.51	1.58	1.58	1.63
17	2.25	1.94	3.8	2.25	2.85	1.80	1.86	1.60	1.47	1.52	1.54	1.43
18	2.5	2.05	3.3	2.2	2.6	1.78	1.84	1.66	1.59	1.48	1.52	1.58
19	2.95	2.3	3.0	2.1	2.45	1.82	2.15	1.69	2.3	1.58	1.50	1.56
20	3.4	2.4	2.85	2.05	2.3	1.75	2.1	3.3	1.90	1.74	1.50	1.42
21	2.8	3.1	2.75	2.15	2.2	1.67	2.15	2.65	1.52	1.57	1.49	1.46
22	2.45	3.6	2.65	2.35	2.15	1.62	1.90	2.3	1.48	1.56	1.49	1.47
23	2.4	2.8	2.55	2.55	2.1	1.74	1.88	2.1	3.6	1.61	1.49	1.50
24	2.3	2.75	3.2	2.25	2.0	2.0	1.78	1.89	3.2	1.65	1.48	1.50
25	2.3	2.85	3.2	2.2	2.0	2.85	2.25	1.82	2.15	1.54	1.48	1.64
26	2.2	2.95	3.1	2.1	2.0	2.0	2.0	1.78	1.96	1.51	1.46	1.78
27	2.3	3.7	2.95	2.45	1.9	1.85	1.82	1.77	2.05	1.48	1.48	1.98
28	2.05	3.2	2.8	2.6	1.88	1.88	1.76	1.68	1.89	1.48	1.62	2.0
29	2.7	2.75	4.6	2.55	2.35	1.91	1.70	1.62	1.76	1.48	1.96	1.98
30	3.7	.....	3.8	2.95	2.2	2.05	2.2	1.63	1.73	1.46	1.70	2.15
31	3.2	.....	3.3	.....	1.98	.....	1.84	1.87	.....	1.44	.....	2.85

NOTE.—Observer made complete reports relative to ice. Relation of gage height to discharge probably affected by ice about Jan. 7–21 and about Feb. 6–20. Observer reported river frozen over Jan. 6–24, with ice from 3 to 12 inches thick. Ice began to break up and run out on Jan. 25 and was all gone Jan. 29. Ice was present from Feb. 3 until after the 17th and was about 4 inches thick. Effect of ice in February was probably relatively slight.

REED CREEK AT GRAHAMS FORGE, VA.

Location.—At highway bridge at Grahams Forge, Va.
Records available.—July 29, 1908, to December 31, 1912.
Drainage area.—247 square miles.
Gage.—Standard chain gage attached to bridge; datum unchanged since established.
Channel.—Permanent; bottom solid rock.
Discharge measurements.—Made from downstream side of bridge.
Point of zero flow.—A determination by leveling July 20, 1911, indicates that there would be no flow past the gage if the river stage were to fall to 0.6 foot ± 0.1 foot, by the gage datum. Point of control is permanent.
Winter flow.—Relation of gage height to discharge is sometimes affected by ice for short periods.
Artificial control.—There is a dam and gristmill just above the station. The storage is small and the miller states that water flows over the dam at all times. The flow is therefore little if at all modified by the operation of the mill.
Accuracy.—The gage-height record is considered accurate and reliable. Sufficient data have been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by C. T. Bailey:
September 24, 1912: Gage height, 3.80 feet; discharge, 1,330 second-feet.

Daily gage height, in feet, of Reed Creek at Grahams Forge, Va., for 1912.

[J. T. Black, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.71	2.92	2.90	3.3	2.94	2.44	2.72	2.80	2.18	2.31	2.16	2.12
2	2.67	2.78	2.80	4.1	2.81	2.42	2.89	2.59	2.15	2.27	2.15	2.14
3	2.61	2.55	2.79	4.5	2.74	2.46	2.69	2.46	2.15	2.28	2.14	2.17
4	2.60	2.52	2.72	3.65	2.68	2.43	2.59	2.48	2.13	2.26	2.14	2.20
5	2.32	2.68	2.70	3.3	2.60	2.44	2.92	2.44	2.16	2.21	2.08	2.36
6	2.50	2.70	2.74	3.2	2.67	2.38	2.96	2.38	2.16	2.22	2.15	2.40
7	2.50	2.60	2.80	3.1	2.78	2.40	2.72	2.32	2.14	2.21	2.27	2.38
8	2.5	2.50	3.20	3.05	2.83	2.36	2.66	2.30	2.22	2.20	2.69	2.37
9	2.44	2.42	3.9	2.92	2.80	2.29	2.56	2.30	2.19	2.19	2.45	2.31
10	2.62	2.42	3.6	2.86	2.70	2.30	2.50	2.37	2.12	2.17	2.34	2.26
11	2.44	2.44	3.25	2.82	2.72	2.28	2.56	2.34	2.14	2.18	2.29	2.24
12	2.40	2.40	3.15	2.84	2.91	2.27	2.61	2.28	2.13	2.16	2.28	2.22
13	2.44	2.38	4.3	2.74	3.45	2.25	2.60	2.26	2.14	2.17	2.24	2.14
14	2.52	2.37	4.2	2.72	3.05	2.28	2.46	2.23	2.14	2.26	2.22	2.22
15	2.32	2.42	5.2	2.68	2.94	2.25	2.40	2.23	2.14	2.32	2.22	2.16
16	2.42	2.40	4.8	2.78	4.2	2.30	2.34	2.22	2.12	2.28	2.20	2.18
17	2.20	2.36	3.8	2.73	3.9	2.32	2.30	2.20	2.14	2.20	2.17	2.18
18	2.34	2.40	3.45	2.79	3.3	2.28	2.28	2.27	2.36	2.17	2.18	2.20
19	2.48	2.52	3.25	2.74	3.05	2.26	2.44	2.27	2.86	2.20	2.18	2.19
20	3.05	2.63	3.15	2.70	2.90	2.25	2.30	2.27	2.37	2.24	2.18	2.14
21	2.92	3.3	3.0	2.66	2.79	2.21	2.26	2.30	2.26	2.22	2.16	2.08
22	2.74	3.9	2.97	2.71	2.72	2.24	2.32	2.26	2.20	2.20	2.16	2.09
23	2.64	3.15	2.88	2.91	2.66	2.23	2.30	2.32	3.15	2.20	2.14	2.12
24	2.62	2.98	3.05	2.83	2.62	2.38	2.26	2.36	3.7	2.18	2.17	2.14
25	2.52	3.25	3.55	2.74	2.60	3.4	2.32	2.28	2.90	2.16	2.15	2.16
26	2.50	3.4	3.3	2.67	2.55	2.76	2.44	2.27	2.64	2.20	2.12	2.12
27	2.60	3.9	3.1	2.87	2.53	2.70	2.31	2.28	2.52	2.16	2.08	2.21
28	2.61	3.35	2.99	3.4	2.56	3.2	2.24	2.24	2.47	2.14	2.15	2.18
29	2.65	3.1	5.7	3.05	2.51	2.71	2.28	2.20	2.38	2.16	2.09	2.20
30	2.70	.....	4.1	3.1	2.52	2.79	2.64	2.21	2.35	2.15	2.14	2.36
31	3.2	.....	3.5	.....	2.48	.....	2.58	2.20	.....	2.16	.....	3.25

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 1–20 and about Feb. 4–16.

BIG REED ISLAND CREEK NEAR ALLISONIA, VA.

Location.—Twelve hundred feet above a suspension footbridge at J. P. Thomas's farm, 1½ miles from Allisonia, Va., and half a mile above mouth of Little Reed Island Creek.

Records available.—July 31, 1908, to December 31, 1912.

Drainage area.—291 square miles.

Gage.—Vertical staff gage fastened to a tree on right bank; datum unchanged since established.

Channel.—The channel is liable to change caused by deposits of silt from ore washing; the point of control below the gage is permanent and is unaffected by the silt.

Discharge measurements.—Made from downstream side of suspension footbridge 1,200 feet below gage, or by wading under bridge.

Point of zero flow.—A determination of leveling July 19, 1911, indicates that there would be no flow past the gage if the river stage were to fall to —0.7 foot ±0.2 foot.

Winter flow.—The relation of gage height to discharge is sometimes affected by ice in winter.

Accuracy.—This station was not visited by engineers of the Survey during 1912. Sufficient data have not been obtained to permit estimates of discharge to be made.

Daily gage height, in feet, of Big Reed Island Creek near Allisonia, Va., for 1912.

[K. M. Thomas, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.90	0.74	0.82	1.25	0.95	0.81	1.05	0.66	0.42	0.50	0.47	0.57
2	.66	.77	.71	1.40	.88	.80	.86	.59	.35	.47	.75	.58
3	.62	.66	.80	1.35	.82	.85	.70	.50	.30	.48	.51	.60
4	.58	.70	.76	1.15	.81	.83	1.0	.73	.35	.48	.46	.54
5	.55	.82	.82	1.05	.78	.81	.77	.72	.35	.47	.48	.89
6	.....	.99	.80	.99	.80	.79	1.05	.54	.37	.46	.46	.92
7	.....	.99	.80	1.00	.80	.77	.75	.50	.33	.47	1.98	.88
8	.....	.94	.94	1.15	.82	.74	.80	.49	.40	.45	1.53	.70
9	.....	.86	1.2	1.05	.74	.71	.75	.55	.45	.43	.85	.62
10	.....	.74	1.05	.99	.68	.71	.89	.56	.37	.42	.70	.58
11	.....	.64	.94	.90	.79	.70	.76	.60	.35	.43	.64	.57
12	.....	.56	1.05	.88	4.8	.69	.79	.48	.32	.43	.63	.55
13	.....	.51	1.6	.84	2.6	.68	.73	.60	.34	.44	.66	.50
14	1.05	.51	1.2	.86	1.40	.60	.82	.52	.43	.54	.76	.49
15	1.1	.52	2.4	.86	1.40	.88	.73	.47	.45	.75	.67	.51
16	1.1	.58	2.1	.84	2.40	.78	.62	.65	.62	.50	.58	.60
17	1.1	.53	1.4	.88	2.0	.71	.70	.50	.35	.54	.44	.45
18	1.15	.58	1.15	.92	1.45	.68	.76	.48	.53	.47	.49	.50
19	1.25	.63	1.0	.84	1.25	1.05	1.10	.45	.53	.50	.57	.60
20	1.4	.60	.96	.79	1.15	.68	.68	.50	.65	.70	.55	.59
21	1.1	.71	.91	.80	1.10	.65	.62	.48	.55	.50	.50	.54
22	1.05	2.2	.86	.88	1.00	.63	.72	.47	.38	.48	.51	.49
23	1.0	.98	.86	1.00	1.00	.77	.60	.53	1.80	.45	.51	.50
24	.96	.90	1.25	.82	.96	.92	.55	.41	1.90	.50	.52	.58
25	.88	1.25	1.3	.78	.93	.74	.65	.38	1.25	.49	.50	.67
26	.80	1.2	1.1	.77	.92	.70	.62	.40	.72	.47	.49	.72
27	.79	1.7	.98	.91	.96	.68	.52	.48	.66	.45	.50	.80
28	.78	1.1	.90	.94	.88	.67	.50	.40	.62	.45	.50	.90
29	.68	.94	2.7	.88	.88	.70	.49	.40	.54	.45	.54	.89
30	1.3	.....	1.7	1.25	.94	.72	.48	.49	.52	.46	.50	.72
31	.92	.....	1.25	.....	.87	.....	.52	.44	.....	.47	.....	1.10

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 3–20 and about Feb. 2–16. Observer reported "backwater" Jan. 18; "creek frozen solid across at some places" Jan. 20, ice 6 to 10 inches thick; and "backwater" Feb. 5 and 6, ice about 5 inches thick.

LITTLE RIVER NEAR COPPER VALLEY, VA.

Location.—At highway bridge about 5 miles south of Childress and half a mile north of Copper Valley, Va., and 600 feet above the mouth of Indian Creek.

Records available.—July 25, 1908, to December 31, 1912.

Drainage area.—195 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Regular and practically permanent.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The high water of about 1900 reached a stage of approximately 12.9 feet referred to present gage datum.

Point of zero flow.—Determinations by leveling, July 18, 1911, and September 21, 1912, indicate that there would be no flow past the gage if the river stage were to fall to 1.8 feet ±0.2 foot. Control probably permanent.

Winter flow.—The discharge is affected by ice for short periods.

Accuracy.—Records of gage height are considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by C. T. Bailey:
September 21, 1912: Gage height, 3.30 feet; discharge, 152 second-feet.

Daily gage height, in feet, of Little River near Copper Valley, Va., for 1912.

[T. A. De Hart, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.68	3.52	3.67	4.05	3.70	3.54	4.15	3.58	3.19	3.28	3.26	3.38
2	3.52	3.71	3.48	4.25	3.63	3.58	3.73	3.41	3.17	3.26	3.38	3.34
3	3.51	3.58	3.50	4.2	3.62	3.67	3.55	3.36	3.16	3.25	3.32	3.34
4	3.49	.....	3.53	3.93	3.52	3.54	3.55	3.61	3.13	3.25	3.26	3.36
5	3.22	.....	3.69	3.83	3.49	3.57	3.89	3.57	3.15	3.28	3.22	3.62
6	3.25	.....	3.50	3.82	3.54	3.58	4.2	3.42	3.19	3.25	3.38	3.68
7	[a]3.7	3.60	3.62	3.87	3.54	3.69	3.65	3.37	3.29	3.20	4.75	3.58
8	[a]3.55	.....	3.82	4.0	3.50	3.53	3.59	3.36	3.47	3.20	4.2	3.42
9	.....	.....	4.65	3.80	3.44	3.51	3.52	3.42	3.33	3.20	3.64	3.34
10	.....	.....	4.15	3.69	3.40	3.48	3.72	3.47	3.25	3.20	3.44	3.31
11	.....	.....	3.96	3.64	3.56	3.47	3.58	3.41	3.16	3.20	3.42	3.30
12	.....	.....	4.3	3.66	7.3	3.45	3.72	3.36	3.09	3.18	3.36	3.30
13	3.65	.....	4.8	3.68	5.0	3.46	3.61	3.39	3.15	3.20	3.38	3.31
14	.....	3.50	4.4	3.68	4.25	3.51	3.77	3.35	3.13	3.35	3.48	3.35
15	.....	.....	5.8	3.68	4.2	3.65	3.52	3.35	3.26	3.62	3.42	3.52
16	.....	.....	5.3	3.66	5.4	3.59	3.47	3.33	3.16	3.38	3.32	3.38
17	.....	3.42	3.83	3.70	4.95	3.51	3.37	3.32	3.16	3.25	3.31	3.38
18	.....	3.62	4.05	3.76	4.3	3.53	3.39	3.25	3.29	3.22	3.30	3.35
19	.....	3.61	3.94	3.58	3.99	3.65	4.2	3.31	3.73	3.28	3.29	3.36
20	4.15	3.53	3.87	3.53	3.86	3.58	3.59	3.35	3.53	3.38	3.28	3.36
21	.....	3.76	3.88	3.54	3.86	3.55	3.43	3.35	3.22	3.32	3.29	3.36
22	.....	5.1	3.81	3.59	3.79	3.66	3.39	3.35	3.19	3.26	3.30	3.32
23	.....	3.93	3.78	3.72	3.76	3.65	3.37	3.27	3.69	3.40	3.29	3.32
24	.....	3.76	4.25	3.52	3.72	4.15	3.35	3.35	4.65	3.36	3.22	3.42
25	.....	4.45	4.35	3.52	3.69	3.61	3.43	3.19	3.89	3.26	3.24	3.54
26	.....	4.3	4.1	3.50	3.69	3.72	3.45	3.25	3.54	3.28	3.28	3.50
27	3.54	5.1	3.90	3.70	3.64	3.63	3.47	3.27	3.78	3.24	3.28	3.62
28	3.51	4.1	3.82	3.83	3.64	3.49	3.31	3.25	3.51	3.21	3.29	3.62
29	3.62	3.91	6.3	3.73	3.68	3.46	3.27	3.21	3.40	3.22	3.36	3.62
30	4.3	.....	4.6	3.86	3.74	3.46	3.28	3.22	3.32	3.22	3.40	3.65
31	3.90	.....	4.2	.....	3.60	.....	3.31	3.21	.....	3.20	.....	4.02

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 6–29 and about Feb. 4–16. Observer reported river entirely frozen over at gage Jan. 13 and Jan. 20, with ice 5 to 6 inches thick, and Feb. 7 and 14, with ice about 5 inches thick. The ice was reported "broken up" at the control at all times. River reported open Feb. 17.

WALKER CREEK AT STAFFORDSVILLE, VA.

Location.—At highway bridge at Staffordsville, Va., 500 feet below the mouth of Whitley Creek.

Records available.—July 24, 1908, to December 31, 1912.

Drainage area.—277 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Rocky; practically permanent.

Discharge measurements.—Made from downstream side of bridge.

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

Artificial control.—A dam and power plant 300 feet above the station may affect the flow at low water.

Accuracy.—Gage-height record is considered reliable. Sufficient data have not been collected to permit estimates of discharge to be made.

Discharge measurements of Walker Creek at Staffordsville, Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 3	J. G. Mathers	6.41	1,860
4	do	5.88	1,460
Sept. 30	C. T. Bailey	3.42	151

Daily gage height, in feet, of Walker Creek at Staffordsville, Va., for 1912.

[J. F. Durham, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.05	4.5	4.4	5.3	4.9	3.49	4.7	3.52	3.16	3.49	3.04	3.14
2	3.98	4.35	4.15	6.4	4.65	3.47	4.6	3.50	3.12	3.42	3.04	3.16
3	4.0	3.88	4.15	6.8	4.4	3.43	4.25	3.35	3.18	3.34	2.99	3.16
4	3.94	3.94	4.05	5.7	4.25	3.41	4.25	3.34	3.15	3.32	3.05	3.22
5	3.60	3.64	3.98	5.3	4.1	3.44	5.1	3.30	3.04	3.26	3.02	3.35
6	3.37	2.78	4.0	4.95	4.05	3.40	5.3	3.28	3.02	3.23	3.04	3.50
7	3.62	3.63	4.05	4.75	4.05	3.33	4.6	3.26	2.94	3.20	3.82	3.66
8	3.52	3.73	4.7	4.55	4.05	3.29	4.2	3.18	.....	3.16	4.9	3.61
9	3.59	3.65	5.7	4.35	3.90	3.27	4.0	3.20	3.44	3.14	4.25	3.54
10	3.54	3.44	5.4	4.25	3.79	3.21	4.2	3.24	3.26	3.14	3.93	3.46
11	3.48	3.48	4.95	4.15	3.79	3.19	5.2	3.26	3.08	3.10	3.72	3.42
12	3.50	3.44	5.0	4.05	5.2	3.17	4.45	3.22	3.05	3.08	3.58	3.36
13	3.40	3.44	7.9	3.99	5.55	3.17	4.35	3.18	3.01	3.11	3.50	3.08
14	3.27	3.42	6.9	3.97	4.75	3.17	4.0	3.18	3.00	3.12	3.50	3.20
15	3.38	3.46	8.8	3.91	4.65	3.19	3.87	3.21	3.01	3.22	3.44	3.20
16	3.27	3.44	7.7	3.91	7.1	3.19	3.71	3.17	3.00	3.24	3.32	3.27
17	3.30	3.47	6.2	3.94	6.5	3.20	3.58	3.15	3.06	3.14	3.30	3.24
18	3.36	3.53	5.6	3.92	5.4	3.23	3.52	3.10	3.15	3.10	3.26	3.24
19	3.61	3.60	5.2	3.89	4.95	3.39	3.54	3.51	3.61	3.18	3.22	3.22
20	4.55	3.73	4.9	3.87	4.6	3.30	3.47	3.30	3.36	3.20	3.21	3.20
21	4.4	4.8	4.7	3.85	4.4	3.26	3.43	3.31	3.21	3.22	3.19	3.14
22	4.2	6.6	4.5	3.85	4.25	3.15	3.40	3.38	3.12	3.21	3.20	3.14
23	4.05	5.2	4.35	4.0	4.05	3.15	3.43	3.34	4.7	3.16	3.18	3.04
24	3.97	4.75	4.55	3.91	3.93	3.18	3.39	3.44	5.8	3.15	3.16	3.11
25	3.91	4.85	5.3	3.87	3.87	4.5	3.46	3.32	4.95	3.13	3.15	3.02
26	3.86	4.95	5.1	3.85	3.89	4.35	3.60	3.26	4.25	3.08	3.11	3.00
27	4.3	6.1	4.8	4.75	3.75	5.0	3.40	3.30	4.7	3.05	3.12	3.29
28	4.3	5.1	4.6	5.7	3.69	6.2	3.32	3.32	4.0	3.06	3.14	3.08
29	4.25	4.7	9.2	5.2	3.67	5.9	3.23	3.23	3.76	3.02	3.08	3.20
30	5.6	.....	6.8	5.2	3.65	4.8	3.24	3.20	3.62	3.06	3.08	3.66
31	5.0	.....	5.8	.....	3.57	.....	3.37	3.22	.....	3.05	.....	5.20

NOTE.—No ice reported by observer. Relation of gage height to discharge probably not affected by ice during 1912.

WOLF CREEK NEAR NARROWS, VA.

Location.—At highway bridge 3 miles above Narrows, Va., 1,500 feet below the New River, Holston & Western Railroad bridge, and 2½ miles above mouth of Mill Creek.

Records available.—July 22, 1908, to December 31, 1912.

Drainage area.—223 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Rocky, practically permanent.

Discharge measurements.—Made from downstream side of bridge.

Floods.—A stage of approximately 15.5 feet, referred to gage datum, has been reached at this station; date unknown.

Point of zero flow.—A determination by leveling July 15, 1911, indicates that there would be no flow past the gage if the river stage were to fall to 1.1 feet ±0.2 foot.

Winter flow.—Relation of gage height to discharge not affected by ice except for short periods during extremely cold weather.

Accuracy.—Records of gage height are considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by C. T. Bailey:
September 19, 1912: Gage height, 2.76 feet; discharge, 88 second-feet.

Daily gage height, in feet, of Wolf Creek near Narrows, Va., for 1912.

[J. A. Hale, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.65	4.35	3.95	4.7	4.6	2.99	4.4	3.24	3.01	2.82	2.68	2.75
2	3.6	4.05	3.7	6.1	4.3	2.95	4.05	3.16	2.94	2.73	2.68	2.70
3	3.55	3.7	3.7	6.8	4.1	2.94	3.7	3.06	2.88	2.69	2.68	2.69
4	3.49	3.6	3.55	5.4	3.9	2.92	3.8	3.06	2.88	2.68	2.66	2.80
5	3.27	3.42	3.55	4.8	3.75	2.96	5.0	3.00	2.84	2.66	2.61	3.02
6	3.24	3.40	3.5	4.4	3.65	2.90	4.7	2.93	2.80	2.64	2.62	3.25
7	3.28	3.30	3.45	4.25	3.7	2.86	4.0	2.86	2.83	2.64	2.98	3.36
8	3.12	3.35	3.85	4.1	3.6	2.82	3.8	2.83	2.81	2.61	3.75	3.31
9	3.16	3.22	5.2	3.9	3.5	2.78	3.7	2.84	2.76	2.60	3.45	3.20
10	3.09	3.18	5.0	3.8	3.42	2.76	3.7	2.82	2.71	2.60	3.24	3.11
11	3.10	3.14	4.5	3.7	3.38	2.73	3.55	2.84	2.68	2.74	3.12	3.06
12	3.12	3.04	4.6	3.6	3.7	2.71	3.55	2.80	2.68	2.58	3.01	3.01
13	3.09	3.11	7.3	3.55	3.65	2.70	3.31	2.82	2.65	2.58	3.00	2.90
14	3.03	3.08	6.4	3.5	3.55	2.69	3.20	2.88	2.64	2.67	3.00	2.84
15	3.04	3.10	7.5	3.42	3.55	2.72	3.20	2.84	2.62	2.84	2.96	2.83
16	3.06	3.06	7.4	3.47	5.5	2.77	3.09	2.77	2.62	2.76	2.89	2.88
17	3.02	3.08	5.8	3.48	5.6	2.77	3.00	2.72	2.62	2.70	2.86	2.83
18	2.98	3.18	5.0	3.5	4.7	2.78	2.96	2.74	2.70	2.66	2.82	2.84
19	3.24	3.22	4.6	3.48	4.25	2.93	3.02	2.33	2.70	2.69	2.78	2.84
20	4.3	3.35	4.35	3.42	4.0	2.86	2.98	3.16	2.70	2.79	2.76	2.79
21	3.9	4.8	4.15	3.42	3.75	2.78	2.93	3.7	2.66	2.86	2.72	2.78
22	3.7	6.4	4.1	3.42	3.6	2.72	2.92	3.55	2.69	2.72	2.72	2.76
23	3.6	4.8	3.95	3.6	3.48	2.75	3.10	3.48	2.94	2.76	2.70	2.72
24	3.55	4.4	4.2	3.5	3.39	3.08	3.06	3.38	3.39	2.79	2.74	2.74
25	3.5	4.3	4.8	3.48	3.42	6.2	3.30	3.24	3.11	2.80	2.70	2.66
26	3.5	4.3	4.7	3.43	3.32	4.15	3.55	3.18	2.96	2.78	2.69	2.78
27	4.1	4.8	4.45	4.6	3.20	4.45	3.24	3.46	3.24	2.74	2.69	2.90
28	3.95	4.5	4.25	5.3	3.16	4.3	3.10	3.26	3.05	2.70	2.72	2.86
29	4.0	4.2	7.8	4.8	3.17	4.5	3.02	3.16	2.94	2.69	2.70	2.90
30	4.8	.....	6.4	4.9	3.12	3.95	3.37	3.08	2.84	2.68	2.68	3.08
31	4.8	.....	5.0	.....	3.06	.....	3.30	3.08	.....	2.67	.....	4.62

NOTE.—Relation of gage height to discharge probably not materially affected by ice during 1912. On Jan. 15 observer reported: "Five feet of ice below bridge on north side of creek; no ice on south side. There are springs above bridge."

BLUESTONE RIVER AT LILLY, W. VA.

Location.—At Lilly, W. Va., 2,000 feet below the mouth of Little Bluestone River.

Records available.—August 22, 1908, to January 13, 1912, and July 21 to November 7, 1912. See "Accuracy."

Drainage area.—454 square miles.

Gage.—Vertical staff gage in two sections; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from a boat 150 feet above gage or by wading.

Point of zero flow.—Levels taken August 24, 1910, indicate that there would be no flow past the gage if the river stage were to fall to 0.0 foot ±0.2 foot.

Winter flow.—During portions of December, January, and February the flow may be affected by ice.

Accuracy.—This station was temporarily discontinued because of its inaccessibility. The gage was read during a part of 1912 to complete the comparison with the gage at True at low stages. No discharge measurements were made at Lilly during 1912. On November 13, 1913, the lower section of the gage was found to be in error. Gage heights of discharge measurements and daily gage heights for this station for 1910 and 1911 published in Water-Supply Papers 283 and 303 should be corrected as follows: August 24, 1910, to January 20, 1911, subtract 0.02 foot; January 21 to June 15, subtract 0.03 foot; June 16 to November 10, subtract 0.04 foot; November 11 to December 31, subtract 0.05 foot. The proper corrections have been applied to the gage heights for 1912 here published.

Daily gage height, in feet, of Bluestone River at Lilly, W. Va., for 1912.

[W. H. Lilly, observer.]

Day.	Jan.	July.	Aug.	Sept.	Oct.	Nov.
1	2.75	.....	2.05	1.75	1.41	1.23
2	2.55	.....	1.91	1.67	1.34	1.19
3	2.85	.....	1.64	1.49	1.27	1.18
4	2.85	.....	1.52	1.48	1.23	1.17
5	2.6	.....	1.44	1.33	1.21	1.23
6	2.25	.....	1.40	1.25	1.15	1.30
7	2.2	.....	1.33	1.23	1.13	1.35
8	2.85	.....	1.32	1.17	1.11	.....
9	3.1	.....	1.30	1.12	1.05	.....
10	2.95	.....	1.23	1.09	1.03	.....
11	2.35	.....	1.26	1.12	1.02	.....
12	2.4	.....	1.28	1.13	.99	.....
13	2.5	.....	1.34	1.10	1.04	.....
14	.....	.....	1.28	1.09	1.09	.....
15	.....	.....	1.32	1.08	1.17	.....
16	.....	.....	1.27	1.05	1.23	.....
17	.....	.....	1.23	.97	1.25	.....
18	.....	.....	1.20	1.08	1.32	.....
19	.....	.....	1.30	1.22	1.38	.....
20	.....	.....	1.39	1.64	1.42	.....
21	.....	1.53	2.1	1.48	1.43	.....
22	.....	1.56	2.45	1.21	1.48	.....
23	.....	1.67	2.15	1.23	1.52	.....
24	.....	1.72	2.1	2.55	1.52	.....
25	.....	2.2	1.89	2.1	1.49	.....
26	.....	2.75	1.76	1.83	1.45	.....
27	.....	2.45	1.92	1.58	1.38	.....
28	.....	1.92	2.05	1.93	1.33	.....
29	.....	1.72	1.81	1.81	1.38	.....
30	.....	1.62	1.64	1.58	1.32	.....
31	.....	2.30	1.69	.....	1.25	.....

NOTE.—Observer made no report concerning ice. Relation of gage height to discharge probably affected by ice Jan. 3–13. See "Accuracy" in station description.

BLUESTONE RIVER NEAR TRUE, W. VA.

Location.—At Barker's ford, 1 mile above the mouth of the river and three-fourths of a mile above True post office.

Records available.—October 17, 1911, to December 31, 1912.

Gage.—Staff gage in two sections, on right side of river.

Channel.—Practically permanent.

Discharge measurements.—Made from a boat 20 feet below gage or by wading.

Point of zero flow.—A determination by wye levels on September 7, 1912, indicates that there would be no flow past the gage if the stage of the river were to fall to 0.5 foot±0.1 foot.

Winter flow.—The relation of gage height to discharge may be affected by ice for short periods during December, January, and February.

Accuracy.—Gage-height record is considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be published.

The following discharge measurement was made by wading at a section about 500 feet below the gage by C. T. Bailey:

September 7, 1912: Gage height, 1.64 feet; discharge, 69 second-feet.

Daily gage height, in feet, of Bluestone River near True, W. Va., for 1912.

[Arthur Barker, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.05	3.4	2.65	3.35	3.55	1.89	3.15	1.97	1.73	1.72	1.50	1.55
2	2.8	3.05	2.3	9.0	3.1	1.84	3.8	1.97	1.72	1.70	1.50	1.56
3	2.65	2.65	2.3	7.1	2.85	1.88	3.2	1.92	1.70	1.68	1.50	1.54
4	2.55	2.5	2.3	4.4	2.65	1.86	2.7	1.88	1.68	1.66	1.50	1.50
5	2.3	2.4	2.25	3.4	2.5	1.86	3.8	1.85	1.67	1.66	1.50	1.56
6	2.25	2.3	2.25	3.15	2.65	1.78	3.7	1.80	1.66	1.61	1.50	1.80
7	2.25	2.15	2.3	2.95	3.7	1.67	3.35	1.76	1.64	1.59	1.56	2.00
8	2.25	.....	3.0	2.85	3.4	1.62	2.6	1.71	1.60	1.56	1.62	2.05
9	2.25	.....	4.7	2.65	3.0	1.62	2.35	1.70	1.58	1.50	1.70	2.00
10	.....	.....	4.3	2.5	2.65	1.59	2.45	1.70	1.56	1.48	1.76	1.95
11	.....	.....	4.0	2.45	2.85	1.57	2.35	1.66	1.56	1.46	1.90	1.90
12	.....	.....	7.0	2.4	4.9	1.54	2.25	1.62	1.53	1.46	1.88	1.86
13	.....	.....	6.7	2.3	3.8	1.52	2.3	1.62	1.52	1.48	1.88	1.84
14	2.4	.....	5.8	2.5	3.5	1.52	2.95	1.62	1.50	1.51	1.86	1.80
15	.....	2.05	4.8	2.4	2.95	1.52	2.25	1.64	1.50	1.54	1.82	1.76
16	.....	.....	5.4	2.3	3.35	1.63	1.94	1.65	1.50	1.60	1.77	1.70
17	.....	.....	4.0	2.25	3.7	1.74	.....	1.64	1.46	1.60	1.70	1.66
18	.....	.....	3.8	2.65	3.2	1.86	1.92	1.66	1.42	1.50	1.66	1.64
19	.....	2.25	3.4	2.55	2.7	1.94	1.97	1.69	1.39	1.60	1.60	1.61
20	.....	2.45	2.9	2.45	2.55	2.05	2.1	1.74	1.62	1.65	1.59	1.61
21	.....	2.8	2.25	2.35	2.5	1.90	1.92	2.25	1.50	1.66	1.59	1.60
22	.....	3.15	2.55	2.35	2.4	1.72	1.90	2.45	1.49	1.62	1.58	1.60
23	.....	3.3	2.65	2.55	2.35	1.75	1.82	2.3	1.65	1.60	1.54	1.60
24	.....	3.0	5.2	2.5	2.25	2.7	1.92	2.25	1.70	1.61	1.50	1.60
25	2.8	2.7	5.0	2.35	2.05	4.8	1.96	2.15	.....	1.66	1.50	1.62
26	2.75	3.0	3.9	2.3	2.05	3.7	3.00	2.1	.....	1.62	1.50	.....
27	3.1	3.6	3.5	4.7	2.1	5.0	2.1	2.6	.....	1.60	1.50	.....
28	3.3	3.25	3.7	5.0	2.0	3.8	2.1	2.0	.....	1.61	1.50	.....
29	4.0	2.85	5.8	4.6	1.96	2.85	2.0	1.92	.....	1.57	1.50	.....
30	5.8	.....	6.0	4.1	1.98	2.6	1.97	1.92	.....	1.52	1.50	.....
31	4.4	.....	4.0	.....	2.0	.....	1.92	1.90	.....	1.50	.....	.....

NOTE.—Relation of gage height to discharge affected by ice about Jan. 6–26 and about Feb. 6–20. The observer reported as follows: Jan. 7, ice present last 10 days; Jan. 9, lower portion of gage torn out by ice; Jan. 14, river frozen over at gage and at control; ice 5 inches thick; Jan. 25, lower portion of gage replaced; Feb. 7 and 15, river open in middle, control partly frozen, ice 3 and 7 inches thick on respective dates. No record Sept. 25–30; gage broken by windstorm.

GREENBRIER RIVER NEAR MARLINTON, W. VA.

Location.—At Chesapeake & Ohio Railway bridge on the switch that runs to Campbell's lumber mill, 1½ miles above Marlinton, W. Va., and immediately below the mouth of Stoney Creek.

Records available.—July 9, 1908, to December 31, 1912.
Drainage area.—408 square miles.
Gage.—Standard chain gage attached to bridge; datum unchanged.
Channel.—Coarse gravel; control section probably not permanent.
Discharge measurements.—Made from downstream side of bridge.
Point of zero flow.—A determination by leveling September 6, 1912, indicates that there would be no flow past the gage if the river stage were to fall to 2.7 feet ±0.1 foot.
Winter flow.—Relation of gage height to discharge affected by ice during parts of December, January, and February.
Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be published.

Discharge measurements of Greenbrier River at Marlinton, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 23	C. T. Bailey	5.44	1,790
25	do	6.84	4,090
Sept. 6	do	3.27	[a]35.1

[a] Measurement made by wading.

Daily gage height, in feet, of Greenbrier River near Marlinton, W. Va., for 1912.

[P. G. Johnston, Jan. 1–Aug. 17, and A. N. Rudd, Sept. 6–Dec. 31, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.3	.....	4.85	5.8	4.21	3.52	4.40	4.26	.....	3.78	3.48	3.62
2	5.8	.....	4.75	5.5	4.16	3.48	4.33	4.02	.....	3.62	3.45	3.56
3	5.35	.....	4.65	5.25	4.12	3.46	4.28	3.82	.....	3.64	3.45	3.64
4	4.9	3.03	4.55	5.1	4.07	3.44	4.24	3.72	.....	3.50	3.42	3.88
5	4.5	.....	4.5	4.8	4.02	3.42	4.18	3.66	.....	3.49	3.40	4.02
6	4.16	.....	4.44	4.5	3.96	3.42	4.13	3.59	3.31	3.45	3.40	4.7
7	4.12	.....	4.37	4.28	3.91	3.40	4.05	3.56	3.31	3.40	5.45	4.8
8	4.25	.....	4.30	4.44	3.88	3.39	3.96	3.52	3.31	3.44	5.9	4.5
9	4.32	.....	4.26	4.7	3.86	3.38	3.89	3.60	3.30	3.42	5.1	4.25
10	4.37	.....	4.21	4.6	3.83	3.35	3.83	3.60	3.30	3.40	4.6	4.18
11	4.42	2.97	4.16	4.48	4.55	3.32	3.79	2.55	3.29	3.40	4.36	4.15
12	4.40	.....	4.23	4.32	6.5	3.28	3.74	3.49	3.25	3.40	4.15	4.08
13	4.38	.....	4.55	4.22	8.7	3.26	3.68	3.46	3.24	3.40	4.00	4.03
14	4.34	.....	5.0	4.14	6.7	3.22	3.62	3.44	3.25	3.40	3.95	4.00
15	4.30	.....	8.7	4.08	5.6	3.19	3.56	3.42	3.25	3.38	3.90	4.10
16	4.30	.....	8.6	4.6	7.5	3.29	3.52	3.42	3.26	3.38	3.82	4.10
17	4.28	.....	7.0	5.1	7.0	3.59	3.46	3.41	3.26	3.36	3.70	3.92
18	4.26	2.85	6.1	5.35	6.0	4.01	3.40	.....	3.32	3.38	3.70	3.92
19	4.26	.....	4.8	5.4	5.5	4.08	3.33	.....	3.39	3.38	3.63	3.85
20	4.24	.....	5.45	5.05	5.3	4.00	3.27	.....	3.38	3.45	.....	3.85
21	4.24	7.0	6.0	4.9	5.0	3.90	3.24	.....	3.40	3.48	3.62	3.85
22	4.42	6.5	5.4	4.8	5.6	3.83	3.22	.....	3.36	3.48	3.61	3.80
23	4.75	6.2	4.9	4.7	5.15	3.76	3.18	.....	3.82	3.50	3.60	3.65
24	4.8	5.8	5.8	4.6	4.7	3.70	3.63	.....	4.9	3.60	3.56	.....
25	4.75	5.6	6.3	4.55	4.35	3.58	7.2	.....	4.7	3.70	3.53	[a]3.8
26	4.7	5.4	5.9	4.46	4.07	3.48	7.6	.....	4.08	3.68	3.50	.....
27	4.6	5.2	5.5	4.39	3.88	3.63	6.4	.....	4.00	3.62	3.50	.....
28	.....	5.1	5.1	4.34	3.74	3.88	5.7	.....	3.85	3.60	3.58	.....
29	.....	4.95	7.2	4.30	3.66	4.49	5.1	.....	3.78	3.55	3.50	.....
30	.....	.....	6.9	4.26	3.60	4.75	4.8	.....	3.82	3.52	3.50	3.80
31	3.12	.....	6.2	.....	3.56	.....	4.5	.....	.....	3.50	.....	6.3

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 7 to Feb. 21 and during most of the period from Nov. 27 to Dec. 30. Observer made no report concerning ice prior to Jan. 28, but from then to Feb. 18 river was reported partly frozen, with ice from 5 to 10 inches thick and broken up at the control. On Feb. 21 rain and the ice break-up were reported. On Nov. 28, Dec. 1 and 2, observer reported river frozen over. On Dec. 4–6, general rain; Dec. 12, ice running; Dec. 13, river frozen over; Dec. 14, "ice gorges up sometimes;" Dec. 25, ice heavy, with snow on top of it; Dec. 30–31, general rain on heavy snow—rain caused rise.

GREENBRIER RIVER AT ALDERSON, W. VA.

Location.—At highway bridge at Alderson, W. Va., half a mile above the mouth of Muddy Creek.

Records available.—August 1, 1895, to July 15, 1906; May 10, 1907, to December 31, 1912.

Drainage area.—1,340 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Permanent or nearly so; wide and shallow.

Discharge measurements.—Made from downstream side of bridge.

Floods.—No record of floods previous to installation of the gage. Maximum gage height since establishment of gage was 18.2 feet November 26, 1900.

Winter flow.—The records are affected little if any by ice.

The following discharge measurement was made by C. T. Bailey:
March 24, 1912: Gage height, 5.88 feet; discharge, 9,200 second-feet.

Daily gage height, in feet, of Greenbrier River at Alderson, W. Va., for 1912.

[W. J. Hancock, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.1	3.85	4.0	4.7	3.45	2.21	2.80	2.20	1.79	2.04	1.86	1.79
2	4.9	3.55	3.5	5.4	3.25	2.19	2.56	2.10	1.78	1.98	1.85	1.85
3	4.2	3.3	3.35	6.0	3.1	2.15	2.38	2.04	1.73	1.90	1.82	1.90
4	3.75	2.92	3.15	5.0	2.94	2.12	2.29	2.12	1.71	1.89	1.81	2.05
5	3.4	2.88	3.0	4.3	2.83	2.08	2.64	2.08	1.65	1.83	1.80	2.20
6	2.95	2.72	2.92	3.8	2.78	2.06	3.0	1.98	1.64	1.79	1.80	2.70
7	2.70	2.80	2.84	3.6	2.62	2.02	2.63	1.96	1.64	1.80	2.00	3.4
8	2.80	2.65	2.96	3.5	3.55	1.96	2.54	1.91	1.67	1.78	4.6	3.2
9	2.96	2.78	3.65	3.3	3.4	1.89	2.37	1.87	1.62	1.76	3.95	2.90
10	2.98	2.55	3.95	3.2	3.25	1.90	2.26	1.84	1.60	1.75	3.2	2.68
11	2.92	2.56	3.6	3.1	3.1	1.80	2.29	1.80	1.62	1.74	2.86	2.52
12	2.79	2.45	3.5	2.96	6.3	1.80	2.49	1.83	1.58	1.72	2.64	2.42
13	2.76	2.46	4.9	2.88	8.3	1.83	2.39	1.82	1.52	1.71	2.48	2.31
14	2.65	2.40	5.4	2.79	6.0	1.80	2.24	1.85	1.51	1.73	2.38	2.12
15	2.58	2.37	6.4	2.74	4.7	1.84	2.36	1.80	1.52	1.82	2.30	2.02
16	2.44	2.35	11.9	2.69	6.1	1.81	2.38	1.74	1.51	1.80	2.24	2.16
17	2.35	2.36	6.7	2.74	8.5	1.81	2.18	1.70	1.49	1.78	2.19	2.26
18	2.52	2.40	5.0	3.2	5.5	1.85	2.15	1.72	1.53	1.74	2.12	2.21
19	2.80	2.57	4.4	3.75	4.3	2.02	2.18	1.77	1.92	1.79	2.09	2.18
20	3.3	2.82	4.2	3.55	3.8	2.12	2.10	1.75	1.75	1.88	2.05	2.16
21	3.2	3.7	4.6	3.25	3.4	2.11	2.38	1.70	1.62	2.14	2.02	2.00
22	3.15	8.1	4.7	3.1	3.15	2.05	2.25	1.75	1.58	2.02	1.99	1.88
23	3.0	5.8	4.4	3.05	2.95	2.20	2.19	1.74	1.78	2.02	1.95	1.78
24	3.0	4.4	5.4	3.1	2.82	2.10	2.99	1.70	3.55	2.09	1.94	1.85
25	3.15	3.8	6.9	3.05	2.71	2.26	2.26	1.69	3.25	2.20	1.92	1.95
26	3.1	3.7	5.7	2.98	2.61	2.25	5.0	1.71	2.84	2.15	1.93	1.91
27	3.05	8.4	4.7	3.05	2.54	2.25	3.4	1.70	2.56	2.11	1.90	1.95
28	2.95	6.2	4.1	3.35	2.45	3.15	2.85	1.64	2.30	2.02	1.90	2.16
29	3.2	4.7	8.3	3.3	2.40	3.10	2.54	1.61	2.18	1.98	1.88	2.04
30	4.5	.....	8.1	3.45	2.38	2.98	2.36	1.63	2.11	1.96	1.81	2.88
31	4.40	.....	5.7	.....	2.29	.....	2.24	1.69	.....	1.90	.....	7.0

NOTE.—Relation of gage height to discharge probably affected by ice Jan. 8 to 18. There may also have been some slight effect for a short period in February.

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10,000	3,720	4,100	5,960	2,740	501	1,330	490	183	347	223	183
2	6,520	2,980	2,860	7,940	2,260	481	942	396	178	301	217	217
3	4,620	2,380	2,500	9,700	1,920	443	696	347	154	246	200	246
4	3,480	1,560	2,040	6,800	1,600	415	587	415	145	240	194	356
5	2,620	1,480	1,720	4,880	1,390	380	1,060	380	120	205	188	490
6	1,620	1,190	1,560	3,600	1,300	364	1,720	301	117	183	188	1,160
7	1,160	1,330	1,400	3,100	1,030	331	1,050	287	117	188	315	2,620
8	.....	1,080	1,640	2,860	2,980	287	913	253	128	178	5,690	2,140
9	.....	1,300	3,220	2,380	2,620	240	683	229	109	169	3,980	1,520
10	.....	928	3,980	2,140	2,260	246	555	211	101	164	2,140	1,130
11	.....	942	3,100	1,920	1,920	188	587	188	109	159	1,440	884
12	.....	788	2,860	1,640	10,600	188	842	205	95	150	1,060	747
13	.....	801	6,520	1,480	17,500	205	708	200	76	145	828	610
14	.....	720	7,940	1,310	9,700	188	533	217	73	154	696	415
15	.....	683	10,900	1,230	5,960	211	671	188	76	200	598	331
16	.....	659	31,100	1,140	10,000	194	696	159	73	188	533	452
17	.....	671	11,900	1,230	18,200	194	471	140	68	178	481	555
18	.....	720	6,800	2,140	8,230	217	443	150	79	159	415	501
19	1,330	956	5,150	3,480	4,880	331	471	174	260	183	388	471
20	2,380	1,370	4,620	2,980	3,600	415	396	164	164	234	356	452
21	2,140	3,350	5,690	2,260	2,620	405	696	140	109	434	331	315
22	2,040	16,800	5,960	1,920	2,040	356	544	164	95	331	308	234
23	1,720	9,100	5,150	1,820	1,620	490	481	159	178	331	280	178
24	1,720	5,150	7,940	1,920	1,370	396	1,700	140	2,980	388	274	217
25	2,040	3,600	12,600	1,820	1,180	555	555	136	2,260	490	260	280
26	1,920	3,350	8,810	1,680	1,020	544	6,800	145	1,400	443	267	253
27	1,820	17,800	5,960	1,820	913	544	2,620	140	942	405	246	280
28	1,620	10,300	4,360	2,500	788	2,040	1,420	117	598	331	246	452
29	2,140	5,960	17,500	2,380	720	1,920	913	105	471	301	234	347
30	5,420	.....	16,800	2,740	696	1,680	671	113	405	287	194	1,480
31	5,150	.....	8,810	.....	587	.....	533	136	.....	246	.....	12,900

NOTE.—Daily discharge computed from a rating curve 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 16,400 second-feet (gage height 8.0 feet).

Mean discharge Jan. 8 to 18 estimated, because of ice, from gage heights, observer's notes, and climatologic records, at 700 second-feet. This estimate of discharge when the relation of gage height to discharge is believed to have been affected by ice is based on insufficient data and therefore should be used with caution. No correction applied for possible effect of ice in February.

Monthly discharge of Greenbrier River at Alderson, W. Va., for 1912.

[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	10,000	.....	2,230	1.66	1.91	C.
February	17,800	659	3,510	2.62	2.83	B.
March	31,100	1,400	6,950	5.19	5.98	B.
April	9,700	1,140	2,960	2.21	2.47	A.
May	18,200	587	4,010	2.99	3.45	A.
June	2,040	188	498	.372	.42	A.
July	6,800	396	1,040	.776	.89	A.
August	490	105	213	.159	.18	A.
September	2,980	68	395	.295	.33	B.
October	490	145	257	.192	.22	A.
November	5,690	188	759	.566	.63	B.
December	12,900	178	1,050	.784	.90	B.
The year	31,100	.....	1,990	1.49	20.21	

NOTE.—See footnote to table of daily discharge.

GAULEY RIVER AT ALLINGDALE, W. VA.

Location.—At Baltimore & Ohio Railroad bridge one-fourth mile south of depot at Allingdale, W. Va., and immediately below the mouth of Rock Creek.

Records available.—July 3, 1908, to December 31, 1912.

Drainage area.—248 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Rough and irregular, but probably permanent.

Discharge measurements.—Made from upstream side of bridge or from wooden bridge near depot. The bottom of the stream is rough and irregular, but with extreme care accurate measurements can be made. The measuring section at the railroad bridge is a poor one, and measurements are made at the wooden bridge near the railroad depot whenever possible.

Point of zero flow.—Levels taken August 15, 1910, indicate that there would be no flow past the gage if the river stage were to fall to 3.33 feet ±0.2 foot.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by C. T. Bailey:
March 21, 1912: Gage height, 7.65 feet; discharge, 2,060 second-feet.

Daily gage height, in feet, of Gauley River at Allingdale, W. Va., for 1912.

[Harry Jones, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.2	7.6	6.25	6.7	5.9	4.71	5.25	7.2	5.15	5.15	5.0	4.80
2	6.65	7.2	5.95	6.6	5.85	4.65	5.15	6.2	5.0	5.05	5.15	4.89
3	6.6	7.0	5.90	7.6	5.80	4.54	5.15	5.75	4.98	5.0	5.15	5.2
4	6.15	7.0	5.6	7.0	5.6	4.78	5.45	5.5	4.96	4.90	5.05	5.5
5	5.6	6.7	5.45	6.6	5.5	4.77	6.4	5.3	5.1	4.84	5.0	5.9
6	5.2	6.65	5.35	6.25	5.45	4.57	6.05	5.15	4.90	4.78	4.98	6.4
7	5.2	6.4	5.25	6.05	5.6	4.57	5.6	5.0	4.94	4.75	5.05	6.5
8	5.3	5.8	5.25	6.65	6.05	4.54	5.25	4.9	4.82	4.70	9.0	6.25
9	5.35	5.6	5.6	6.3	6.35	4.42	5.1	4.85	4.98	4.68	7.0	5.9
10	5.3	5.35	5.8	6.0	6.0	4.37	5.4	4.78	4.66	4.64	6.2	5.65
11	5.3	5.1	5.7	5.8	5.75	4.36	6.55	4.87	4.68	4.60	5.9	5.6
12	5.2	5.05	5.8	5.65	11.1	4.20	6.05	5.25	4.54	4.60	5.65	5.6
13	5.15	5.0	6.05	5.55	8.6	4.20	5.45	5.5	4.50	4.60	5.5	5.4
14	5.0	4.98	6.7	5.45	8.1	4.22	5.3	5.05	4.47	4.60	5.5	5.05
15	5.0	4.75	6.6	5.3	6.75	4.18	5.8	4.88	4.46	4.60	5.4	5.15
16	5.0	4.97	10.6	5.25	7.7	4.12	7.1	4.78	4.42	4.62	5.3	5.4
17	5.05	5.0	7.8	5.95	8.8	4.22	6.05	4.70	4.44	4.62	5.25	5.4
18	5.1	5.05	7.0	6.2	7.6	5.15	5.8	4.62	4.68	4.62	5.2	5.1
19	5.3	5.15	6.9	6.3	6.85	6.05	8.7	4.80	4.70	4.74	5.15	5.1
20	6.45	5.2	7.3	5.95	6.35	6.1	6.7	5.7	4.76	5.35	5.15	5.15
21	6.0	6.05	7.8	5.7	6.0	5.45	6.0	5.5	4.68	5.15	5.15	5.1
22	6.05	7.6	8.0	5.55	5.75	5.1	7.5	5.3	4.52	4.95	5.15	5.9
23	6.15	6.8	6.9	6.0	5.55	4.98	6.65	5.3	4.54	5.05	5.15	4.7
24	6.25	6.6	7.1	5.95	5.35	5.15	6.0	5.3	6.85	6.1	4.98	5.0
25	6.15	5.95	8.8	5.75	5.2	5.1	9.7	4.96	6.3	5.7	4.98	4.85
26	6.05	6.35	7.4	5.6	5.15	5.6	8.0	4.86	5.65	5.45	4.90	4.86
27	5.7	11.8	6.7	5.5	5.05	6.1	6.7	5.1	5.55	5.45	4.85	5.0
28	5.25	7.2	6.25	5.7	4.96	6.5	6.05	5.0	5.5	5.3	4.75	5.2
29	6.9	6.7	8.3	5.5	4.93	5.8	5.7	5.95	5.3	5.2	5.0	a 5.3
30	10.2	.....	8.6	5.8	4.92	5.45	5.9	5.8	5.3	5.1	4.68	5.4
31	7.7	.....	7.4	.....	4.83	.....	5.75	5.35	.....	5.1	.....	8.5

a Gage height to top of ice.

NOTE.—Relation of gage height to discharge probably affected by ice Jan. 6–19, and possibly at times during February. The observer reported on Apr. 1 that the river did not freeze over at the bridge, probably because of being high and swift at the gage, during the cold periods, but that on the pools both above and below the gage at a distance of about 200 yards the ice ranged from about 10 inches thick at the banks to about 5 inches thick at the center; that on Feb. 27 the ice began to break up and quite a large quantity came down from above, after which date there was no ice.

GAULEY RIVER NEAR SUMMERSVILLE, W. VA.

Location.—At highway bridge known as Brocks Bridge, 2½ miles southeast of Summersville, W. Va., and one-eighth mile below mouth of Muddlety Creek.
Records available.—July 6, 1908, to December 31, 1912.
Drainage area.—686 square miles.
Gage.—Standard chain gage attached to bridge; datum unchanged since established.
Channel.—Practically permanent.
Discharge measurements.—Made from downstream side of bridge.
Winter flow.—Relation of gage height to discharge may be affected by ice for short periods during December, January, and February.
Accuracy.—Gage-height records are considered reliable

The following discharge measurement was made by C. T. Bailey:
March 29, 1912: Gage height, 11.96 feet; discharge, 9,460 second-feet.

Daily gage height, in feet, of Gauley River near Summersville, W. Va., for 1912.

[Mrs. Sula Gawthrop, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.4	7.7	7.4	8.4	7.4	4.02	4.13	7.4	6.3	5.4	4.95	4.6
2	7.9	7.2	6.4	8.9	6.9	4.0	3.68	5.65	5.2	5.7	4.42	4.65
3	7.4	6.0	7.6	10.1	6.6	3.06	4.6	5.5	4.8	5.7	5.05	5.9
4	7.2	6.5	6.2	9.1	6.1	3.44	4.00	5.6	6.2	5.6	5.2	6.2
5	6.6	7.1	7.2	8.3	6.5	3.72	7.0	4.95	5.9	4.46	4.55	7.2
6	6.8	6.8	8.0	7.6	6.1	3.18	6.3	5.45	4.6	4.36	3.87	7.8
7	6.7	6.4	5.4	7.2	7.5	4.15	5.0	4.4	6.4	4.33	7.3	8.5
8	6.8	6.4	5.6	8.1	7.9	3.60	4.95	5.95	4.6	4.5	11.4	7.4
9	7.0	6.3	7.4	7.4	8.0	3.88	4.06	4.9	4.33	4.08	9.2	6.8
10	7.0	6.2	6.7	7.1	7.2	2.31	6.2	4.23	5.2	3.83	7.8	6.4
11	7.1	6.0	7.6	6.6	6.7	3.74	4.75	5.35	4.6	4.40	7.3	6.2
12	7.2	6.1	9.7	6.3	13.6	3.02	6.8	5.7	3.30	4.30	6.3	5.65
13	7.0	6.0	8.6	6.2	11.8	2.94	5.2	6.3	3.60	3.68	5.5	5.2
14	6.6	5.8	9.0	6.6	9.5	2.95	5.1	5.75	4.13	4.02	5.75	4.8
15	6.6	5.7	11.8	5.5	8.8	2.62	5.65	5.7	3.26	4.08	5.5	4.37
16	6.8	5.7	13.2	6.5	11.5	2.87	7.4	5.15	3.93	3.81	5.4	4.02
17	6.8	5.55	10.2	7.6	11.2	3.44	6.2	5.55	4.5	3.53	4.95	4.7
18	6.6	5.45	8.8	7.2	9.7	4.30	7.8	4.55	3.60	3.99	5.2	5.2
19	8.4	5.55	8.6	7.4	8.5	6.6	9.4	4.95	4.8	4.03	5.05	5.05
20	9.3	6.0	9.8	6.6	7.8	6.8	7.6	6.7	4.9	5.75	4.85	4.8
21	7.9	7.2	9.8	6.2	7.1	5.6	6.7	6.0	4.20	4.75	5.05	5.0
22	7.3	10.1	10.0	6.3	6.4	5.4	7.6	6.0	4.10	4.5	5.05	5.05
23	6.8	8.5	8.6	6.7	6.1	5.0	6.5	6.0	4.8	5.0	4.47	5.0
24	6.4	7.8	10.6	6.5	5.6	4.12	6.0	5.2	7.9	7.2	4.95	5.2
25	6.1	6.9	11.3	6.5	5.55	6.4	12.8	4.8	7.1	6.7	4.85	5.1
26	5.7	9.2	9.2	6.2	5.0	5.4	10.6	5.45	5.9	6.1	4.55	5.3
27	6.4	13.0	8.2	6.0	4.9	6.0	7.9	5.75	6.1	5.85	4.36	5.5
28	6.2	10.5	6.8	6.7	4.85	7.3	5.3	4.8	6.0	5.25	4.5	5.7
29	6.6	8.4	10.2	6.5	4.75	8.3	5.65	7.9	5.95	5.3	4.25	5.6
30	10.0	.....	11.1	7.0	4.7	4.65	5.8	8.5	5.3	4.75	4.47	6.9
31	9.4	.....	9.7	.....	4.38	.....	6.2	6.6	.....	5.0	.....	11.0

NOTE.—No report by observer relative to ice is available. Relation of gage height to discharge probably affected by ice during parts of January and February.

GAULEY RIVER NEAR BELVA, W. VA.

Location.—Three-fourths mile below Chesapeake & Ohio Railway bridge at Belva, W. Va., one-fourth mile below the mouth of Twentymile Creek, and about 5½ miles above the mouth of river at Gauley Bridge.
Records available.—August 25, 1908, to December 31, 1912.
Drainage area.—1,420 square miles.
Gage.—Vertical staff gage fastened to tree on right bank; datum unchanged since established. The sea-level elevation of the zero of the gage is 663.53 feet.

Channel.—Coarse gravel; practically permanent.

Discharge measurements.—Made from a boat 1,000 feet above gage or by wading.

Floods.—No records of floods previous to installation of gage are available. Maximum gage height since installation of gage was approximately 19 feet January 30, 1911.

Winter flow.—Relation of gage height to discharge may be affected by ice at intervals during December, January, and February.

Accuracy.—Records of gage height are accurate and reliable. Sufficient data have not been obtained to warrant the publication of estimates of discharge.

Discharge measurements of Gauley River near Belva, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 2	C. T. Bailey	6.16	[a] 6,460
Sept. 11	do	2.12	[b] 342

[a] At Kanawha & Michigan Railroad bridge 5 miles below gage; increase in drainage area about 1 per cent.
[b] Wading measurement.

Daily gage height, in feet, of Gauley River near Belva, W. Va., for 1912.

[C. L. Davis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.3	5.8	5.4	6.4	5.6	2.4	3.5	4.6	4.0	2.95	2.55	2.2
2	5.6	5.2	4.6	6.6	5.2	2.4	3.1	4.3	3.4	2.8	2.55	2.35
3	5.0	4.6	4.3	8.3	4.8	2.3	2.8	3.7	3.1	2.65	2.6	2.5
4	4.6	4.0	4.0	7.2	4.4	2.25	3.3	3.3	2.85	2.5	2.5	3.4
5	4.1	3.6	3.8	6.2	4.0	2.2	4.0	2.95	3.0	2.4	2.4	4.4
6	3.6	3.3	3.6	5.4	3.9	2.2	4.2	2.75	2.8	2.3	2.4	5.4
7	3.7	3.4	3.5	4.9	4.5	2.1	3.8	2.55	2.65	2.2	3.5	5.6
8	4.3	3.7	3.45	5.2	5.6	1.98	3.25	2.45	2.5	2.1	9.1	5.2
9	4.7	3.8	4.0	5.1	5.5	1.91	2.95	2.4	2.4	2.05	6.8	4.6
10	4.7	3.8	5.0	4.8	5.0	1.86	3.0	2.35	2.2	2.0	5.3	4.2
11	4.5	3.7	5.1	4.4	4.5	1.81	3.4	2.3	2.1	1.95	4.4	3.8
12	4.3	3.4	5.2	4.1	9.0	1.72	4.0	2.4	2.05	1.91	4.1	3.6
13	4.0	3.1	7.5	3.8	9.4	1.62	3.5	3.4	1.98	1.85	3.9	3.2
14	3.9	2.85	7.7	3.7	7.4	1.60	3.0	3.15	1.88	1.82	3.6	2.75
15	3.8	2.8	10.3	3.5	6.6	1.54	2.85	2.7	1.85	1.78	3.6	3.1
16	3.8	2.7	13.8	3.6	9.0	1.48	4.0	2.45	1.78	1.71	3.4	3.05
17	4.1	2.7	9.1	4.3	10.2	1.45	3.8	2.3	1.74	1.75	3.1	3.0
18	4.2	2.7	7.1	4.6	7.8	1.55	7.4	2.2	1.75	1.78	3.0	2.9
19	4.9	2.9	6.2	5.2	6.5	2.3	7.3	2.45	1.88	1.78	2.95	2.9
20	6.8	3.3	6.3	4.8	5.5	3.4	5.5	3.25	1.95	1.72	2.9	2.9
21	5.5	4.4	7.2	4.4	4.8	3.4	4.2	4.0	1.9	3.0	2.85	2.7
22	4.8	7.8	7.2	4.1	4.3	2.9	3.5	4.6	1.9	2.7	2.8	2.55
23	4.2	6.8	6.4	4.4	3.8	2.55	4.3	4.0	2.75	2.55	2.7	2.4
24	4.0	6.0	6.8	4.5	3.5	2.6	3.7	3.4	3.7	3.5	2.65	2.6
25	3.8	5.2	9.0	4.3	3.2	2.9	6.8	3.0	4.1	4.4	2.6	2.5
26	3.6	6.4	7.4	4.0	3.1	3.0	7.6	2.9	3.8	3.7	2.6	3.15
27	3.6	12.2	6.3	4.2	3.0	3.5	5.9	3.5	3.5	3.4	2.6	2.65
28	3.5	8.4	5.4	4.8	2.8	5.6	5.2	3.25	3.6	3.15	2.5	3.0
29	3.6	6.6	7.4	4.8	2.7	5.0	4.2	3.9	3.3	2.95	2.4	3.4
30	7.0	.....	8.8	5.1	2.6	3.9	4.4	6.5	3.1	2.75	2.3	4.5
31	7.0	.....	7.8	.....	2.5	.....	4.6	4.8	.....	2.6	.....	9.2

NOTE.—Relation of gage height to discharge probably affected by ice Jan. 7–19 and Feb. 7–18. Observer reported as follows: Jan. 16, river entirely frozen over; ice about 4 inches thick, control partly frozen; Jan. 20, no ice; Feb. 4, river open in middle, ice along shore 2 inches thick, control open; Feb. 11, ice along shore 4 inches thick, ice broken up at control; Feb. 21, no ice.

CHERRY RIVER AT RICHWOOD, W. VA.

Location.—At the highway bridge at Richwood, W. Va., half a mile below junction of North and South forks.

Records available.—July 3, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Coarse gravel; practically permanent, but at different times stones and bowlders have been taken from the river bed in the vicinity of the point of control and the relation of gage height to discharge has thereby been affected. The first stones were removed during August, 1909; additional stones were removed during May, June, July, and August, 1911.

Discharge measurements.—Made from downstream side of bridge.

Point of zero flow.—A determination by leveling August 16, 1910, indicates that there would be no flow past the gage if the river stage were to fall to 1.3 feet ±0.2 foot.

Winter flow.—The relation of gage height to discharge is at times affected by ice during December, January, and February.

Accuracy.—See discussion under "Channel." Sufficient data have not been obtained to permit estimates of discharge to be published.

The following discharge measurement was made by C. T. Bailey, March 20, 1912: Gage height, 4.35 feet; discharge, 1,270 second-feet.

Daily gage height, in feet, of Cherry River at Richwood, W. Va., for 1912.

[Floyd Artrip, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.3	2.95	3.0	3.2	3.1	2.18	2.28	2.62	2.60	2.40	2.38	2.22
2	3.05	2.75	2.85	3.7	2.98	2.15	2.22	2.50	2.50	2.36	2.43	2.32
3	2.92	2.72	2.75	3.7	2.90	2.18	2.20	2.42	2.43	2.33	2.36	2.82
4	2.80	2.60	2.62	3.35	2.78	2.12	2.38	2.35	2.60	2.28	2.30	2.79
5	2.58	2.65	2.58	3.2	2.70	2.10	2.50	2.28	2.40	2.23	2.28	3.05
6	.....	2.70	2.50	3.0	2.65	2.05	2.32	2.22	2.36	2.23	2.28	3.25
7	.....	2.70	2.50	3.1	3.4	2.10	2.22	2.20	2.28	2.20	4.6	3.2
8	.....	.....	2.50	3.15	3.35	2.02	2.18	2.15	2.20	2.18	4.1	3.35
9	.....	.....	2.75	3.0	3.15	1.98	2.25	2.15	2.16	2.16	3.4	2.82
10	.....	.....	2.70	2.95	3.0	1.95	2.50	2.30	2.13	2.13	3.05	2.72
11	.....	.....	2.65	2.78	2.95	1.90	3.2	2.30	2.08	2.08	2.89	2.67
12	2.48	.....	2.70	2.70	5.0	1.90	2.78	2.42	2.06	2.08	2.75	2.52
13	2.38	.....	3.4	2.62	4.0	1.90	2.55	2.38	2.00	2.06	2.67	2.47
14	2.35	.....	3.1	2.60	3.55	1.90	2.60	2.25	1.98	2.10	2.72	2.52
15	2.30	2.25	6.2	2.58	3.35	1.88	3.3	2.12	1.98	2.08	2.65	2.47
16	.....	2.25	4.6	2.82	6.0	1.92	3.15	2.08	2.08	2.08	2.55	2.42
17	.....	2.22	3.7	2.70	4.5	2.20	2.75	2.05	2.10	2.03	2.52	2.37
18	2.40	2.32	3.5	2.98	3.55	2.40	2.80	2.05	2.08	2.03	2.47	2.37
19	2.85	2.38	3.6	2.85	3.3	2.78	3.0	2.45	2.20	2.63	2.47	2.39
20	3.05	2.68	4.4	2.78	3.05	2.65	2.75	2.55	2.10	2.66	2.45	2.29
21	2.75	3.7	4.0	2.70	2.88	2.35	2.60	2.45	2.06	2.46	2.42	2.27
22	2.70	3.9	3.85	2.75	2.78	2.25	2.60	2.65	1.98	2.38	2.37	2.29
23	2.60	3.3	3.35	2.88	2.68	2.72	2.50	2.48	3.05	3.1	2.37	2.35
24	2.60	3.1	4.0	2.80	2.58	2.38	2.40	2.30	3.4	2.70	2.32	2.27
25	2.50	2.92	3.8	2.72	2.50	2.65	4.10	2.26	3.05	2.66	2.32	2.32
26	2.50	4.6	3.45	2.68	2.48	2.62	3.55	2.28	2.76	2.63	2.27	2.42
27	2.45	4.4	3.15	2.85	2.38	2.52	3.1	2.40	2.76	2.63	2.27	2.37
28	2.45	3.55	3.0	3.4	2.32	2.65	2.80	2.28	2.63	2.58	2.25	2.37
29	2.70	3.25	4.8	2.85	2.30	2.42	2.80	3.65	2.53	2.53	2.19	2.39
30	3.5	.....	3.9	3.2	2.25	2.32	2.88	3.1	2.48	2.48	2.22	3.25
31	3.1	.....	3.45	.....	2.20	.....	2.68	2.76	.....	2.40	.....	3.4

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 6–12, 16–18, and Feb. 5–17. Observer reported as follows: Jan. 6–11, river frozen over; Jan. 12, ice thawed out; Jan. 16 and 17, river frozen; Jan. 18, thawing; Feb. 8–14, river frozen; and Feb. 15, ice thawing out.

MEADOW RIVER NEAR RUSSELLVILLE, W. VA.

Location.—At Bays Ferry, 3 miles below Russellville, W. Va., one-fourth mile below mouth of Youngs Creek.

Records available.—July 17, 1908, to December 31, 1912.

Drainage area.—297 square miles.

Gage.—Standard chain gage attached to trees on left bank just above the ferry; datum unchanged since established.

Channel.—Practically permanent.

Discharge measurements.—Made from a boat or by wading.

Winter flow.—Relation of gage height to discharge is at times affected by ice gorges.

Accuracy.—In the fall backwater is sometimes caused at the gage by leaves lodging at the riffle below the gage. Because of an error in the gage found by wye levels on November 20, 1913 (before this report was prepared), gage heights of discharge measurements and daily gage heights for this station for 1909, 1910, and 1911, published in Water Supply Papers 263, 283, and 303, should be corrected as follows:

February 21, 1909, to June 7, subtract 0.02 foot.
June 8 to September 24, subtract 0.03 foot.
September 25, 1909, to January 11, 1910, subtract 0.04 foot.
January 12 to April 28, subtract 0.05 foot.
April 29 to August 15, subtract 0.06 foot.
August 16 to November 30, subtract 0.07 foot.
December 1, 1910, to March 17, 1911, subtract 0.08 foot.
March 18 to July 3, subtract 0.09 foot.
July 4 to October 19, subtract 0.10 foot.
October 20 to December 31, 1911, subtract 0.11 foot.

The necessary corrections have been applied to the gage heights in the following tables:

Discharge measurements of Meadow River near Russellville, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 27	C. T. Bailey	7.02	1,370
30	do	9.44	3,230

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for 1912.

[J. R. Bays, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.3	6.8	6.4	7.5	6.9	3.81	4.55	3.79	4.15	3.83	3.86	3.56
2	6.3	6.4	5.9	7.8	6.3	3.73	4.06	3.69	4.09	3.71	3.82	3.74
3	6.0	5.8	5.35	8.7	6.0	3.65	3.85	3.57	3.89	3.60	3.78	3.98
4	5.7	5.6	5.0	8.1	5.6	3.57	4.07	3.39	3.73	3.51	3.71	4.65
5	6.3	[a] 5.5	4.95	7.0	5.25	3.50	4.5	3.35	3.71	3.42	3.60	6.0
6	5.6	[a] 5.2	4.8	6.3	5.15	3.42	4.8	3.29	3.67	3.33	3.56	6.4
7	5.5	[a] 5.1	4.7	5.8	6.1	3.37	4.9	3.23	3.59	3.27	4.41	6.6
8	5.3	[a] 5.05	4.7	5.4	6.3	3.29	4.7	3.18	3.49	3.24	7.9	6.2
9	5.1	4.75	5.9	5.8	6.1	3.26	4.17	3.15	3.35	3.19	6.9	5.6
10	4.85	4.43	6.3	5.5	5.7	3.21	4.42	3.14	3.27	3.15	5.9	5.15

[a] Gage height to top of ice.

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for 1912—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	.....	4.38	6.2	5.3	5.4	3.09	4.29	3.13	3.23	3.12	5.45	4.9
12	.....	4.36	6.4	5.05	9.3	3.04	4.23	3.11	3.19	3.10	5.0	4.7
13	.....	4.36	8.3	4.9	9.4	3.00	4.09	3.09	3.17	3.10	4.75	4.55
14	.....	4.32	8.2	4.8	8.5	2.95	3.84	3.08	3.05	3.12	4.65	4.35
15	4.36	4.22	10.9	4.7	7.2	2.91	4.17	3.06	2.94	3.15	4.55	4.33
16	.....	4.18	12.2	4.9	9.1	2.89	4.11	3.05	2.96	3.20	4.41	4.28
17	.....	4.19	9.6	5.1	11.1	2.87	4.11	3.01	2.94	3.27	4.29	4.23
18	.....	4.26	7.8	5.5	9.1	3.05	4.95	2.98	2.98	3.24	4.22	4.17
19	.....	4.43	7.1	5.7	7.2	3.38	4.55	3.09	3.00	3.44	4.14	4.14
20	.....	4.85	6.8	5.5	6.3	3.72	3.89	3.41	2.98	4.46	4.07	4.07
21	.....	7.1	7.3	5.3	5.6	3.80	3.66	4.04	2.95	4.41	4.02	3.97
22	5.4	.....	7.3	5.1	5.1	3.52	3.57	4.8	2.94	4.20	3.96	3.83
23	.....	8.3	7.0	5.5	4.85	3.34	3.43	4.55	3.14	4.41	3.93	3.80
24	.....	7.1	7.9	5.6	4.65	3.25	3.35	4.23	4.10	5.1	3.90	3.76
25	.....	6.4	8.8	5.35	4.47	3.15	4.07	3.84	4.55	5.25	3.89	.....
26	.....	7.3	8.3	5.2	4.34	3.41	5.15	3.59	4.46	4.85	3.87	3.79
27	.....	10.0	7.1	5.5	4.21	3.83	4.7	3.44	4.22	4.7	3.82	3.91
28	.....	8.4	6.5	6.8	4.07	6.2	4.32	3.37	4.10	4.26	3.70	3.98
29	4.37	7.2	8.7	6.5	4.04	5.7	3.97	3.81	4.00	4.20	3.46	3.96
30	7.5	.....	9.5	7.0	4.01	5.25	3.89	4.34	3.89	4.06	3.38	5.00
31	7.3	.....	8.5	.....	3.89	.....	3.83	4.19	.....	3.94	.....	8.0

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–29 and Feb. 4–8. Observer reported as follows: Jan. 5, ice gorge; Jan. 10, river frozen up solid, ice 4 inches thick at gage; Jan 15, control frozen, river entirely frozen over, ice 5 inches thick at gage; Jan 22 and 29, control open, river partly frozen over, ice 6 and 4 inches thick at gage; and Jan. 30, ice gone out. No notes relative to ice during February. In October and November the gage observer reported that false work for the construction of the piers of the new county highway bridge below the gage was placed about the middle of October; that piers were started Oct. 28 and finished Nov. 6, and that the bridge would not be completed until after Dec. 31, 1912.

ELK RIVER AT WEBSTER SPRINGS, W. VA.

Location.—At suspension bridge on the grounds of the Webster Springs Hotel at Webster Springs, W. Va., one-fourth mile above the mouth of Back Fork Creek.

Records available.—July 1, 1908, to December 31, 1912.

Drainage area.—168 square miles.

Gage.—Vertical staff attached to right abutment of bridge; datum unchanged since established.

Channel.—Coarse gravel; practically permanent.

Discharge measurements.—Made from upstream side of bridge or by wading.

Point of zero flow.—Levels taken August 13, 1910, indicate that there would be no flow past the gage at a stage of 0.95 foot±0.2 foot.

Winter flow.—Relation of gage height to discharge is sometimes affected by ice.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be published. No discharge measurement was made at this station during 1912. Because of errors in the gage found by wye levels on December 3, 1913 (before the preparation of this report), gage heights of discharge measurements and daily gage heights for this station for 1910 and 1911, published in Water-Supply Papers 283 and 303, should be corrected as follows:

Gage heights below 6.0 feet:

August 20 to November 21, 1910, add 0.04 foot.

November 22, 1910, to February 28, 1911, add 0.03 foot.

March 1 to June 10, 1911, add 0.02 foot.

Gage heights above 6.0 feet:

March 1 to June 10, 1911, subtract 0.02 foot.

June 11 to September 20, 1911, subtract 0.03 foot.

September 21 to December 31, 1911, subtract 0.04 foot.

The necessary corrections have been applied to the daily gage heights for 1912 in the following table:

Daily gage height, in feet, of Elk River at Webster Springs, W. Va., for 1912.

[Cherry Woodzell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.0	3.25	2.90	3.5	2.70	2.00	2.47	3.1	2.15	2.32	2.06	1.96
2	3.5	3.05	2.80	3.7	2.68	1.94	2.40	2.97	2.07	2.19	2.12	2.06
3	3.2	2.92	2.76	3.9	2.67	1.96	2.30	2.75	2.07	2.09	2.07	2.51
4	3.05	2.90	2.68	3.7	2.60	1.98	2.68	2.52	2.07	2.01	2.02	2.61
5	2.96	.....	2.60	3.45	2.56	1.97	3.3	2.41	2.01	1.97	1.96	2.91
6	.....	.....	2.53	3.25	2.49	1.92	2.93	2.29	1.99	1.95	1.96	3.15
7	.....	.....	2.50	3.15	3.15	1.92	2.63	2.19	1.99	1.93	3.85	3.25
8	.....	.....	2.50	3.35	3.5	1.87	2.38	2.05	1.89	1.86	4.4	3.05
9	.....	.....	2.88	3.15	3.4	1.80	2.30	2.02	1.81	1.83	3.6	2.91
10	.....	.....	2.99	2.98	3.1	1.77	2.38	2.01	1.76	1.78	3.15	2.74
11	.....	2.40	2.83	2.83	2.88	1.70	2.86	2.05	1.69	1.75	2.84	2.67
12	.....	.....	2.78	2.70	5.6	1.60	2.80	2.29	1.67	1.73	2.68	2.58
13	.....	.....	3.45	2.60	4.6	1.58	2.56	2.17	1.63	1.71	2.58	2.41
14	2.6	.....	3.5	2.50	3.9	1.58	2.93	2.03	1.61	1.72	2.56	2.36
15	.....	.....	5.7	2.48	3.6	1.58	2.98	1.97	1.57	1.68	2.48	2.35
16	.....	.....	5.4	3.5	5.4	2.24	2.93	1.96	1.62	1.67	2.38	2.28
17	.....	.....	4.1	3.4	4.5	2.73	2.80	1.89	1.77	1.67	2.35	2.24
18	.....	2.55	3.7	3.45	4.0	2.48	4.15	1.92	1.79	1.65	2.30	2.22
19	4.0	.....	3.55	3.25	3.6	2.78	4.2	2.32	1.79	1.71	2.26	2.26
20	3.65	.....	4.2	3.05	3.3	2.93	3.45	2.72	1.79	2.27	2.25	2.25
21	3.3	3.5	4.35	2.86	3.05	2.68	3.05	2.59	1.81	2.12	2.21	2.22
22	3.1	4.25	4.1	2.78	2.83	2.48	4.35	2.42	1.77	1.92	2.16	2.21
23	2.78	3.55	3.8	3.5	2.63	2.42	3.65	2.29	1.97	2.02	2.16	2.16
24	2.72	3.2	4.35	3.15	2.43	2.33	3.2	2.19	3.05	2.75	2.16	2.12
25	2.64	2.95	4.6	2.98	2.26	2.30	4.85	2.07	3.05	2.62	2.16	2.04
26	2.58	4.8	3.9	2.87	2.22	2.38	4.0	1.97	2.82	2.49	2.15	1.96
27	2.55	5.4	3.55	2.78	2.19	2.66	3.45	2.05	2.62	2.38	2.14	2.51
28	2.52	4.05	3.2	2.78	2.18	2.93	3.05	2.12	2.49	2.28	2.04	2.56
29	3.25	3.45	4.1	2.72	2.17	2.73	2.92	1.99	2.37	2.20	1.96	2.61
30	4.35	.....	4.6	2.74	2.14	2.53	3.05	2.43	2.45	2.15	1.96	3.9
31	3.6	.....	3.9	.....	2.06	.....	2.97	2.31	.....	2.10	.....	4.35

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–19 and Feb. 4–21. Probably little if any effect during December. Observer reported relative to ice as follows: Jan. 6, slush ice, gorged across river; Jan. 14, control partly frozen, river entirely frozen over at gage, ice about 12 inches thick; Jan. 19, ice going out; Feb. 3, river partly frozen, ice at gaging section 1 inch thick; Feb. 4, 11, and 18, control partly frozen, river frozen over, ice 2 inches thick on Feb. 4 and 10 inches on other dates; Feb. 21, rain, ice going out; Dec. 23 and 28, river frozen over, ice 2 to 5 inches thick, and Dec. 30, rain, ice gone out.

ELK RIVER AT GASSAWAY, W. VA.

Location.—At the Coal & Coke Railroad bridge in the northeastern part of Gassaway, W. Va., immediately below the mouth of Little Otter Creek.

Records available.—July 1, 1908, to December 31, 1912.

Drainage area.—578 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged. The sea-level elevation of the zero of the gage is 796.31 feet.

Channel.—Coarse gravel; point of control is probably permanent.

Discharge measurements.—Made from upstream side of bridge or by wading.

Floods.—No records of floods prior to the installation of the gage are available. The flood of January 30, 1911, reached a stage of 30.4 feet as determined by wye levels on September 13, 1912.

Point of zero flow.—Determinations by leveling August 12, 1910, and September 13, 1912, indicate that there would be no flow past the gage if the stage were to fall to 0.5 foot$\pm$0.2 foot.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be published.

Discharge measurements of Elk River at Gassaway, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 19	C. T. Bailey	5.48	2,170
Sept. 13	do	1.98	169

Daily gage height, in feet, of Elk River at Gassaway, W. Va., for 1912.

[H. A. Hays, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.9	5.7	5.1	6.7	3.25	1.86	2.64	4.4	2.82	3.05	1.96	1.86
2	5.4	5.1	4.8	6.7	3.2	1.68	3.05	4.9	2.74	2.98	2.04	1.84
3	4.9	4.1	3.9	7.4	3.15	1.80	2.78	4.1	2.48	2.80	2.31	1.84
4	4.7	3.9	3.7	6.5	3.1	1.38	4.7	3.6	2.42	2.44	2.27	1.88
5	4.4	3.7	3.15	5.6	3.5	1.46	3.5	2.92	2.26	2.10	2.23	2.02
6	4.1	4.1	2.84	4.9	3.2	1.80	4.6	2.52	2.22	2.02	2.19	3.8
7	3.9	3.8	2.58	4.6	4.2	1.78	3.8	2.36	2.18	1.96	2.12	3.9
8	3.9	3.7	2.76	4.5	6.9	1.59	2.67	2.22	2.30	1.94	5.0	3.8
9	3.8	3.6	3.6	4.4	6.3	1.62	2.69	2.23	1.69	1.88	6.0	3.15
10	3.7	3.3	3.1	4.1	5.0	1.64	2.68	2.65	1.70	1.84	5.3	2.99
11	3.6	3.2	3.8	3.8	4.0	1.36	2.54	3.05	1.79	1.79	3.9	3.10
12	3.6	3.05	4.6	3.5	8.6	1.48	2.78	2.26	1.24	1.75	3.35	2.94
13	3.45	2.79	7.0	3.35	9.8	1.47	2.70	2.53	1.54	1.72	3.05	2.94
14	3.4	2.44	8.2	3.25	7.3	1.39	2.68	2.60	1.88	1.71	2.98	2.70
15	3.35	2.29	9.0	3.15	6.0	1.29	2.66	2.42	1.87	1.70	2.94	2.41
16	3.3	2.26	15.9	2.90	8.7	1.42	2.64	1.91	1.86	1.70	2.90	2.49
17	3.3	2.22	9.2	3.0	11.8	2.09	2.80	1.76	1.84	1.69	2.88	2.38
18	3.7	2.19	6.5	4.6	7.4	2.72	4.2	1.62	1.93	1.68	2.84	2.47
19	4.8	2.34	5.5	5.3	6.3	2.67	8.5	1.88	2.00	1.70	2.81	3.7
20	5.0	3.6	5.8	5.4	5.4	2.68	8.9	2.42	1.98	1.74	2.48	2.39
21	4.6	4.3	7.6	4.4	4.2	2.64	7.1	3.7	1.94	1.92	2.27	2.20
22	4.5	5.7	8.6	4.2	3.7	2.78	8.6	3.7	2.28	2.30	2.26	2.05
23	4.5	4.8	7.4	4.2	3.25	2.74	7.4	2.86	3.3	2.48	2.24	1.98
24	4.2	4.4	6.8	4.3	2.96	2.25	7.2	2.50	3.6	2.22	2.23	1.96
25	3.4	4.4	10.0	4.0	2.83	2.40	16.6	2.39	3.5	2.10	2.22	1.96
26	3.3	7.8	7.8	3.7	2.39	3.35	12.7	2.40	3.4	2.06	2.20	1.99
27	3.4	15.5	6.1	3.4	2.29	3.45	9.8	2.62	3.35	2.04	2.18	2.12
28	3.6	8.7	5.1	3.6	2.14	3.25	9.2	2.40	3.3	2.02	2.05	2.66
29	5.3	6.3	7.0	3.5	2.55	3.6	8.9	3.5	3.25	2.00	1.88	3.6
30	9.1	.....	9.0	3.15	2.18	3.40	4.2	4.5	3.1	2.10	1.86	5.1
31	7.8	.....	7.1	.....	2.10	.....	4.6	3.9	.....	2.02	.....	10.9

NOTE.—On Apr. 30, in a general report, the observer stated: "No ice in the immediate vicinity of the gage except a little shore ice." Relation of gage height to discharge may have been affected slightly by ice about Jan. 7–17.

ELK RIVER AT CLENDENIN, W. VA.

Location.—At highway bridge in town of Clendenin, W. Va., immediately above mouth of Big Sandy Creek. See "Accuracy."

Records available.—June 27, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged since established. The elevation above sea level of the zero of the gage is 588.69 feet.

Channel.—Practically permanent; point of control is probably permanent.

Discharge measurements.—Made from downstream side of bridge or by wading.

Floods.—The high water of 1889 reached a stage of about 31.9 feet referred to gage datum.

Point of zero flow.—Levels taken August 11, 1910, and September 14, 1912, indicate that there would be no flow past the gage if the stage were to fall to 1.0 foot ±0.2 foot.

Winter flow.—Ice may affect the relation of gage height to discharge at times during December, January, and February.

Accuracy.—Big Sandy Creek empties into Elk River immediately below the gage and affects the gage height. This effect may be negligible during periods of low water in the Big Sandy, but at other times the flow of the creek may be a large percentage of the flow in the Elk River above the Big Sandy. On November 28, 1913 (before the preparation of this report), the station was visited by engineers of the Survey, and the flow of the Big Sandy measured and found to be 29 per cent of the flow in Elk River above Big Sandy Creek at that time. In making estimates of discharge at this station the discharge and drainage area of Big Sandy Creek should be included; that is, the Clendenin gage should be considered as an index of the flow of the Elk River just below the mouth of Big Sandy Creek. Discharge measurements at this station published to date do not include the flow of the Big Sandy, and should, therefore, be used with caution.

Discharge measurements of Elk River at Clendenin, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 16	C. T. Bailey	16.46	22,000
Sept. 14	....do	2.38	193

Daily gage height, in feet, of Elk River at Clendenin, W. Va., for 1912.

[J. W. Riley, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.8	7.0	6.1	7.6	4.3	2.80	4.2	5.1	4.8	3.2	2.70	2.49
2	6.6	5.9	5.3	8.3	4.3	2.66	3.85	5.0	4.2	3.1	2.62	2.57
3	5.8	5.2	4.8	9.8	4.3	2.64	3.75	4.7	3.8	3.05	2.58	2.52
4	5.3	4.7	4.5	8.1	4.1	2.66	3.6	4.2	3.5	2.97	2.64	2.54
5	4.7	4.5	4.3	6.8	5.0	2.58	5.0	3.9	3.35	2.74	2.70	2.76
6	4.2	4.8	4.1	6.0	4.7	2.53	5.4	3.55	3.35	2.60	2.64	4.0
7	4.0	5.0	4.0	5.4	5.2	2.46	4.6	3.3	3.2	2.61	2.67	4.7
8	4.6	4.6	4.0	5.4	8.6	2.48	4.0	3.1	3.05	2.54	8.0	4.9
9	.....	4.6	4.9	5.3	8.0	2.36	3.7	2.93	2.90	2.47	8.1	4.7
10	.....	4.9	5.4	5.0	6.3	2.33	3.45	2.83	2.81	2.44	5.9	4.3
11	a5.2	4.3	5.6	4.9	5.5	2.30	3.15	2.91	2.67	2.40	4.7	3.9
12	a5.1	4.2	5.9	4.6	6.6	2.25	3.45	5.5	2.56	2.38	4.2	3.65
13	a4.6	4.0	11.0	4.4	10.9	2.24	3.4	4.8	2.50	2.32	3.8	3.45
14	a4.4	3.7	10.3	4.3	8.7	2.17	3.35	4.1	2.44	2.27	3.65	3.2
15	a4.3	3.6	11.8	4.1	6.8	2.06	3.05	3.7	2.37	2.32	3.55	3.0
16	a4.6	3.4	15.9	4.4	6.3	2.06	2.82	3.45	2.44	2.24	3.4	3.05
17	a4.6	3.45	11.6	4.2	10.0	2.13	3.35	3.15	2.37	2.25	3.25	3.05
18	a5.0	3.6	8.6	5.9	8.9	2.95	5.1	2.93	2.50	2.22	3.2	3.1
19	10.6	4.0	6.4	5.4	7.2	3.6	5.9	3.65	2.49	2.16	3.1	3.0
20	9.1	4.9	6.9	5.4	6.2	3.45	6.6	7.0	2.66	2.12	2.91	3.0
21	7.6	5.1	7.6	5.0	5.2	3.7	4.9	5.4	2.56	2.12	2.92	3.05
22	6.6	8.1	8.6	4.7	4.7	3.95	7.7	5.2	2.50	2.18	2.88	3.0
23	5.3	8.1	8.4	4.5	4.3	3.65	8.7	4.7	2.66	2.19	2.84	2.88
24	5.0	6.4	9.6	4.4	3.9	3.15	6.1	4.2	6.0	2.45	2.76	2.90
25	4.7	5.6	10.4	4.6	3.6	3.55	9.5	3.75	4.6	2.64	2.74	3.0
26	4.4	8.7	9.3	4.4	3.35	3.9	12.3	3.7	4.6	2.91	2.70	2.84
27	4.3	14.3	7.3	4.5	3.25	4.6	7.7	4.4	4.2	3.3	2.66	3.0
28	4.1	11.4	6.2	4.6	3.05	5.0	5.7	4.3	3.75	3.05	2.76	4.1
29	5.5	7.5	6.9	4.5	3.0	4.8	4.8	11.1	3.55	2.97	2.63	4.6
30	8.7	.....	9.0	4.4	3.0	4.2	4.9	7.0	3.4	2.84	2.55	5.7
31	9.1	.....	9.9	.....	2.90	.....	5.0	5.7	.....	2.74	.....	10.7

a Gage height to top of slush ice.

NOTE.—Observer made no report concerning ice. Relation of gage height to discharge probably affected by ice Jan. 7-19 and about Feb. 5-12.

COAL RIVER AT BRUSHTON, W. VA.

Location.—At Chesapeake & Ohio Railway bridge at Brushton, W. Va., 500 feet above the mouth of Brush Creek.

Records available.—June 23, 1908, to December 31, 1912.

Drainage area.—379 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged. The elevation above sea level of the zero of the gage is 633.83 feet.

Channel.—A change in channel causing a change in the relation of gage height to discharge is indicated by the discharge measurement made September 17, 1912.

Discharge measurements.—Made from downstream side of bridge or by wading.

Winter flow.—The relation of gage height to discharge is little if at all affected by ice.

Accuracy.—Gage-height records are considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be published.

Discharge measurements of Coal River at Brushton, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 3	C. T. Bailey	6.39	3,680
Sept. 17	....do	1.29	[a] 22.7

[a] Measurement made by wading at section about 1,500 feet above gage.

Daily gage height, in feet, of Coal River at Brushton, W. Va., for 1912.

[G. W. Fitzpatrick, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	3.85	3.4	4.1	4.0	1.75	2.18	2.05	1.97	1.80	1.40	1.36
2	3.45	3.4	3.0	6.5	3.6	1.44	2.7	2.0	1.82	1.69	1.40	1.36
3	3.15	2.95	2.85	7.2	3.3	1.79	2.6	1.88	1.69	1.63	1.38	1.45
4	2.95	2.65	2.7	4.9	3.0	1.67	2.49	1.78	1.60	1.56	1.38	1.64
5	2.55	2.55	2.65	3.95	4.3	1.68	3.3	1.70	1.64	1.51	1.34	2.7
6	2.48	2.6	2.6	3.50	4.4	1.62	2.65	1.61	1.59	1.46	1.33	3.55
7	2.46	2.5	2.6	3.2	6.4	1.06	2.36	1.59	1.46	1.92	1.41	3.3
8	2.37	2.5	2.85	3.0	5.0	1.28	2.09	1.58	1.82	1.88	2.55	2.9
9	2.42	2.34	4.3	2.8	4.1	1.46	2.4	1.54	1.82	1.82	2.9	2.55
10	2.37	2.30	4.8	2.7	3.5	1.42	2.55	1.57	1.60	1.56	2.42	2.32
11	2.35	2.30	4.2	2.6	3.15	1.36	2.4	1.47	1.49	1.34	2.16	2.14
12	2.25	2.32	4.4	2.5	4.4	1.26	4.7	1.50	1.42	1.30	2.02	2.07
13	2.21	2.19	8.9	2.5	5.1	1.22	3.15	1.68	1.34	1.28	1.90	1.89
14	2.36	2.10	6.3	2.46	4.3	1.19	2.55	1.61	1.25	1.25	1.84	1.72
15	2.24	2.12	7.5	2.38	3.6	1.18	2.20	1.52	1.28	1.25	1.81	1.78
16	2.26	2.07	7.4	2.40	3.55	1.34	2.16	1.42	1.26	1.24	1.74	1.81
17	2.22	2.15	5.0	2.42	4.1	1.33	2.29	1.38	1.24	1.22	1.66	1.76
18	2.32	2.24	4.0	2.75	3.8	1.36	3.2	1.32	1.30	1.28	1.60	1.72
19	4.6	2.36	3.55	2.9	3.4	1.72	3.55	1.54	1.26	1.24	1.56	1.72
20	5.2	2.55	3.45	2.8	3.05	2.10	3.05	1.50	1.26	1.26	1.53	1.74
21	4.1	3.05	3.5	2.7	2.8	1.92	2.55	1.60	1.26	1.24	1.48	1.75
22	3.4	6.1	3.6	2.65	2.55	1.54	2.30	1.70	1.27	1.24	1.44	1.60
23	3.1	4.4	3.65	2.7	2.38	1.65	2.14	1.79	1.71	1.52	1.43	1.45
24	2.95	3.7	4.9	2.65	2.25	1.53	2.01	1.78	2.8	1.61	1.42	1.50
25	2.85	3.3	5.6	2.6	2.13	1.52	3.5	1.64	2.49	1.78	1.43	1.54
26	2.7	3.95	4.6	2.46	2.11	1.48	3.85	1.60	2.10	1.78	1.46	1.52
27	2.7	8.2	3.9	3.85	2.02	1.54	2.9	1.98	2.32	1.67	1.44	1.71
28	2.6	5.2	3.5	5.9	1.94	1.86	2.5	1.98	2.27	1.61	1.42	1.84
29	3.0	3.95	5.0	4.6	1.80	2.02	2.3	2.04	2.10	1.56	1.38	2.14
30	6.0	.....	6.2	4.1	1.94	1.88	2.18	2.24	1.94	1.48	1.38	2.8
31	5.0	.....	4.9	.....	1.85	.....	2.02	2.14	.....	1.44	.....	6.0

NOTE.—Observer reported as follows: Jan. 15, shore ice, river open under bridge; Jan. 16, about 100 feet below bridge river frozen over, with ice 5 inches thick; Feb. 11, about two-thirds of water surface frozen over; shore ice all that amounts to anything, ice at gage about 7 inches thick. Relation of gage height to discharge probably affected by ice about Jan. 6–18 and about Feb. 5–13.

COAL RIVER AT FUQUA, W. VA.

Location.—At W. C. Hoy's passenger ferry half a mile below Fuqua railroad station and 1 mile below the mouth of Fuqua Creek.

Records available.—October 12, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff gage in two sections on right bank.

Channel.—Firm sand.

Discharge measurements.—Made from boat 300 feet above gage or by wading.

Point of zero flow.—Wye levels, run September 16, 1912, indicate that there would be no flow past the gage if the river were to fall to a stage of 0.0 foot ±0.2 foot referred to gage datum.

Winter flow.—The relation of gage height to discharge may be affected by ice for short periods.

Accuracy.—Gage-height record is considered reliable. Sufficient data have not been obtained to warrant publication of estimates of discharge.

The following discharge measurement was made by C. T. Bailey by wading at a section about 500 feet above gage:

September 16, 1912: Gage height, 0.89 foot; discharge, 51 second-feet.

Daily gage height, in feet, of Coal River at Fuqua, W. Va., for 1912.

[W. C. Hoy, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.6	6.0	5.0	6.6	6.3	1.65	2.34	2.32	2.00	1.65	0.94	0.94
2	4.6	4.8	4.1	10.4	5.4	1.56	4.6	2.04	1.72	1.48	.94	1.00
3	4.2	3.95	3.85	14.2	4.6	1.60	3.6	1.84	1.52	1.32	.91	1.04
4	3.8	3.8	3.65	9.0	4.0	1.64	2.84	1.67	1.40	1.22	.92	1.10
5	3.75	.....	3.48	6.5	6.9	1.56	2.93	1.57	1.26	1.14	.90	1.76
6	4.0	.....	3.42	5.3	6.8	1.48	2.84	1.44	1.26	1.10	.88	4.2
7	4.2	5.2	3.42	4.6	15.1	1.42	2.40	1.36	1.16	1.04	.98	4.0
8	4.6	.....	3.75	4.3	10.9	1.30	2.01	1.30	1.28	1.00	1.13	3.33
9	4.6	.....	5.8	3.75	7.4	1.28	2.01	1.30	1.44	.95	2.67	2.80
10	4.0	.....	8.2	3.55	5.4	1.25	2.38	1.41	1.26	.91	2.40	2.41
11	3.5	3.75	6.8	3.25	4.5	1.14	2.34	1.34	1.12	.90	1.97	2.16
12	3.42	.....	6.7	3.22	5.4	1.07	4.6	1.48	1.02	.85	1.76	1.99
13	3.12	.....	15.8	3.14	7.7	.98	4.0	1.52	.94	.83	1.60	1.95
14	2.85	3.34	12.4	3.18	5.9	1.03	2.79	1.47	.90	.82	1.52	1.88
15	.....	3.30	12.3	3.01	4.9	.94	2.15	1.36	.94	.80	1.47	1.85
16	.....	3.22	14.3	2.96	4.9	.95	1.91	1.23	.89	.80	1.40	1.63
17	.....	3.38	9.3	2.90	5.9	.96	1.90	1.13	.86	.79	1.34	1.56
18	3.20	3.5	6.6	3.8	5.8	1.13	2.76	1.09	.90	.78	1.26	1.50
19	[a]5.0	3.7	5.4	4.0	5.0	1.22	5.3	1.22	.95	.75	1.20	1.50
20	9.8	4.2	5.5	3.75	4.3	1.93	3.85	1.54	.93	.80	1.16	1.45
21	6.7	5.6	5.4	3.5	3.65	1.90	2.89	1.48	.87	.80	1.12	1.40
22	5.0	11.1	5.6	3.38	3.18	1.66	2.40	1.52	.86	.79	1.10	1.38
23	4.2	8.0	5.6	3.41	2.78	1.54	2.03	1.48	.94	.99	1.07	1.30
24	3.9	5.7	8.1	3.36	2.54	1.42	1.78	1.52	2.63	1.04	1.05	1.26
25	3.6	4.7	10.8	3.19	2.25	1.18	6.6	1.40	2.52	1.12	1.06	1.35
26	3.38	9.2	7.9	3.01	2.20	1.10	6.4	1.50	2.04	1.22	1.06	1.18
27	3.26	13.9	6.2	5.5	2.02	1.19	4.0	1.87	1.75	1.25	1.06	1.43
28	3.16	9.5	5.1	11.6	1.89	1.46	3.04	1.95	2.15	1.15	1.04	1.60
29	3.95	6.4	6.3	8.1	1.85	1.54	2.50	1.93	1.97	1.12	1.08	1.94
30	8.6	.....	10.6	6.7	1.90	2.04	2.36	2.57	1.85	1.10	1.00	3.6
31	8.7	.....	8.6	.....	1.82	.....	2.39	2.40	.....	1.00	.....	9.2

[a] Gage height estimated by observer.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–19, Feb. 4–20, and Dec. 25–29. Observer made full report relative to ice, noting conditions as follows: Jan. 5, ice running; Jan. 6, ice gorged, thickness of ice at gaging section 2 inches; Jan. 14 and 16, river entirely frozen over, ice 7 inches thick, controlling section frozen over; Jan. 18, ice melting, water running over ice, average thickness of ice 6 inches; Jan. 19, can not cross river to read gage, river still frozen over except at banks, river rising, estimated gage height about 5.0 feet, ice breaking up and running out; Jan. 20, ice out; Feb. 4, ice along shores, slush ice running at controlling section; Feb. 7, frozen all week, ice about 5 inches thick and very rough, control frozen; Feb. 11 and 14, river entirely frozen over, ice 8 to 9 inches thick, control frozen over; Feb. 21 ice broke up at 9 a. m.; Dec. 26, river partly frozen over; and Dec. 30, ice broke up.

COAL RIVER AT TORNADO, W. VA.

Location.—At highway bridge at Upper Falls railroad station, one-fourth mile above Tornado, W. Va., and 1 mile above mouth of Smith Creek.

Records available.—June 24, 1908, to June 3, 1912. Station discontinued June 3, 1912, in favor of station at Fuqua. See "Accuracy."

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Practically permanent; strewn with large bowlders.

Discharge measurements.—Made from downstream side of bridge or by wading.

Point of zero flow.—Determined August 8, 1910, as approximately 1.2 feet. The control is a rough log dam and point of zero flow changes.

Winter flow.—The relation between gage height and discharge is affected by ice cover and gorges from one to two weeks at a time during December, January, and February.

Artificial control.—There is a low dam and water-power plant about 1,000 feet below the station.

Accuracy.—The low-water gage heights at this station are affected by the operation of the power plant below the station. Another gaging station has been established at Fuqua above the influence of this dam, by means of which the effect of the power plant upon the lower gage may be observed.

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

April 3, 1912: Gage height, 9.90 feet; discharge, 11,900 second-feet.

Daily gage height, in feet, of Coal River at Tornado, W. Va., for 1912.

[G. C. Hoy, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	3.6	4.0	3.5	4.1	4.0	1.96	16	2.48	2.36	9.4	2.55	3.6	.....
2	3.6	3.55	3.18	6.1	3.65	1.90	17	2.35	2.42	5.7	2.54	3.9	.....
3	3.41	3.28	3.05	9.6	3.36	1.90	18	2.74	2.42	4.2	3.11	3.9	.....
4	3.2	2.94	2.92	5.4	3.2	.....	19	4.8	2.52	3.16	3.10	3.6	.....
5	2.78	3.06	2.81	4.2	4.5	.....	20	6.3	2.86	3.7	3.04	3.28	.....
6	3.02	3.0	2.8	3.7	4.2	.....	21	4.3	3.50	3.65	2.92	3.04	.....
7	2.58	2.92	2.82	3.4	10.4	.....	22	3.6	6.4	3.75	2.88	2.76	.....
8	2.78	2.76	2.98	3.26	6.9	.....	23	3.3	4.8	3.75	2.91	2.58	.....
9	2.95	2.82	3.8	2.98	4.4	.....	24	3.14	3.9	5.1	2.84	2.43	.....
10	2.82	2.52	4.8	2.88	3.8	.....	25	2.99	3.55	6.7	2.75	2.32	.....
11	2.75	2.45	4.2	2.78	3.36	.....	26	2.86	5.3	4.4	2.66	2.28	.....
12	2.5	2.50	4.2	2.74	3.6	.....	27	2.82	9.2	4.0	3.85	2.22	.....
13	2.47	2.50	11.2	2.70	4.6	.....	28	2.75	5.7	3.6	7.4	2.09	.....
14	2.35	2.45	7.9	2.66	3.9	.....	29	3.2	4.1	4.1	5.2	2.00	.....
15	2.48	2.35	7.9	2.60	3.55	.....	30	5.0	.....	6.2	4.2	2.09	.....
							31	5.2	.....	5.0	.....	2.05	.....

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–19 and about Feb. 3–20. Gage height to top of ice Feb. 11. It is questionable whether other gage heights during ice period were read to water surface or to top of ice. Observer reported ice as follows: Jan. 5, ice running, gorged above; Jan. 7, channel frozen over, thickness of ice at gaging station 3 inches; Jan. 10–17, river entirely frozeu over, ice 4 to 6 inches thick; Jan. 19, ice breaking and running; Feb. 3, slush ice running; Feb. 4, ice gorged above; Feb. 5–10, river entirely frozen over above gage, channel open at gage; Feb. 11, river entirely frozen over; Feb. 12, river entirely frozen over, ice 2 inches thick at gage and 7 inches along shores; and Feb. 18, thaw beginning.

POCOTALIGO RIVER AT SISSONVILLE, W. VA.

Location.—At the highway bridge at the post office at Sissonville, W. Va., one-fourth mile below the mouth of Grapevine Creek.

Records available.—June 26, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from downstream side of bridge or by wading.

Floods.—The flood of June 27, 1910, reached a height of 33.0 feet by the gage datum. Some of the flood water passed around the gage.

Point of zero flow.—Levels taken August 10, 1910, indicate that there would be no flow past the gage if the stage were to fall to 1.2 feet ±0.2 foot.

Winter flow.—The relation of gage height to discharge may be affected by ice for short periods in December, January, and February.

Artificial control.—A dam and small power plant above the station modifies the low-water flow.

Accuracy.—Some of the flood water passed around the gage June 27, 1910. Sufficient data have not been obtained to permit estimates of discharge to be made. Because of an error in the gage found by wye levels on November 25, 1913, gage heights of discharge measurements and daily gage heights for this station for 1911, published in Water-Supply Paper 303, should be corrected as follows: February 11 to May 11, subtract 0.02 foot; May 12 to August 12, subtract 0.03 foot; August 13 to November 13, subtract 0.04 foot; November 14 to December 31, subtract 0.05 foot. The necessary correction has been applied to the gage heights in the following tables:

Discharge measurements of Pocotaligo River at Sissonville, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 14	C. T. Bailey	6.09	961
15	....do	13.38	4,130

Daily gage height, in feet, of Pocotaligo River at Sissonville, W. Va., for 1912.

[B. N. Sisson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.0	3.6	3.25	3.8	3.45	1.88	2.8	3.35	2.8	1.89	1.39	1.38
2	4.2	3.4	2.9	8.9	3.15	1.89	3.15	2.6	2.33	1.83	1.64	1.59
3	3.6	3.1	2.85	8.2	2.9	1.85	2.33	2.17	2.11	1.66	1.55	1.80
4	3.25	2.95	2.75	4.6	2.75	1.79	2.11	2.02	1.99	1.49	1.42	1.77
5	2.9	2.95	2.8	3.7	3.05	1.63	1.95	1.80	1.63	1.43	1.38	2.29
6	2.65	2.25	2.8	3.4	3.25	1.61	2.11	1.92	1.66	1.43	1.40	4.6
7	2.55	2.55	2.9	3.3	4.8	1.69	1.89	1.56	1.69	1.41	1.44	3.9
8	2.55	2.55	3.4	3.5	6.8	1.53	1.82	1.56	1.99	1.56	1.50	2.95
9	2.65	2.55	6.3	3.2	4.1	1.35	1.58	1.47	1.70	1.53	1.80	2.55
10	2.55	2.39	5.1	3.25	3.25	1.41	1.77	1.48	1.57	1.47	1.80	2.34
11	2.5	2.20	4.1	3.25	3.0	1.41	1.95	1.76	1.59	1.42	1.88	2.07
12	2.29	2.16	6.3	2.75	3.7	1.44	3.7	10.6	1.23	1.43	1.55	1.97
13	2.30	2.15	12.9	2.7	3.5	1.47	3.1	3.9	1.46	1.42	1.60	1.83
14	2.35	2.21	6.9	3.4	3.1	1.63	2.36	2.8	1.53	1.40	1.85	1.64
15	2.31	2.15	12.9	3.5	2.85	1.38	1.94	2.42	1.55	1.36	1.99	1.70
16	2.10	2.30	7.3	3.5	3.45	1.37	1.84	2.07	1.53	1.34	1.80	1.62
17	2.05	2.39	4.5	3.35	5.2	1.55	1.70	1.97	1.61	1.35	1.42	1.74
18	3.8	2.7	3.7	9.5	4.8	1.49	2.33	1.94	1.51	1.38	1.62	1.67
19	14.2	3.45	6.3	4.9	3.6	1.68	3.7	2.01	1.96	1.46	1.64	1.79
20	6.6	4.4	7.4	3.6	3.2	1.43	2.87	1.87	1.69	1.39	1.56	1.89
21	4.2	8.1	6.3	3.25	2.85	1.47	2.5	4.1	1.71	1.40	1.68	1.73
22	3.6	8.9	7.2	3.15	2.55	1.45	9.1	3.0	1.53	1.40	1.49	1.74
23	3.8	4.1	5.1	2.95	2.36	1.55	4.4	2.85	1.73	1.65	1.54	1.74
24	4.0	3.5	10.4	2.7	2.24	1.73	3.15	2.6	1.71	1.54	1.44	1.69
25	3.6	3.2	7.1	2.55	1.96	1.33	8.7	2.42	1.80	1.48	1.50	1.66
26	3.3	11.4	4.7	2.45	2.06	1.72	6.0	5.2	1.83	1.42	1.53	1.59
27	3.05	11.1	3.7	3.6	1.86	1.70	3.25	3.25	2.14	1.44	1.52	2.07
28	2.9	4.7	3.35	3.5	1.72	1.61	2.75	2.5	1.86	1.41	1.39	2.7
29	6.8	3.7	9.3	3.25	1.82	1.85	2.5	10.9	2.55	1.41	1.40	3.0
30	7.4	.....	5.9	3.9	2.29	3.2	2.35	3.8	2.26	1.38	1.39	7.1
31	4.6	.....	4.3	.....	2.22	.....	2.6	3.4	.....	1.40	.....	6.9

NOTE.—Relation of gage height to discharge probably affected by ice Jan. 7–17 and Feb. 5–15. Observer reported relative to ice as follows: River partly frozen with ice 5 to 6 inches thick Jan. 13 and 16; ice out Jan. 18; river partly frozen Feb. 6 and 13 with ice 1 to 3 inches thick, and on Feb. 18 ice and snow thawing.

MILL CREEK BASIN.

MILL CREEK AT ARLINGTON HEIGHTS, OHIO.

Location.—At Arlington Heights about 1,000 feet below confluence of East and West forks of Mill Creek.
Records available.—September 19 to December 31, 1912.
Drainage area.—109 square miles.
Gage.—Inclined staff fastened to posts on right bank.
Channel.—Earth, mud bottom, probably shifting.
Discharge measurements.—Made from boat at section or by wading both forks.
Winter flow.—Affected by ice during severe winters.
Accuracy.—Data insufficient for estimates of flow; gage heights reliable.
Cooperation.—This station is maintained in cooperation with the division of sewerage of the city of Cincinnati, Ohio, for use in connection with its sewerage studies.

The following discharge measurement was made by wading the East and West forks by Bailey and Root:

October 16, 1912: gage height 1.41 feet; discharge, 18.1 second-feet.

Daily gage height, in feet, of Mill Creek at Arlington Heights, Ohio, for 1912.

[H. C. Harris, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	1.52	1.55	1.42	16	.....	1.42	1.55	1.42
2	.....	1.55	1.50	1.65	17	.....	1.42	1.60	1.72
3	.....	1.55	1.48	1.58	18	.....	1.55	1.52	1.68
4	.....	1.55	1.42	1.50	19	1.60	1.62	1.50	1.68
5	.....	1.55	1.42	1.55	20	1.55	1.42	1.55	1.58
6	.....	1.48	1.48	2.20	21	1.48	1.45	1.52	1.48
7	.....	1.45	2.00	1.58	22	2.70	1.80	1.48	1.32
8	.....	1.48	1.78	1.58	23	1.90	1.98	1.48	1.38
9	.....	1.50	1.70	1.52	24	1.75	1.65	1.48	1.40
10	.....	1.50	2.05	1.48	25	1.70	1.60	1.42	1.38
11	.....	1.50	1.55	1.48	26	1.60	1.52	1.58	1.48
12	.....	1.50	1.55	1.42	27	1.52	1.40	1.48	1.58
13	.....	1.45	1.58	1.32	28	1.48	1.40	1.40	1.48
14	.....	1.40	1.55	1.28	29	1.48	1.48	1.42	1.52
15	.....	1.50	1.52	1.42	30	1.48	1.50	1.40	1.72
					31	.....	1.52	.....	1.82

NOTE.—No ice reported by observer. Relation of gage height to discharge probably not materially affected by ice during time of record.

MILL CREEK AT CINCINNATI, OHIO.

Location.—At the Eighth Street Viaduct, Cincinnati, Ohio, about three-eighths mile above mouth of Mill Creek.
Records available.—September 10 to December 31, 1912.
Drainage area.—154 square miles.
Gage.—Standard chain gage attached to bridge.
Channel.—Concrete channel under bridge.
Discharge measurements.—Made from upstream side of bridge or by wading at the same section.
Winter flow.—Affected by ice during severe winters.
Accuracy.—For the greater part of the year gage heights are affected by backwater from Ohio River; estimates of the flow, therefore, can not be made.
Cooperation.—This station is maintained in cooperation with the division of sewerage of the city of Cincinnati, Ohio, for use in connection with its sewerage studies.

The following discharge measurement was made by wading at regular section by Bailey and Root:

August 23, 1912: Gage height, 1.54 feet; discharge, 121 second-feet.

Daily gage height, in feet, of Mill Creek at Cincinnati, Ohio, for 1912.

[Wm. Manning, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	5.19	6.89	2.79	16	1.8	2.42	4.69	3.52
2	.....	5.53	5.59	2.97	17	1.75	2.47	3.09	2.08
3	.....	4.63	3.73	2.57	18	2.5	2.69	2.29	1.87
4	.....	3.67	2.47	2.81	19	1.84	2.31	1.89	1.81
5	.....	2.06	1.81	3.22	20	1.86	2.43	1.89	.94
6	.....	1.96	2.04	3.53	21	1.80	2.39	1.89	1.81
7	.....	1.62	2.38	2.15	22	3.33	3.27	1.83	1.79
8	.....	1.74	2.18	1.95	23	2.45	2.43	1.83	1.79
9	.....	1.78	2.06	2.21	24	2.19	2.80	1.79	1.81
10	11.0	1.78	1.96	6.12	25	2.80	2.26	1.82	1.34
11	9.0	1.84	2.35	9.50	26	2.25	2.58	1.96	1.84
12	6.65	2.45	2.94	7.31	27	1.85	2.42	2.12	1.88
13	5.0	2.91	5.10	6.77	28	2.87	3.44	2.29	1.84
14	3.75	2.67	6.86	5.89	29	3.94	4.57	2.48	1.84
15	2.4	2.67	5.51	4.81	30	5.25	7.29	2.58	2.67
					31	.....	8.01	.....	2.33

NOTE.—Backwater from Ohio River was reported Sept. 10–12, 23–30; Oct. 1–4, 12–31; Nov. 1–20, 27–30; Dec. 1–4, and 10–16.

MIAMI RIVER BASIN.

MIAMI RIVER AT HAMILTON, OHIO.

Location.—At single-span highway bridge on High Street, Hamilton, Ohio.

Records available.—February 28, 1910, to December 31, 1912. Flood stages only, November 16, 1904, to February 27, 1910, reported by the United States Weather Bureau.

Drainage area.—3,580 square miles.

Gage.—Vertical staff gage in two sections fastened to the retaining wall on the left bank of the river about 100 feet above the bridge; upper section, placed by Weather Bureau in November, 1904, reads from 2.5 to 25.0 feet; lower section, placed by the United States Geological Survey, extends from 0.5 foot to 4.0 feet. Gage datum has not been changed.

Channel.—The section at the bridge shifts to some extent in floods on account of the high velocity; but the point of control, a short distance below, is apparently permanent under ordinary conditions.

Discharge measurements.—Made from upstream side of bridge.

Floods.—Maximum gage height 21.2 feet March 24, 1898, according to the records of the United States Weather Bureau.

Winter flow.—Relation of gage height to discharge may be at times affected by ice during very severe weather, but for short periods only, as factory wastes probably keep the temperature of the water above the freezing point.

Artificial control.—There are several power plants in Hamilton above the station, but all the water used by them is returned to the river above the gage; there is little if any regulation of the flow from this source.

Diversions.—The Miami & Erie Canal is fed by water taken from Miami River at Middletown and Miamisburg, Ohio. The quantity diverted is not known, but it is believed to be a considerable part of the low-water flow.

Accuracy.—Values of "discharge in second-feet per square mile" and "run-off (depth in inches)" published for this station in previous reports may be misleading and should be used with caution if at all. See "Artificial control" and "Diversions."

The following discharge measurement was made by C. T. Bailey:
August 21, 1912: Gage height, 2.14 feet; discharge, 1,930 second-feet.

Daily gage height, in feet, of Miami River at Hamilton, Ohio, for 1912.

[C. A. Huber, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.6	2.7	4.4	6.8	5.6	2.5	2.2	1.75	2.25	1.55	1.6	1.6
2	4.0	2.45	3.7	7.0	4.4	2.35	2.3	1.7	1.95	1.5	1.6	1.5
3	3.4	2.15	3.6	9.0	3.8	2.2	2.2	1.7	1.75	1.5	1.5	1.5
4	2.95	2.1	3.4	7.6	3.4	2.1	2.1	1.7	1.6	1.5	1.5	1.5
5	2.8	1.8	3.2	6.3	3.4	2.0	2.0	1.65	1.5	1.5	1.5	1.5
6	.....	1.8	2.95	5.3	3.5	2.0	2.0	1.6	1.5	1.5	1.5	1.5
7	.....	1.8	2.8	4.6	3.2	2.0	1.9	1.6	1.5	1.5	2.0	1.5
8	2.15	1.8	3.4	4.4	3.0	1.9	1.9	1.6	1.7	1.5	1.9	1.5
9	2.05	1.8	3.4	4.0	2.9	1.85	1.9	1.65	1.7	1.5	1.8	1.5
10	1.9	1.8	3.1	3.8	2.7	1.8	1.9	1.95	1.6	1.5	1.8	1.5
11	1.85	1.8	2.9	3.4	2.7	1.8	1.9	1.85	1.55	1.5	1.7	1.5
12	1.75	1.6	3.1	3.2	2.8	1.8	1.9	1.8	1.5	1.5	1.7	1.5
13	1.75	1.6	4.2	3.0	2.75	1.8	1.9	1.9	1.5	1.5	1.7	1.5
14	1.75	1.6	4.4	3.3	2.65	1.8	1.9	2.2	1.5	1.5	1.7	1.5
15	1.75	1.6	10.3	3.6	2.6	1.8	1.9	2.2	1.5	1.5	1.7	1.5
16	1.75	2.05	9.8	3.5	2.6	1.8	2.9	2.05	1.5	1.5	1.7	1.5
17	1.75	2.55	5.8	4.3	2.6	3.2	3.2	1.85	1.5	1.5	1.7	1.5
18	2.55	3.5	5.0	5.4	2.6	3.7	3.4	1.8	1.5	1.5	1.7	1.5
19	6.4	4.7	4.9	4.7	2.6	2.9	3.2	1.7	1.6	1.5	1.7	1.5
20	5.0	5.8	5.0	3.9	2.6	2.65	3.4	3.0	1.6	1.5	1.7	1.5
21	3.8	5.1	8.2	3.4	2.5	2.5	3.3	2.25	1.5	1.5	1.7	1.5
22	3.4	4.3	7.4	3.4	2.45	2.4	3.2	2.4	2.35	1.5	1.6	1.5
23	3.2	3.2	5.1	3.2	2.4	2.4	2.8	2.2	2.45	2.0	1.6	1.5
24	2.85	2.9	7.6	2.9	2.35	2.3	2.8	1.95	2.25	1.8	1.6	1.5
25	2.65	3.8	6.8	2.8	2.3	2.3	2.6	1.75	2.05	1.8	1.6	1.5
26	2.45	13.4	5.5	5.2	2.2	2.2	2.45	1.6	1.85	1.8	1.6	1.5
27	2.3	13.8	7.0	4.6	2.1	2.1	2.25	1.6	1.7	1.7	1.6	1.5
28	2.05	10.6	7.0	3.4	2.0	2.0	2.05	1.6	1.6	1.7	1.6	1.5
29	5.5	5.9	11.6	4.8	2.65	2.0	1.9	7.4	1.6	1.7	1.6	1.5
30	4.4	.....	12.6	6.7	3.0	2.0	1.85	3.2	1.6	1.7	1.6	2.4
31	3.2	.....	10.3	.....	2.55	.....	1.8	2.5	.....	1.6	.....	2.35

NOTE.—Jan. 8 to about Jan. 25 gage heights were taken from a reference point on the bridge because the gage was frozen in and surrounded by debris from a burned building. Relation of gage height to discharge probably affected by ice about Jan. 5–17 and Feb. 4–16. During January the observer reported ice along shores on the 5th, 11th, and 12th, ice 8 and 9 inches thick on the 11th and 12th, slush ice running on the 12th and in February. On the 5th ice along shores 3 inches thick; on Feb. 11 ice went out from shore opposite gage and on Feb. 12, ice along one shore 40 feet in width and 10 inches thick. No ice on control reported at any time.

Daily discharge, in second feet, of Miami River at Hamilton, Ohio, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,080	3,310	8,440	16,800	12,400	2,800	2,100	1,160	2,220	860	920	920
2	7,160	2,680	6,230	17,400	8,440	2,440	2,330	1,070	1,560	800	920	800
3	5,330	1,990	5,930	25,200	6,540	2,100	2,100	1,070	1,160	800	800	800
4	4,000	.....	5,330	16,700	5,330	1,880	1,880	1,070	920	800	800	800
5	.....	.....	4,730	14,900	5,330	1,660	1,660	995	800	800	800	800
6	.....	.....	4,000	11,400	5,630	1,660	1,660	920	800	800	800	800
7	.....	.....	3,580	9,080	4,730	1,660	1,450	920	800	800	1,660	800
8	.....	.....	5,330	8,440	4,150	1,450	1,450	920	1,070	800	1,450	800
9	.....	.....	5,330	7,160	3,860	1,350	1,450	995	1,070	800	1,250	800
10	.....	.....	4,440	6,540	3,310	1,250	1,450	1,560	920	800	1,250	800
11	.....	.....	3,860	5,330	3,310	1,250	1,450	1,350	860	800	1,070	800
12	.....	.....	4,440	4,730	3,580	1,250	1,450	1,250	800	800	1,070	800
13	.....	.....	7,800	4,150	3,440	1,250	1,450	1,450	800	800	1,070	800
14	.....	.....	8,440	5,030	3,180	1,250	1,450	2,100	800	800	1,070	800
15	.....	.....	30,700	5,930	3,050	1,250	1,450	2,100	800	800	1,070	800
16	.....	.....	28,500	5,630	3,050	1,250	3,860	1,770	800	800	1,070	800
17	.....	2,920	13,100	8,120	3,050	4,730	4,730	1,350	800	800	1,070	800
18	2,920	5,630	10,400	11,700	3,050	6,230	5,330	1,250	800	800	1,070	800
19	15,200	9,410	10,100	9,410	3,050	3,860	4,730	1,070	920	800	1,070	800
20	10,400	13,100	10,400	6,850	3,050	3,180	5,330	4,150	920	800	1,070	800

Daily discharge, in second-feet, of Miami River at Hamilton, Ohio, for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	6,540	10,700	22,000	5,330	2,800	2,800	5,030	2,220	800	800	1,070	800
22	5,330	8,120	18,900	5,330	2,680	2,560	4,730	2,560	2,440	800	920	800
23	4,730	4,730	10,700	4,730	2,560	2,560	3,580	2,100	2,680	1,660	920	800
24	3,720	3,860	16,700	3,860	2,440	2,330	3,580	1,560	2,220	1,250	920	800
25	3,180	6,540	16,800	3,580	2,330	2,330	3,050	1,160	1,770	1,250	920	800
26	2,680	45,000	12,100	11,100	2,100	2,100	2,680	920	1,350	1,250	920	800
27	2,330	46,900	17,400	9,080	1,880	1,880	2,220	920	1,070	1,070	920	800
28	1,770	32,000	17,400	5,330	1,660	1,660	1,770	920	920	1,070	920	800
29	12,100	13,400	36,500	9,740	3,180	1,660	1,450	18,900	920	1,070	920	800
30	8,440	.....	41,200	16,300	4,150	1,660	1,350	4,730	920	1,070	920	2,560
31	4,730	.....	30,700	.....	2,920	.....	1,250	2,800	.....	920	.....	2,440

NOTE.—Daily discharge determined by means of a discharge rating curve that is fairly well defined below 210 second-feet (gage height 0.6 foot); 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).

Discharge Jan. 5–17 and Feb. 4–16 estimated, because of ice, from gage heights, observer's notes, and climatologic records, as follows: Jan. 5–17, 1,400 second-feet; Feb. 4–16, 900 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been effected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of Miami River at Hamilton, Ohio, for 1912.

[Drainage area, 3,580 square miles.][a]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	15,200	.....	4,120	C.
February	46,900	.....	7,650	C.
March	41,200	3,580	13,600	A.
April	25,200	3,580	9,160	A.
May	12,400	1,660	3,880	A.
June	6,230	1,250	2,180	A.
July	5,330	1,250	2,560	A.
August	18,900	920	2,170	B.
September	2,680	800	1,160	A.
October	1,660	800	912	B.
November	1,660	800	1,020	B.
December	2,560	800	914	B.
The year	46,900	.....	4,100	

[a] Estimates of discharge in "second-feet per square mile" and "run-off (depth in inches)" would be misleading. See "Artificial control" and "Diversions."

NOTE.—See footnote to table of daily discharge.

DIX RIVER BASIN.

DIX RIVER NEAR BURGIN, KY.

Location.—At highway bridge on Burgin-Buena Vista pike, 4 miles from Burgin, Ky.

Records available.—July 2, 1910, to July 16, 1911; October 1, 1911, to December 31, 1912.

Drainage area.—416 square miles.

Gage.—Staff gage attached to abutment of bridge.

Channel.—Probably permanent

Discharge measurements.—See "Cooperation."

Winter flow.—Relation of gage height to discharge ordinarily not affected by ice.

Accuracy.—This station has not been visited by United States Geological Survey engineers, but the computations of daily and monthly discharge were made by the Survey. No discharge measurements were made during 1912. The station was last visited September 20, 1910, and the accuracy of the data published in

the following tables depends upon the permanency of the gage and of the conditions of flow since that date.

Cooperation.—The station was established and measurements made by representatives of the Kentucky Geological Survey and the Madison Electric & Power Co., of Richmond, Ky. The gage reader's salary is paid by the Madison Electric & Power Co., and by the State Geological Survey of Kentucky.

Daily gage height, in feet, of Dix River near Burgin, Ky., for 1912.

[C. P. Kennedy, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.2	6.55	6.95	6.2	7.65	3.65	4.3	3.4	3.7	3.2	2.8	3.3
2	8.8	6.4	6.4	15.6	6.35	.....	3.9	3.3	3.6	3.2	2.9	3.4
3	8.0	6.4	5.95	12.6	5.95	.....	3.7	3.2	3.4	3.2	2.9	4.2
4	7.5	6.15	5.7	9.1	5.35	.....	5.2	3.2	3.9	3.2	3.0	4.5
5	7.05	5.65	5.65	8.5	5.5	.....	5.6	3.1	3.8	3.1	3.3	5.0
6	6.9	5.25	5.7	7.5	6.9	.....	5.1	3.0	3.6	3.1	3.4	12.2
7	6.6	5.0	5.85	6.45	8.2	.....	5.5	3.4	3.8	3.0	3.6	8.9
8	6.1	4.7	10.7	5.85	8.1	.....	5.5	3.3	3.7	3.0	3.6	6.9
9	5.75	4.6	12.2	5.45	7.15	.....	4.9	3.7	3.7	3.0	3.8	5.8
10	5.65	4.4	10.0	5.2	6.5	3.3	4.2	5.5	3.6	3.0	4.7	5.5
11	5.35	4.35	8.4	5.0	5.9	3.3	8.7	5.0	3.4	3.0	4.6	5.4
12	5.2	4.4	10.8	4.9	14.8	3.3	6.0	4.7	3.3	3.0	4.5	5.4
13	4.9	4.35	10.8	4.9	9.4	3.3	5.5	4.1	3.2	3.0	4.4	5.2
14	4.8	4.3	11.8	5.55	7.65	3.3	5.1	3.8	3.0	3.0	4.3	5.2
15	4.7	4.2	17.6	5.4	6.75	3.3	4.6	3.5	3.0	2.9	4.1	5.1
16	4.7	4.1	12.0	5.25	6.1	.....	5.4	3.3	2.9	2.9	3.8	5.1
17	4.5	4.05	8.5	5.35	5.35	3.3	5.1	3.3	2.9	2.9	3.8	5.0
18	4.35	4.05	7.0	5.7	4.85	3.3	8.0	3.2	2.9	2.9	3.8	5.0
19	18.8	4.0	6.75	5.45	4.55	3.4	6.6	3.8	2.9	2.9	3.8	5.0
20	11.4	4.5	6.45	5.15	4.25	3.55	6.1	4.6	3.0	2.9	3.8	5.0
21	7.7	12.8	6.05	4.95	4.0	3.65	4.8	4.8	2.9	2.9	3.7	4.9
22	6.15	11.4	5.95	5.15	3.85	5.45	4.6	4.8	3.0	2.9	3.6	4.9
23	6.75	9.2	6.7	5.05	3.7	4.0	5.8	4.8	3.0	2.9	3.6	4.9
24	6.45	8.4	12.8	4.85	3.7	3.95	5.0	4.8	5.0	2.9	3.5	4.9
25	5.9	7.55	12.0	4.7	3.6	3.85	4.6	4.4	4.6	2.9	3.4	4.8
26	5.55	11.8	9.7	4.7	3.45	3.7	4.3	4.1	4.0	2.9	3.4	4.8
27	5.5	11.0	8.6	4.7	3.4	3.55	3.9	3.7	3.6	2.8	3.3	4.8
28	5.65	9.4	7.05	7.85	3.4	3.5	3.7	4.5	3.4	2.8	3.3	5.4
29	6.05	8.1	6.8	10.6	3.8	3.9	3.5	4.5	3.4	2.8	3.3	5.8
30	6.55	.....	12.0	10.6	3.8	4.25	3.4	3.9	3.3	2.8	3.3	5.8
31	6.8	.....	7.95	.....	3.8	.....	3.4	3.8	.....	2.8	.....	9.2

Daily discharge, in second-feet, of Dix River near Burgin, Ky., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,900	1,060	1,270	878	1,700	92	219	60	99	41	15	50
2	2,580	978	978	9,770	952	87	132	50	84	41	20	60
3	1,950	978	765	6,440	765	83	99	50	60	41	20	195
4	1,600	854	665	2,850	536	79	485	50	132	41	26	270
5	1,330	646	646	2,340	590	75	627	33	115	33	50	420
6	1,240	502	665	1,600	1,240	70	452	26	84	33	60	6,000
7	1,080	420	724	1,000	2,100	65	590	60	115	26	84	2,670
8	830	327	4,400	724	2,020	60	590	50	99	26	84	1,240
9	684	298	6,000	572	1,390	55	388	99	99	26	115	704
10	646	244	3,700	485	1,030	50	195	590	84	26	327	590
11	536	232	2,260	420	744	50	2,500	420	60	26	298	554
12	485	244	4,510	388	8,860	50	786	327	50	26	270	554
13	388	232	4,510	388	3,120	50	590	172	41	26	244	485
14	357	219	5,560	608	1,700	50	452	115	26	26	219	485
15	327	195	12,100	554	1,160	50	298	71	26	20	172	452
16	327	172	5,780	502	830	50	554	50	20	20	115	452
17	270	152	2,340	536	536	50	452	50	20	20	115	420
18	232	152	1,300	665	372	50	1,950	41	20	20	115	420
19	13,400	151	1,160	572	284	60	1,080	115	20	20	115	420
20	5,140	270	1,000	468	207	78	830	298	26	20	115	420

Daily discharge, in second-feet, of Dix River near Burgin, Ky., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	1,730	6,660	808	404	151	92	357	357	20	20	99	388
22	854	5,140	765	468	124	572	298	357	26	20	84	388
23	1,160	2,940	1,140	436	99	151	704	357	26	20	84	388
24	1,000	2,260	6,660	372	99	142	420	357	420	20	71	388
25	744	1,630	5,780	327	84	124	298	244	298	20	60	357
26	608	5,560	3,410	327	66	99	219	172	151	20	60	357
27	590	4,720	2,420	327	60	78	132	99	84	15	50	357
28	646	3,120	1,330	1,840	60	71	99	270	60	15	50	554
29	808	2,020	1,190	4,300	115	132	71	270	60	15	50	704
30	1,060	.....	5,780	4,300	115	207	60	132	50	15	50	704
31	1,190	.....	1,910	.....	115	.....	60	115	.....	15	.....	2,940

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). Above 6,550 second-feet the rating curve is simply an extension, and discharge values above that point should therefore be used with caution. See "Accuracy" in station description.

Monthly discharge of Dix River near Burgin, Ky., for 1912.

[Drainage area, 416 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	13,400	232	1,540	3.70	4.27
February	6,660	151	1,460	3.51	3.79
March	12,100	646	2,950	7.09	8.17
April	9,770	327	1,500	3.61	4.03
May	8,860	60	1,010	2.43	2.80
June	572	50	97.4	.234	.26
July	2,500	60	516	1.24	1.43
August	590	26	176	.423	.49
September	420	20	82.5	.198	.22
October	41	15	24.3	.058	.07
November	327	15	108	.260	.29
December	6,000	50	787	1.89	2.18
The year	13,400	15	855	2.06	28.00

NOTE.—See "Accuracy" in station description.

WABASH RIVER BASIN.

WABASH RIVER AT MOUNT CARMEL, ILL.

Location.—At Southern Railway bridge at Mount Carmel, Ill., 1½ miles below mouth of White River and immediately below mouth of Patoka River.

Records available.—June 16, 1884, to November, 1904, United States Army Engineer Corps; November, 1904, to December 31, 1912, United States Weather Bureau.

Drainage area.—Published by the United States Weather Bureau as 26,300 square miles.

Gage.—Staff gage attached to pivot pier of drawspan. Gage datum has remained unchanged since it was established in 1884.

Channel.—Slightly shifting.

Discharge measurements.—Made from downstream side of bridge. There are numerous overflow openings in the railroad embankment east of the railroad bridge.

Floods.—Maximum stage published by United States Weather Bureau as 28.3 feet August 7, 1875.

Winter flow.—The relation of gage height to discharge may be affected by ice for a week or so at a time during December, January, and February.

Accuracy.—Sufficient data have not been obtained to enable estimates of discharge to be made for publication.

Cooperation.—Gage heights furnished by United States Weather Bureau.

Discharge measurements of Wabash River at Mount Carmel, Ill., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 28	Horton and Monk	22.40	134,000
Aug. 13	Monk and Carr	3.28	9,590

Daily gage height, in feet, of Wabash River at Mount Carmel, Ill., for 1912.

[H. M. Phillips, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.9	12.8	18.9	22.5	17.2	6.8	3.3	4.2	5.0	4.4	2.2	2.3
2	8.5	12.6	19.3	22.3	17.6	6.2	3.3	3.9	4.9	4.2	2.2	2.3
3	8.7	12.3	19.4	22.4	17.9	5.8	3.3	3.5	4.8	4.1	2.9	2.3
4	8.2	.....	19.4	22.5	18.1	5.6	5.0	3.3	4.3	3.6	3.3	2.2
5	.....	.....	20.4	22.7	18.2	5.5	8.0	3.1	3.7	3.1	3.5	2.1
6	.....	.....	20.8	23.0	18.1	5.1	9.3	3.0	3.5	2.8	3.6	2.1
7	.....	.....	21.0	23.2	17.7	4.8	8.2	2.9	3.3	2.6	3.7	2.3
8	.....	.....	20.4	23.2	17.1	4.6	7.0	2.8	3.0	2.4	3.7	2.3
9	.....	.....	18.0	23.0	16.2	4.4	6.0	2.7	2.8	2.2	3.7	2.2
10	.....	.....	14.4	22.8	15.0	4.2	6.5	2.7	2.6	1.9	3.8	2.2
11	.....	.....	12.5	22.2	13.2	4.0	7.5	2.7	2.4	1.8	3.8	2.2
12	.....	.....	11.7	21.0	12.8	3.8	8.2	2.7	2.2	1.7	3.9	2.2
13	.....	.....	11.7	19.7	13.6	3.6	7.9	3.2	2.1	1.7	4.0	2.2
14	.....	.....	12.2	17.2	14.8	3.4	7.8	3.3	2.1	1.7	4.1	2.1
15	.....	.....	15.5	14.8	15.2	3.3	7.8	3.4	2.0	1.7	4.1	2.1
16	.....	.....	15.6	12.4	15.5	3.3	9.8	3.4	2.0	1.7	4.0	2.0
17	.....	.....	16.6	11.8	16.4	4.3	10.9	5.7	2.0	1.6	3.8	1.9
18	.....	.....	17.2	11.6	17.1	4.9	10.4	5.8	2.3	1.5	3.7	1.9
19	.....	.....	17.8	11.9	17.3	5.0	9.5	5.3	2.5	1.4	3.5	1.9
20	10.8	.....	18.2	11.9	17.0	5.2	8.3	4.9	2.6	1.8	3.4	1.9
21	12.7	.....	18.7	12.3	16.5	5.9	7.8	5.3	2.6	2.0	3.3	2.0
22	14.4	.....	19.3	12.5	15.9	6.0	7.7	6.0	2.6	2.1	3.3	2.1
23	15.1	.....	19.9	12.5	15.4	5.8	8.6	8.2	2.6	2.2	3.1	2.2
24	15.6	.....	20.5	11.9	14.2	5.5	8.8	9.6	2.4	2.2	3.0	2.2
25	16.3	.....	21.1	11.1	12.2	5.2	7.8	10.0	2.3	2.2	2.9	2.2
26	16.7	.....	21.6	10.7	9.6	4.8	6.7	9.3	3.6	2.1	2.8	2.1
27	17.0	17.2	22.1	13.3	7.9	4.3	6.0	8.1	5.2	2.1	2.7	2.0
28	15.0	18.1	22.4	15.4	7.1	3.9	5.8	6.6	4.8	2.1	2.6	1.9
29	14.8	18.3	22.6	15.6	7.2	3.7	5.6	5.3	4.7	2.1	2.5	1.8
30	14.2	.....	22.7	16.5	7.8	3.5	5.1	5.1	4.6	2.1	2.4	1.8
31	13.0	.....	22.6	.....	7.2	.....	4.7	5.0	.....	2.1	.....	1.8

NOTE.—River reported "frozen" Jan. 5–19 and Feb. 4–26. The Monthly Weather Review for January, 1912 (published by the United States Department of Agriculture), states: "The Wabash River was frozen from the 5th to the 19th, and a threatening gorge formed near Mount Carmel, Ill., during the last decade of the month, causing flood stages of water and some damage."

EMBARRASS RIVER NEAR OAKLAND, ILL.

Location.—At highway bridge about 2 miles northwest of Oakland, Ill., on the county-line road to Hindsboro and Arcola, in the northeastern part of T. 14 N., R. 10 E., about 5 miles below the mouth of Brush Creek.

Records available.—October 23, 1909, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—535 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—The section is at a pool; measurements to date indicate that the control has not changed.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The flood of 1897 reached a height of about 24 feet by the present gage datum.

Point of zero flow.—Not determined. There was no flow past the bridge during a portion of the summer of 1908.

Winter flow.—Ice may affect the relation of gage height to discharge during portions of December, January, and February.

The following discharge measurement was made by P. S. Monk:
July 26, 1912: Gage height, 2.88 feet; discharge, 58 second-feet.

Daily gage height, in feet, of Embarrass River near Oakland, Ill., for 1912.

[Paul McDaniels, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.6	a 4.6	10.8	12.0	9.3	4.4	3.5	3.0	2.4	.....	.....	2.0
2	5.4	a 4.6	8.4	11.3	9.0	4.0	3.6	3.0	2.3	.....	.....	2.0
3	5.4	a 4.6	7.0	11.0	8.9	3.7	3.8	3.1	2.5	.....	2.0	2.0
4	4.9	.....	6.0	10.8	8.6	3.5	4.0	3.0	2.5	.....	2.1	1.9
5	4.9	4.2	5.7	10.4	9.0	3.3	4.0	2.9	2.4	.....	2.3	1.95
6	5.1	4.2	5.2	9.2	9.6	3.3	4.1	2.8	2.4	.....	2.3	1.95
7	5.0	4.0	5.3	8.0	10.4	3.3	4.0	2.9	2.3	.....	2.4	1.9
8	a 5.1	4.0	5.0	7.6	9.2	3.0	4.0	3.1	2.3	.....	2.5	1.85
9	a 5.2	4.0	.....	7.4	8.9	3.0	3.8	3.1	2.4	.....	2.5	1.85
10	a 5.1	4.0	5.3	7.4	8.6	3.2	3.7	3.0	2.4	.....	2.3	1.85
11	a 5.1	.....	5.0	6.9	8.7	3.2	3.9	3.0	2.4	.....	2.2	1.8
12	a 5.1	3.8	4.1	6.4	7.0	3.3	3.7	2.9	2.4	.....	2.1	1.8
13	5.0	3.8	4.7	6.0	6.6	3.2	3.8	2.8	2.4	.....	2.0	1.8
14	a 5.0	3.8	6.2	6.3	6.2	3.4	3.6	2.8	2.3	.....	1.95	1.8
15	4.9	3.8	12.8	6.5	6.0	3.4	3.55	2.7	2.3	.....	1.9	1.8
16	4.0	4.0	14.2	6.4	5.3	3.4	3.3	2.7	2.3	.....	1.9	1.8
17	4.4	4.4	15.5	7.8	5.8	3.7	3.0	2.6	2.2	.....	1.9	1.9
18	6.6	6.0	14.8	8.8	5.0	4.8	3.1	2.7	2.3	.....	1.8	1.9
19	9.0	8.8	14.6	8.0	4.9	5.6	3.0	2.8	2.4	.....	1.8	1.9
20	11.0	9.5	14.4	8.3	4.9	5.0	2.9	3.4	2.4	.....	1.85	1.9
21	13.0	8.4	14.2	9.6	4.8	4.6	2.9	4.3	2.4	.....	1.8	1.9
22	10.7	7.1	13.6	9.4	4.7	4.0	2.9	5.6	2.5	.....	1.7	1.9
23	7.6	6.5	12.0	9.2	4.9	3.8	2.85	4.2	2.5	.....	1.7	1.9
24	8.6	5.4	12.6	8.4	4.8	3.8	2.85	3.4	2.4	.....	1.7	1.9
25	8.8	7.0	12.4	8.4	4.6	3.6	2.85	3.0	2.3	.....	1.7	1.95
26	8.2	13.0	12.3	9.1	4.4	3.5	2.85	2.9	2.2	.....	1.6	1.95
27	8.0	16.0	13.0	10.0	4.3	3.5	2.85	2.8	2.2	.....	1.6	1.95
28	a 7.5	17.2	14.0	10.2	4.3	3.6	2.95	2.8	2.2	.....	1.55	1.9
29	a 6.0	15.3	14.6	11.1	4.7	3.6	3.1	2.5	2.2	.....	1.5	1.85
30	a 4.8	.....	13.8	10.4	4.7	3.5	3.2	2.5	2.0	.....	1.5	1.85
31	4.6	.....	13.0	.....	4.6	.....	3.2	2.4	.....	.....	.....	1.9

a Gage height to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–Feb. 28, Mar. 7–11. There may also have been some effect during December. Observer reported ice from 4 to 8 inches thick during January and from 5 to 9 inches thick during February and reported "some ice in river during most of time in December."

Daily discharge, in second-feet, of Embarrass River near Oakland, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	456	.....	1,860	2,300	1,360	226	105	61	27	.....	a 5	10
2	416	.....	1,100	2,040	1,270	165	116	61	22	.....	a 5	10
3	416	.....	760	1,930	1,240	128	140	68	32	.....	10	10
4	316	.....	540	1,860	1,160	105	165	61	32	.....	13	8
5	.....	.....	477	1,720	1,270	85	165	55	27	.....	22	9
6	.....	.....	376	1,330	1,450	85	179	49	27	.....	22	9
7	.....	.....	.....	1,000	1,720	85	165	55	22	.....	27	8
8	.....	.....	.....	902	1,330	61	165	68	22	.....	32	7
9	.....	.....	.....	854	1,240	61	140	68	27	.....	32	7
10	.....	.....	.....	854	1,160	76	128	61	27	.....	22	7
11	.....	.....	.....	737	1,190	76	152	61	27	.....	17	6
12	.....	.....	179	627	760	85	128	55	27	.....	13	6
13	.....	.....	278	540	671	76	140	49	27	.....	10	6
14	.....	.....	583	605	583	95	116	49	22	.....	9	6
15	.....	.....	2,630	649	540	95	110	43	22	.....	8	6
16	.....	.....	3,220	627	396	95	85	43	22	.....	8	6
17	.....	.....	3,780	950	498	128	61	37	17	.....	8	8
18	.....	.....	3,480	1,210	336	297	68	43	22	.....	6	8
19	.....	.....	3,390	1,000	316	456	61	49	27	.....	6	8
20	.....	.....	3,310	1,080	316	336	55	95	27	.....	7	8
21	.....	.....	3,220	1,450	297	260	55	210	27	.....	6	8
22	.....	.....	2,960	1,390	278	165	55	456	32	.....	5	8
23	.....	.....	2,300	1,330	316	140	52	194	32	.....	5	8
24	.....	.....	2,540	1,100	297	140	52	95	27	.....	5	8
25	.....	.....	2,460	1,100	260	116	52	61	22	.....	5	9
26	.....	.....	2,420	1,300	226	105	52	55	17	.....	4	9
27	.....	.....	2,710	1,580	210	105	52	49	17	.....	4	9
28	.....	.....	3,140	1,650	210	116.	58	49	17	.....	3.5	8
29	.....	3,700	3,390	1,970	278	116	68	32	17	.....	3	7
30	.....	.....	3,050	1,720	278	105	76	32	10	.....	3	7
31	.....	.....	2,710	.....	260	.....	76	27	.....	.....	.....	8

a Estimated.

NOTE.—Daily discharge determined by means of a discharge rating curve well defined between 22 and 1,450 second-feet (gage heights 2.3 and 9.6 feet). Daily discharge Jan. 3 to 7 estimated, because of ice, from climatologic records and run-off in adjacent drainage areas.

Discharge Jan. 5–Feb. 28 and Mar. 7–11 estimated, because of ice, from climatologic records, daily gage heights, observer's notes, and discharge of adjacent drainage areas, as follows: Jan. 5–31, 340 second-feet; Feb. 1–28, 320 second-feet; Mar. 7–11, 250 second-feet.

These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution. Possibly also slight ice effect during December.

Monthly discharge of Embarrass River near Oakland, Ill., for 1912.

[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	.....	.....	348	0.650	0.75	D.
February	.....	.....	437	.817	.88	D.
March	3,780	.....	1,870	3.50	4.04	C.
April	2,300	540	1,250	2.34	2.61	A.
May	1,720	210	701	1.31	1.51	A.
June	456	61	139	.260	.29	B.
July	179	52	99.7	.186	.21	B.
August	456	27	77.1	.144	.17	B.
September	32	10	24.1	.045	.05	C.
October	.....	.....	.....	.....	.....	.....
November	32	3	10.8	.020	.02	D.
December	10	6	7.8	.015	.02	D.

NOTE.—See footnotes to table of daily discharge.

EMBARRASS RIVER AT STE. MARIE, ILL., 1911.

Location.—At highway bridge at the north end of Main Street, Ste. Marie, Ill., about 150 yards downstream from the Cincinnati, Hamilton & Dayton Railway bridge and 2½ miles upstream from the mouth of Hickory (or North Fork) Creek.

Records available.—October 20, 1909, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—1,540 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Shifting; section is at a pool, and measurements to date indicate that the point of control has remained unchanged.

Discharge measurements.—Made from downstream side of highway bridge at ordinary stages, and during high water made also from the downstream side of five wooden trestles on the Cincinnati, Hamilton & Dayton Railway northwest of the highway bridge.

Floods.—The flood of the spring of 1908 reached a height of 22.5 feet by the present gage datum.

Winter flow.—Relation of gage height to discharge may be affected by ice during portions of December, January, and February.

The following discharge measurement was made by P. S. Monk: August 17, 1912: Gage height, 4.43 feet; discharge, 420 second-feet.

Daily gage height, in feet, of Embarrass River at Ste. Marie, Ill., for 1912.

[Val. C. Wuerth, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.5	6.2	17.1	17.9	17.2	5.4	3.6	3.8	3.5	2.3	2.7	2.3
2	7.2	5.8	16.3	17.2	16.2	5.3	5.0	3.6	3.3	2.3	3.3	2.3
3	6.2	5.5	15.3	18.1	15.4	8.2	7.2	3.4	3.1	.....	3.6	2.3
4	5.8	5.3	11.1	18.1	15.0	5.8	12.2	3.4	3.1	.....	3.2	2.3
5	6.2	5.0	8.0	17.2	14.2	5.3	11.8	3.3	3.0	.....	2.9	2.5
6	5.8	4.8	7.2	15.7	12.3	4.9	6.0	3.2	3.4	.....	2.6	2.5
7	5.8	4.7	6.8	13.7	13.2	4.7	5.9	3.1	3.0	.....	2.7	2.4
8	5.8	4.7	6.4	12.0	11.9	4.3	5.6	3.4	2.8	.....	2.7	2.3
9	5.8	4.6	6.2	10.6	11.1	4.3	5.5	3.3	2.7	.....	3.1	2.3
10	6.2	4.4	6.0	9.6	9.9	4.1	5.5	4.1	2.6	.....	3.1	2.2
11	6.2	4.4	6.2	9.0	9.0	4.0	6.3	8.4	2.6	.....	3.0	2.2
12	6.0	4.4	6.3	8.3	10.0	4.0	13.3	4.4	2.5	.....	3.0	2.3
13	5.6	4.3	7.7	10.5	10.9	3.8	7.2	5.4	2.5	.....	3.0	2.3
14	5.4	4.3	13.3	11.0	10.0	3.8	6.4	5.8	2.5	.....	4.0	2.3
15	.....	4.2	16.7	8.9	8.8	3.8	13.2	9.1	2.4	.....	3.2	2.4
16	.....	4.2	17.7	7.6	11.4	4.2	14.4	5.2	2.5	.....	2.9	2.3
17	.....	4.3	18.0	7.7	10.5	5.2	14.0	4.2	2.5	.....	2.8	2.2
18	.....	4.3	17.8	11.5	9.8	5.7	10.1	4.3	2.6	.....	2.6	2.2
19	.....	5.0	17.6	10.5	8.0	5.3	10.3	4.2	2.5	.....	2.6	2.2
20	.....	9.0	17.7	8.8	7.3	6.5	7.2	4.7	2.7	.....	2.6	2.2
21	14.1	7.7	18.0	9.0	6.9	6.5	6.3	9.4	2.6	.....	2.5	2.2
22	12.5	6.5	18.0	9.0	6.4	6.4	5.6	9.4	2.6	.....	2.5	2.1
23	11.6	6.3	18.0	7.6	6.3	5.3	5.4	6.5	2.4	.....	2.5	2.1
24	11.4	6.4	17.9	6.9	5.9	5.0	5.1	6.7	2.4	.....	2.4	2.1
25	10.6	6.2	17.3	7.0	5.7	4.6	4.8	5.6	2.5	.....	2.3	2.1
26	9.5	15.6	16.7	6.0	5.7	4.2	4.5	5.0	2.5	.....	2.3	2.1
27	9.4	17.6	17.0	16.4	5.4	4.1	4.2	4.5	2.4	.....	2.3	2.1
28	9.0	18.2	17.5	16.7	5.4	4.0	3.9	4.2	2.3	.....	2.3	2.2
29	8.3	18.1	18.2	16.8	6.3	3.8	4.2	3.9	2.3	.....	2.3	2.3
30	7.3	.....	18.4	17.4	5.7	3.6	5.4	4.2	2.3	.....	2.3	2.2
31	6.7	.....	18.4	.....	5.5	.....	4.0	3.8	.....	.....	.....	2.2

NOTE.—Gage heights Jan. 7, 8, and 9, and Jan. 21–Feb. 16 to top of ice. Relation of gage height to discharge affected by ice about Jan. 4–Feb. 17 and Dec. 11–29. Observer reported ice to be from 3 to 6 inches in thickness during January.

Daily discharge, in second-feet, of Embarrass River at Ste. Marie, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,720	.....	5,200	5,530	5,240	656	275	308	259	129	160	129
2	1,340	.....	4,870	5,240	4,830	630	555	275	229	129	229	129
3	893	.....	4,460	5,610	4,500	1,600	1,240	244	202	.....	275	129
4	.....	.....	2,740	5,610	4,340	769	3,190	244	202	.....	215	129
5	.....	.....	1,530	5,240	4,010	630	3,030	229	190	.....	179	144
6	.....	.....	1,240	4,630	3,230	532	830	215	244	.....	152	144
7	.....	.....	1,100	3,810	3,600	487	799	202	190	.....	160	136
8	.....	.....	959	3,110	3,070	403	711	244	169	.....	160	129
9	.....	.....	893	2,540	2,740	403	683	229	160	.....	202	129
10	.....	.....	830	2,140	2,260	364	683	364	152	.....	202	122
11	.....	.....	893	1,900	1,900	345	926	1,680	152	.....	190	.....
12	.....	.....	926	1,640	2,300	345	3,640	423	144	.....	190	.....
13	.....	.....	1,420	2,500	2,660	308	1,240	656	144	.....	190	.....
14	.....	.....	3,640	2,700	2,300	308	959	769	144	.....	345	.....
15	.....	.....	5,040	1,870	1,830	308	3,600	1,940	136	.....	215	.....
16	.....	.....	5,450	1,380	2,860	383	4,090	604	144	.....	179	.....
17	.....	.....	5,570	1,420	2,500	604	3,930	383	144	.....	169	.....
18	.....	403	5,490	2,900	2,220	740	2,340	403	152	.....	152	.....
19	.....	555	5,410	2,500	1,530	630	2,420	383	144	.....	152	.....
20	.....	1,900	5,450	1,830	1,270	992	1,240	487	160	.....	152	.....
21	.....	1,420	5,570	1,900	1,130	992	926	2,060	152	.....	144	.....
22	.....	992	5,570	1,900	959	959	711	2,060	152	.....	144	.....
23	.....	926	5,570	1,380	926	630	656	992	136	.....	144	.....
24	.....	959	5,530	1,130	799	555	579	1,060	136	.....	136	.....
25	.....	893	5,280	1,160	740	465	509	711	144	.....	129	.....
26	.....	4,590	5,040	830	740	383	444	555	144	.....	129	.....
27	.....	5,410	5,160	4,910	656	364	383	444	136	.....	129	.....
28	.....	5,650	5,360	5,040	656	345	326	383	129	.....	129	.....
29	.....	5,610	5,650	5,080	926	308	383	326	129	.....	129	.....
30	.....	.....	5,730	5,320	740	275	656	383	129	.....	129	122
31	.....	.....	5,730	.....	683	.....	345	308	.....	.....	.....	122

NOTE.—Daily discharge determined by means of a discharge rating curve 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 and 16 feet). Above 4,750 second-feet (gage height 16.0 feet) curve is extended as a tangent which starts at 2,700 second-feet (gage height 11.0 feet).

Discharge, Jan. 4–Feb. 17, and Dec. 11–29, estimated, because of ice, from climatologic records, gage heights, observer's notes, and discharge of adjacent drainage areas, as follows: Jan. 4–31, 900 second-feet; Feb. 1–17, 300 second-feet; Dec. 11–29, 100 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of Embarrass River at Ste. Marie, Ill., for 1912.

[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.		
January	.....	.....	940	0.610	0.70	D.
February	5,650	.....	1,190	.773	.83	D.
March	5,730	830	3,980	2.58	2.97	B.
April	5,610	830	3,090	2.01	2.24	A.
May	5,240	656	2,200	1.43	1.65	A.
June	1,600	275	557	.362	.40	A.
July	4,090	275	1,360	.883	1.02	A.
August	2,060	202	631	.410	.47	B.
September	259	129	162	.105	.12	C.
October	.....	.....	.....	.....	.....	.....
November	345	129	174	.113	.13	C.
December	144	.....	112	.073	.08	D.

NOTE.—See footnotes to table of daily discharge.

EAST BRANCH OF WHITE RIVER AT SHOALS, IND.

Location.—At highway bridge between East and West Shoals, Ind., a short distance above the Baltimore & Ohio Southwestern Railroad bridge.

Records available.—June 25, 1903, to July 21, 1906; October 12, 1908, to December 31, 1912.

Drainage area.—4,900 square miles.

Gage.—Standard chain gage attached to bridge. The gage datum was raised 61 feet on January 1, 1909, to agree with that used by the United States Weather Bureau.

Channel.—Solid rock; permanent.

Discharge measurements.—Made from downstream side of bridge.

Floods.—Maximum gage height as published by the United States Weather Bureau was 34.1 feet March 30, 1904; flood of March, 1897, said to have been 1 to 1½ feet higher.

Winter flow.—Relation of gage height to discharge affected by ice during severe winters during portions of January and February. In ordinary winters there is little if any ice at the station.

Accuracy.—This station was not visited during 1912, and the data are published on the assumption that no changes have occurred during the year in the gage nor in the relation of gage height to discharge. The discharge rating curve used is the same as that used for 1911, is based on discharge measurements made during 1909, 1910, and 1911 and the form of previous curves, reverses at about 3,980 second-feet (gage height 4.5 feet), is drawn as a tangent above 17,000 second-feet (gage height, 11.0 feet), and is fairly well defined.

Cooperation.—Gage readings are furnished by the United States Weather Bureau part of the year.

Daily gage height, in feet, of East Branch of White River at Shoals, Ind., for 1912.

[G. H. Rowe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.8	8.9	21.5	18.8	17.3	5.0	3.5	2.75	4.15	3.4	3.0	2.6
2	7.7	8.8	22.8	19.4	16.9	4.6	3.65	2.9	4.0	3.35	2.8	2.65
3	8.2	7.4	23.7	20.4	15.7	4.3	3.55	2.8	3.7	3.05	2.85	3.1
4	7.6	6.6	22.5	21.0	13.9	4.1	3.8	2.7	3.5	3.05	2.9	2.65
5	6.6	5.3	17.4	18.4	11.1	3.9	4.2	2.8	3.35	2.9	2.95	2.5
6	5.3	4.6	9.5	17.2	10.7	3.8	4.15	2.65	3.2	2.9	3.0	2.6
7	4.4	4.5	6.5	17.6	10.1	3.8	4.15	2.75	3.1	2.9	3.1	2.8
8	4.1	4.0	5.7	15.5	10.5	3.7	5.1	2.8	2.9	2.95	3.15	2.7
9	4.4	4.1	6.7	12.8	9.9	3.6	5.7	2.35	3.0	2.9	3.2	2.9
10	4.5	4.3	7.9	10.4	8.5	3.5	5.2	2.85	3.05	2.7	3.0	3.15
11	4.5	5.1	8.8	8.8	7.9	3.5	5.0	2.95	3.15	2.55	2.95	3.15
12	4.5	5.0	8.6	7.6	12.3	3.4	4.7	2.7	2.9	2.55	3.2	3.1
13	4.5	4.2	8.7	6.7	15.1	3.4	4.6	3.3	2.8	2.65	2.9	2.85
14	4.5	4.8	8.9	6.2	14.0	3.4	4.5	3.6	2.7	2.6	2.85	2.55
15	4.0	3.8	10.6	6.2	13.7	3.7	4.55	3.85	2.65	2.7	3.0	2.5
16	4.0	3.8	13.2	6.1	12.8	3.9	4.7	5.0	2.45	2.55	2.85	2.7
17	4.4	3.8	13.2	6.2	13.0	3.8	4.7	5.8	2.75	2.8	2.95	2.9
18	4.0	4.0	14.0	7.6	12.8	3.6	4.4	5.5	2.75	2.65	3.05	2.5
19	8.4	4.3	14.5	9.2	11.4	3.7	4.4	4.7	2.9	2.7	3.15	2.6
20	12.2	5.2	14.2	10.6	10.9	3.7	4.5	4.2	3.0	2.65	3.0	2.75
21	11.6	6.1	13.9	10.1	9.3	3.7	4.7	4.8	3.0	2.5	3.0	2.8
22	12.1	7.2	14.8	9.3	7.6	3.9	5.3	5.6	2.75	2.95	3.0	2.75
23	16.9	8.0	15.0	8.3	6.2	3.7	4.95	6.4	3.2	2.65	2.9	2.7
24	12.3	7.8	15.8	7.5	5.5	3.5	4.9	6.1	3.1	2.85	2.7	2.6
25	14.0	7.2	17.6	7.0	5.1	3.5	4.75	5.4	3.15	2.9	2.6	2.55
26	12.9	11.2	18.4	6.4	4.8	3.5	4.5	4.9	3.7	2.9	2.95	2.7
27	9.2	18.6	18.9	13.3	4.6	3.4	4.1	4.45	4.1	2.65	2.95	2.75
28	7.9	19.1	19.0	17.0	4.4	3.4	3.65	4.25	4.0	2.6	2.85	2.75
29	8.0	19.0	18.9	17.0	4.7	3.4	3.5	4.15	3.7	2.9	2.6	2.6
30	8.6	.....	19.7	17.2	4.7	3.4	3.3	4.6	3.45	2.75	2.6	2.65
31	8.8	.....	19.0	.....	4.8	.....	2.7	4.5	.....	2.95	.....	2.6

NOTE.—No record of ice kept by observer. Relation of gage height to discharge probably affected by ice about Jan. 7-23 and Feb. 6-19.

Daily discharge, in second-feet, of East Branch of White River at Shoals, Ind., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,250	13,400	32,800	28,700	26,400	5,210	1,740	785	3,120	1,580	1,040	650
2	11,100	13,200	34,700	29,600	25,800	4,230	2,000	930	2,760	1,500	830	695
3	12,100	10,500	36,000	31,100	24,000	3,480	1,820	830	2,100	1,100	880	1,160
4	10,900	8,820	34,200	32,000	21,400	3,000	2,310	740	1,740	1,100	930	695
5	8,820	5,910	26,600	28,100	17,200	2,530	3,240	830	1,500	930	985	570
6	5,910	.....	14,500	26,300	16,500	2,310	3,120	695	1,290	930	1,040	650
7	.....	.....	8,600	26,900	15,600	2,310	3,120	785	1,160	930	1,160	830
8	.....	.....	6,830	23,800	16,200	2,100	5,450	830	930	985	1,220	740
9	.....	.....	9,040	19,700	15,200	1,910	6,830	465	1,040	930	1,290	930
10	.....	.....	11,500	16,000	12,700	1,740	5,680	880	1,100	740	1,040	1,220
11	.....	.....	13,200	13,200	11,500	1,740	5,210	985	1,220	610	985	1,220
12	.....	.....	12,900	10,900	19,000	1,580	4,480	740	930	610	1,290	1,160
13	.....	.....	13,000	9,040	23,200	1,580	4,230	1,430	830	695	930	880
14	.....	.....	13,400	7,940	21,500	1,580	3,980	1,910	740	650	880	610
15	.....	.....	16,400	7,940	21,000	2,100	4,100	2,420	695	740	1,040	570
16	.....	.....	20,300	7,720	19,700	2,530	4,480	5,210	535	610	880	[a]740
17	.....	.....	20,300	7,940	20,000	2,310	4,480	7,060	785	830	985	930
18	.....	.....	21,500	10,900	19,700	1,910	3,730	6,370	785	695	1,100	570
19	.....	.....	22,200	14,000	17,600	2,100	3,730	4,480	930	740	1,220	650
20	.....	5,680	21,800	16,400	16,800	2,100	3,980	3,240	1,040	695	1,040	785
21	.....	7,720	21,400	15,600	14,200	2,100	4,480	4,730	1,040	570	1,040	830
22	.....	10,100	22,700	14,200	10,900	2,530	5,910	6,600	785	985	1,040	785
23	.....	11,700	23,000	12,300	7,940	2,100	5,090	8,380	1,290	695	930	740
24	19,000	11,300	24,200	10,700	6,370	1,740	4,970	7,720	1,160	880	740	650
25	21,500	10,100	26,900	9,670	5,450	1,740	4,600	6,140	1,220	930	650	610
26	19,800	17,300	28,100	8,380	4,730	1,740	3,980	4,970	2,100	930	985	740
27	14,000	28,400	28,800	20,400	4,230	1,580	3,000	3,860	3,000	695	985	785
28	11,500	29,200	29,000	26,000	3,730	1,580	2,000	3,360	2,760	650	880	785
29	11,700	29,000	28,800	26,000	4,480	1,580	1,740	3,120	2,100	930	650	650
30	12,900	.....	30,000	26,300	4,480	1,580	1,430	4,230	1,660	785	650	695
31	13,200	.....	29,000	.....	4,730	.....	740	3,980	.....	985	.....	650

[a] Dec. 16 observer reported: "Rise evidently due to gates in dam at Williams."

NOTE.—Discharge Jan. 7–23 and Feb. 6–19 estimated, because of ice, from climatologic records and daily gage heights, as follows: Jan. 7–23, 3,500 second-feet; Feb. 6–19, 1,500 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution. See also "Accuracy" in station description.

Monthly discharge of East Branch of White River at Shoals, Ind., for 1912.

[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	.....	.....	7,780	1.59	1.83	D.
February	29,200	.....	8,050	1.64	1.77	D.
March	36,000	6,830	22,000	4.49	5.18	C.
April	32,000	7,720	17,900	3.65	4.07	B.
May	26,400	3,730	14,600	2.98	3.44	A.
June	5,210	1,580	2,220	.453	.51	B.
July	6,830	740	3,730	.761	.88	A.
August	8,380	465	3,180	.649	.75	A.
September	3,120	535	1,410	.288	.32	B.
October	1,580	570	859	.175	.20	B.
November	1,290	650	977	.199	.22	B.
December	1,220	570	780	.159	.18	B.
The year	36,000	.....	6,970	1.42	19.35	

NOTE.—See "Accuracy" in station description and footnotes to table of daily discharge.

LITTLE WABASH RIVER NEAR CLAY CITY, ILL.

Location.—At the Baltimore & Ohio Southwestern Railroad bridge about 2 miles east of Clay City, Ill., and about 5 miles above the mouth of Big Muddy Creek.

Records available.—October 3, 1908, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—808 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent. Location of point of control not known.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The flood of February 8, 1909, reached a height of 23.7 feet on the gage.

Winter flow.—Ice may affect the relation between gage height and discharge during parts of December, January, and February.

Remarks.—The station is at the toe of a horseshoe bend in the river, and the ground inside the bend along the railroad is very low. During high water the Little Wabash overflows into Little Muddy Creek and in extreme high water into Big Muddy Creek, forming at such times a sheet of water 4 miles wide along the railroad; at times, however, because of local storms causing relatively higher stages on Little and Big Muddy creeks than on the Little Wabash, the overflow is reversed, that is, from the creeks into the river. The high-water discharge of Little Wabash River at this station can not, therefore, be determined. Nine discharge measurements were made at this station during 1909–1912, but no estimates of discharge have been published because of the impossibility of determining the high-water discharge. There was no overflow at the station at the gage height (13.35 feet) of the discharge measurement made August 16, 1912, and the cross section at the gaging section indicates that there will probably be no flow in the flood channel one-fourth mile east of the main channel below gage height, about 15 feet. When the discharge measurement was made March 4, 1910, there was a large amount of overflow, but the lowest stage of such overflow could not then be determined. At what stage overflow above the station occurs can be ascertained only by observation or an examination of the intervening topography.

Discharge below the probable stage of overflow may be estimated from the records available at the discretion of those using the data. The accuracy of such records will be only fair.

The following discharge measurement was made by P. S. Monk:

August 16, 1912: Gage height, 13.35 feet; discharge, 1,110 second-feet. At the time of this discharge measurement all the flow was in the main channel.

Daily gage height, in feet, of Little Wabash River near Clay City, Ill., for 1912.

[Wm. F. Davis and J. D. Evans, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11.0	9.1	19.4	18.8	18.8	9.0	6.9	10.2	7.0	6.0	6.3	6.1
2	11.8	8.8	19.0	18.8	18.5	7.6	6.45	8.0	6.9	6.0	6.5	6.1
3	9.9	8.1	.....	18.9	18.5	9.6	6.5	7.4	6.8	6.0	8.5	6.1
4	9.2	7.9	13.8	18.5	17.6	12.2	9.6	7.15	6.7	6.0	8.0	6.1
5	9.2	7.25	10.8	18.5	14.5	9.3	18.0	7.8	7.2	6.0	7.8	6.1
6	9.2	6.85	9.1	18.1	12.0	8.0	18.0	6.75	6.7	6.0	7.5	6.1
7	8 8	6.3	8.8	16.3	10.4	7.2	13.6	6.7	6.6	5.9	7.0	6.1
8	8.6	6.15	8.8	12.0	11.6	6.95	10.1	6.7	6.5	5.9	6.8	6.1
9	8.0	6.15	9.2	10.3	9.6	6.8	9.2	8.8	6.4	5.9	6.6	6.1
10	7.7	6.15	9.8	9.5	8.8	6.6	8.4	8.2	6.3	5.9	6.6	6.1

Daily gage height, in feet, of Little Wabash River near Clay City, Ill., for 1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	7.55	6.15	10.3	8.8	8.0	6.5	8.4	14.0	6.2	5.9	6.6	6.1
12	[a]6.7	6.15	11.0	8.6	9.8	6.4	10.0	11.2	6.2	5.9	6.6	6.1
13	6.7	6.15	11.8	8.4	10.0	6.25	11.2	9.2	6.2	5.9	6.55	6.1
14	6.7	6.15	14.8	15.0	9.6	6.3	12.1	11.8	6.1	5.9	6.5	6.1
15	6.7	6.15	18.1	14.0	9.4	6.2	14.2	15.8	6.1	5.9	7.8	6.05
16	[a]6.6	6.15	18.5	11.2	9.0	6.15	17.2	12.3	6.0	5.9	7.3	6.05
17	6.6	6.15	18.5	9.2	8.4	6.2	17.8	11.6	6.0	5.9	6.9	6.0
18	8.3	6.5	18.6	9.4	8.1	8.8	18.0	11.8	6.0	5.9	6.7	6.0
19	13.8	8.0	18.7	15.5	9.0	9.6	16.2	12.2	6.0	5.9	6.5	6.0
20	16.8	10.1	18.8	17.2	8.5	8.6	15.0	10.0	5.9	5.9	6.4	6.0
21	18.0	11.5	18.9	14.8	8.0	7.8	11.4	15.2	5.9	5.9	6.3	6.0
22	17.8	13.0	18.6	12.6	7.4	7.5	9.2	17.9	6.0	5.9	6.2	6.0
23	15.0	10.5	18.5	11.4	7.3	7.15	10.5	18.2	6.1	6.0	6.2	6.0
24	12.0	9.0	18.5	15.6	7.15	7.1	10.1	16.6	6.1	6.0	6.2	6.0
25	12.0	8.7	18.5	.....	7.0	7.05	9.8	10.3	6.2	6.0	6.2	6.0
26	11.6	13.9	18.3	11.1	6.95	7.15	8.1	8.4	6.2	6.0	6.2	6.0
27	11.2	18.4	17.8	18.1	7.0	7.0	7.25	7.8	6.1	6.0	6.15	6.0
28	11.0	18.6	18.4	.....	7.9	6.45	7.1	7.5	6.0	6.0	6.1	6.0
29	10.0	18.8	18.6	18.4	9.0	6.5	7.8	7.4	5.9	6.0	6.1	6.0
30	9.8	.....	18.8	18.6	10.4	6.35	13.2	7.2	5.8	6.0	6.1	6.0
31	9.4	.....	19.0	.....	9.6	.....	12.1	7.1	.....	6.0	.....	6.0

[a] Gage height 7.5 feet to top of ice.

NOTE.—Gage heights to top of ice Jan. 4–11. Relation of gage height to discharge probably affected by ice about Jan. 4–18 and Feb. 4–17. Observer reported ice from 2 to 9 inches thick Jan. 4–17, and from 5 to 8 inches in thickness Feb. 5–17. Observer reported "rain and thaw cause of rise" on Jan. 19 and "ice gone" on Feb. 18. On or about Sept. 30 the gage box was struck by a loose brake rod of a passing train, and as a result readings from that date to Dec. 31 may be in error. The gage was repaired by the observer, who reports that the gage readings would be only slightly affected because of the accident.

LITTLE WABASH RIVER NEAR GOLDEN GATE, ILL.

Location.—At Southern Railway bridge about 1 mile west of Golden Gate, Ill., and 1 mile below the mouth of Elm Creek.

Records available.—August 17, 1908, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—1,780 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent. Location of control not known.

Discharge measurements.—Made from downstream side of the bridge, and in high water, also from downstream side of three wooden trestles east of the gaging station.

Floods.—The flood of May, 1908, reached a height of about 29.2 feet on the present gage datum.

Winter flow.—Ice may affect the relation between gage height and discharge during portions of December, January, and February.

Accuracy.—Backwater affects the relation of gage height to discharge at this station and, although 21 measurements of discharge have been made at this point during 1908–1912, no reliable estimates of discharge can be made.

The following discharge measurement was made by P. S. Monk:

August 13, 1912: Gage height, 9.41 feet; discharge, 1,250 second-feet.

Daily gage height, in feet, of Little Wabash River near Golden Gate, Ill., for 1912.

[Ben Chalcraft, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.8	8.1	21.8	24.8	20.8	11.0	3.6	7.9	5.8	2.5	3.4	2.5
2	10.2	7.8	22.2	25.3	21.2	9.3	2.7	8.8	4.0	2.4	5.2	2.7
3	9.9	7.2	22.0	25.6	21.4	7.2	3.4	7.3	3.6	2.4	7.5	2.7
4	8.8	6.8	21.4	25.6	21.7	6.8	a16.1	5.1	3.2	2.2	7.1	2.6
5	7.4	6.4	22.1	25.5	22.4	5.4	18.4	4.8	3.1	2.1	6.8	2.6
6	6.7	6.4	22.1	25.3	22.2	8.4	24.4	4.5	3.0	.....	7.4	2.5
7	6.1	5.8	21.8	25.0	21.8	6.8	24.2	4.4	3.0	.....	8.1	2.5
8	5.8	4.6	21.4	24.9	21.0	4.3	23.8	3.9	3.0	.....	8.0	2.5
9	5.2	3.9	20.2	24.2	18.9	3.9	23.3	3.4	3.0	.....	7.2	2.4
10	5.0	3.6	18.9	23.6	15.7	3.8	23.0	3.3	2.9	.....	5.5	2.3
11	4.9	3.5	17.5	22.5	10.2	3.6	22.0	4.3	2.9	.....	5.0	2.3
12	4.8	3.5	15.8	21.2	14.3	3.1	21.1	6.2	2.6	.....	4.8	2.3
13	4.8	3.4	16.5	19.5	8.1	3.1	17.8	8.1	2.6	.....	5.5	2.3
14	4.6	3.3	17.2	17.8	9.2	3.1	14.4	8.3	2.5	.....	5.0	2.2
15	4.6	3.3	19.1	14.3	9.0	3.0	10.0	8.6	2.7	.....	4.2	2.2
16	4.6	3.1	19.9	12.1	8.6	3.2	9.1	9.6	2.8	.....	4.0	2.2
17	5.8	3.8	20.5	11.5	9.2	12.4	11.1	10.7	3.2	.....	3.9	2.3
18	8.4	4.5	20.9	11.1	9.8	14.8	12.2	9.5	3.6	.....	3.6	2.4
19	11.2	4.9	21.3	10.6	9.0	10.4	13.8	6.8	3.9	.....	3.4	2.3
20	13.8	5.3	22.1	11.2	7.4	8.2	14.0	11.2	3.0	.....	3.2	2.3
21	15.8	6.2	22.7	11.9	5.6	7.3	14.6	11.7	3.8	.....	3.1	2.2
22	16.1	9.4	23.4	12.4	5.2	6.4	14.0	12.4	4.1	.....	3.0	2.3
23	16 4	14.3	23.9	12.0	4.8	5.8	11.3	13.3	3.9	.....	3.0	2.3
24	16.6	16.2	24.2	9.8	4.5	3.7	9.3	14.0	3.5	.....	3.0	2.3
25	16.7	19.3	24.4	9.4	4.4	3.5	7.2	15.9	3.9	.....	2.9	2.4
26	16.4	16.5	24.5	15.7	4.5	3.2	7.5	16.1	6.0	.....	2.9	2.4
27	14.6	19.1	24.4	19.3	5.1	3.8	6.3	16.2	4.9	.....	2.9	2.3
28	14.0	20.2	24.3	14.9	5.8	4.5	4.1	15.5	3.6	.....	2.8	2.3
29	13.7	21.6	24.5	18.7	7.2	4.2	2.9	12.3	3.0	.....	2.6	3.4
30	12.6	.....	24.6	19.2	9.7	4.3	8.1	8.8	2.7	.....	2.6	3.5
31	11.2	.....	24.6	.....	11.2	.....	4.8	6.4	.....	2.1	.....	3.4

a Rise of 4.6 feet in one hour reported by observer July 4.

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 4–17 and Feb. 4–20. Observer reported ice 3 to 3½ inches thick from Jan. 5–12 and 5 inches thick on Feb. 14. Snow to a depth of 7 inches reported on the ice Jan. 12.

LITTLE WABASH RIVER AT CARMI, ILL.

Location.—At highway bridge at northeast edge of Carmi, Ill., about one-fourth mile below the Big Four and Louisville & Nashville Railroad bridges, and about 4½ miles below the mouth of Skillet Fork River.

Records available.—October 9, 1908, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—3,090 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent. Location of control not known.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The following high-water marks have been preserved: 1875, 33.5 feet; about 1895, 34.0 feet; 1897, 34.5 feet; 1898, 36.0 feet; all based on present gage datum. These gage heights are authentic, but there is a possibility that some of the dates are erroneous.

Winter flow.—Ice does not affect the flow in ordinary winters.

Accuracy.—Backwater exists at this station and reliable estimates of discharge can not be made.

The following discharge measurement was made by P. S. Monk:

August 12, 1912: Gage height, 3.50 feet; discharge, 732 second-feet.

Daily gage height, in feet, of Little Wabash River at Carmi, Ill., for 1912.

[Noah Weigant, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.0	9.4	20.7	27.7	21.4	8.8	2.35	4.2	3.0	.....	2.0	2.0
2	6.9	7.0	21.1	28.0	21.8	7.8	2.35	6.2	2.6	.....	2.5	2.0
3	7.4	5.3	21.3	28.4	22.2	6.5	2.45	6.6	2.4	.....	3.25	2.0
4	7.0	5.7	21.5	28.6	22.5	4.2	11.5	5.0	2.25	.....	4.2	2.0
5	7.0	5.0	21.6	28.8	22.5	3.1	19.2	4.4	2.2	.....	4.2	2.0
6	7.1	4.3	21.8	28.8	22.2	3.2	19.5	2.7	2.15	.....	4.8	2.05
7	6.95	3.6	21.7	28.9	21.6	3.2	20.0	2.45	2.15	.....	5.2	2.05
8	6.20	3.3	21.8	28.8	20.7	3.05	21.0	2.3	2.1	.....	6.1	2.05
9	5.80	3.0	22.0	28.6	19.2	2.65	21.2	2.25	2.1	.....	5.8	2.0
10	5.55	2.9	21.2	28.0	17.0	2.45	20.9	2.35	2.05	.....	5.0	2.0
11	[a]5.05	2.8	20.1	27.4	13.9	2.3	20.5	2.80	2.0	.....	4.2	2.0
12	4.55	2.65	19.4	26.7	10.4	2.2	19.8	3.0	2.0	.....	3.4	2.0
13	4.45	2.55	18.8	25.7	8.4	2.1	18.8	5.1	1.95	.....	3.6	1.95
14	4.35	2.4	18.4	24.2	8.2	2.1	16.5	5.4	1.95	.....	4.2	1.95
15	4.40	2.3	19.6	22.6	8.3	1.95	12.8	5.0	2.0	.....	3.25	1.95
16	4.40	2.25	19.5	20.7	7.3	2.05	7.8	4.4	2.05	.....	3.05	1.95
17	4.40	2.2	19.3	17.2	7.0	7.0	6.2	4.2	2.0	.....	2.8	1.95
18	5.00	2.2	19.6	14.3	7.4	13.4	7.8	4.0	2.05	.....	2.75	1.95
19	9.45	2.3	20.2	11.2	7.8	14.0	7.8	3.6	2.2	.....	2.65	1.95
20	10.20	3.0	20.8	9.6	7.0	12.3	8.0	6.8	2.2	.....	2.55	1.95
21	11.35	3.25	21.8	8.0	6.6	11.4	8.6	8.4	2.25	.....	2.45	1.95
22	[b]12.5	3.45	22.7	10.4	6.2	10.9	8.9	10.6	2.3	.....	2.35	1.95
23	13.8	4.3	23.3	10.8	5.6	10.4	8.5	10.8	2.55	.....	2.3	1.95
24	14.6	5.2	24.4	8.7	4.8	9.3	6.6	10.0	2.55	.....	2.2	1.95
25	14.7	6.5	25.0	6.4	4.4	9.0	4.8	10.0	3.05	.....	2.15	1.95
26	14.4	18.6	25.4	15.6	3.2	7.8	4.1	9.7	7.8	.....	2.1	1.95
27	14.0	20.0	25.8	20.8	3.3	5.8	4.0	9.5	5.2	.....	2.1	1.95
28	13.3	19.4	26.2	20.5	3.9	4.0	3.5	8.6	3.4	.....	2.05	1.95
29	16.0	19.4	27.0	20.8	5.4	4.0	3.25	7.7	2.7	.....	2.05	1.95
30	14.6	.....	27.4	21.0	6.9	3.4	2.70	6.0	2.2	1.90	2.05	2.0
31	11.8	.....	27.4	.....	8.2	.....	2.75	4.6	.....	.....	.....	2.0

[a] Gage height 5.15 feet to top of ice. [b] Gage height 12.55 feet to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–22. Gage heights Jan 7–10 and 12–21 to top of ice.

SKILLET FORK RIVER NEAR WAYNE CITY, ILL.

Location.—At Southern Railway bridge 1 mile east of Wayne City, Ill., about 4 miles below the mouth of Horse Creek.

Records available.—August 16, 1908, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—481 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Practically permanent; rough; remains of rock dam at section. Point of control at section.

Discharge measurements.—Made from downstream side of bridge, and in high water also from downstream side of wooden railroad trestle about 1 mile east of main channel. Low-water measurements are made about 600 feet below regular section by wading or from a boat.

Floods.—Maximum gage height since establishment of gage, 21.8 feet, on March 11, 1909. No records previous to establishment of gage are available.

Point of zero flow.—A determination by leveling October 28, 1911, indicates that there would be no flow past the gage if the river stage were to fall to about 1.5 feet by the gage datum.

Winter flow.—Ice may affect the relation between gage height and discharge during portions of December, January, and February.

The following discharge measurement was made by P. S. Monk:

August 14, 1912: Gage height, 3 feet; discharge, 54.5 second-feet. This measurement was made by wading at a section just above the bridge.

Daily gage height, in feet, of Skillet Fork River near Wayne City, Ill., for 1912.

[Geo. A. Johnson and J. C. Taylor, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.5	5.2	19.5	19.1	16.7	4.9	2.5	8.9	2.4	2.4	3.1	2.3
2	6.3	3.7	16.5	15.0	8.6	3.4	4.0	5.2	2.4	.....	4.7	2.4
3	5.1	3.6	8.2	18.9	5.0	3.4	3.4	3.6	2.4	.....	3.2	2.4
4	4.2	3.3	6.5	18.9	3.9	3.0	4.0	2.9	2.3	.....	2.8	2.4
5	4.0	3.0	5.9	18.1	3.5	2.9	5.7	2.7	2.3	.....	2.6	2.4
6	3.7	2.8	4.6	11.5	3.0	2.8	13.2	2.7	2.6	.....	2.9	2.5
7	3.5	2.7	4.9	5.9	2.9	2.7	15.2	2.6	2.5	.....	7.3	2.5
8	3.1	2.7	5.6	5.0	2.9	2.7	12.4	2.6	2.4	.....	6.0	2.4
9	3.1	2.7	9.7	4.4	3.0	2.7	13.9	2.6	2.3	.....	3.7	2.4
10	3.1	[b] 2.25	10.2	4.0	2.9	2.7	11.0	2.9	2.3	.....	2.8	2.4
11	3.1	[b] 2.5	10.2	3.8	3.3	2.7	11.7	2.8	2.3	.....	2.7	2.4
12	3.1	2.7	11.0	3.4	10.4	2.4	8.6	3.2	2.3	.....	2.7	2.4
13	[a] 2.5	2.6	12.1	3.3	9.1	2.3	5.5	3.4	2.3	.....	2.6	2.4
14	3.1	2.4	13.0	4.0	6.2	2.3	3.9	2.9	2.2	.....	2.4	2.45
15	3.1	2.5	16.4	3.8	4.3	2.3	3.1	2.8	2.2	.....	2.4	2.4
16	3.1	2.6	19.7	3.4	5.7	5.0	8.0	3.4	2.2	.....	2.4	2.4
17	3.1	2.6	19.5	3.2	7.3	15.7	5.6	3.5	2.2	.....	3.2	2.4
18	4.7	2.7	19.5	5.4	5.2	19.6	3.6	2.9	2.7	.....	2.8	2.4
19	15.7	3.0	19.1	5.7	3.7	20.0	3.5	2.6	3.0	.....	2.7	2.4
20	17.7	3.9	16.1	5.2	3.1	17.9	2.7	4.5	3.0	.....	2.6	2.4
21	15.6	4.2	16.6	3.9	2.9	12.6	2.7	6.0	2.8	.....	2.6	2.4
22	13.2	4.2	18.3	3.5	2.8	7.5	5.6	7.4	2.6	.....	2.5	2.4
23	10.0	4.3	17.4	3.1	2.7	3.9	3.0	7.1	2.5	.....	2.5	2.4
24	8.7	4.6	16.0	2.9	2.6	3.0	3.0	4.8	2.5	.....	2.5	2.4
25	8.1	11.7	16.6	2.9	2.5	2.9	3.1	3.3	2.5	.....	2.5	2.4
26	7.1	19.0	17.6	9.9	4.1	2.7	2.7	2.8	2.8	.....	2.5	2.4
27	6.7	20.0	17.5	20.0	3.1	3.0	2.6	2.7	2.7	.....	2.4	2.4
28	6.3	20.2	17.1	20.4	3.9	2.8	2.6	2.5	2.6	.....	2.3	2.4
29	7.0	19.8	19.4	20.2	13.7	2.7	3.7	2.5	2.5	.....	2.3	2.4
30	6.7	.....	20.0	20.0	13.1	2.6	13.7	2.5	2.5	.....	2.3	2.5
31	6.1	.....	19.7	.....	8.5	.....	12.6	2.4	.....	.....	.....	2.5

[a] Gage height 3.1 feet to top of ice. [b] Gage height 2.7 feet to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 7–18 and Feb. 5–13. Gage heights Jan. 8–12, 14–17, and Feb. 7, 8, 9, and 12 to top of ice. Ice reported 6 to 6½ inches in thickness Jan. 13–17; 4½ inches Feb. 10, and 2 inches Feb. 11. The point of control is at the riffle in the gaging section, which is said to practically never freeze.

Daily discharge, in second-feet, of Skillet Fork River near Wayne City, Ill., for 1912.

Day.	Jan	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	420	205	5,300	4,900	3,080	182	13	586	7	7	55	3
2	293	97	2,960	2,220	547	76	118	205	7	.....	167	7
3	197	90	499	4,700	190	76	76	90	7	.....	62	7
4	132	69	313	4,700	111	48	118	41	3	.....	34	7
5	118	.....	257	4,010	83	41	242	27	3	.....	20	7
6	97	.....	160	1,060	48	34	1,520	27	20	.....	41	13
7	.....	.....	182	257	41	27	2,310	20	13	.....	398	13
8	.....	.....	235	190	41	27	1,280	20	7	.....	265	7
9	.....	.....	710	146	48	27	1,770	20	3	.....	97	7
10	.....	.....	796	118	41	27	950	41	3	.....	34	7
11	.....	.....	796	104	69	27	1,110	34	3	.....	27	7
12	.....	.....	950	76	832	7	547	62	3	.....	27	7
13	.....	.....	1,200	69	614	3	227	76	3	.....	20	7
14	.....	7	1,460	118	283	3	111	41	1	.....	7	10
15	.....	13	2,910	104	139	3	55	34	1	.....	7	7
16	.....	20	5,500	76	242	190	475	76	1	.....	7	7
17	.....	20	5,300	62	398	2,550	235	83	1	.....	62	7
18	.....	27	5,300	220	205	5,400	90	41	27	.....	34	7
19	2,550	48	4,900	242	97	5,800	83	20	48	.....	27	7
20	3,710	111	2,750	205	55	3,860	27	153	48	.....	20	7
21	2,500	132	3,020	111	41	1,340	27	265	34	.....	20	7
22	1,520	132	4,180	83	34	420	235	409	20	.....	13	7
23	760	139	3,500	55	27	111	48	376	13	.....	13	7
24	559	160	2,700	41	20	48	48	174	13	.....	13	7
25	487	1,110	3,020	41	13	41	55	69	13	.....	13	7

Daily discharge, in second-feet, of Skillet Fork River near Wayne City, Ill., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	376	4,800	3,640	742	125	27	27	34	34	.....	13	7
27	333	5,800	3,570	5,800	55	48	20	27	27	.....	7	7
28	293	6,000	3,310	6,220	111	34	20	13	20	.....	3	7
29	365	5,600	5,200	6,000	1,700	27	97	13	13	.....	3	7
30	333	.....	5,800	5,800	1,490	20	1,700	13	13	.....	3	13
31	274	.....	5,500	.....	535	.....	1,340	7	.....	.....	.....	13

NOTE.—Daily discharge determined by means of a discharge rating curve fairly well defined between 1 and 1,180 second-feet (gage heights 2.2 and 12 feet), and poorly defined above 1,180 second-feet (gage height 12 feet).

Discharge Jan. 7–18 and Feb. 5–13 estimated, because of ice, from climatologic records, gage heights, observer's notes, and discharge of adjacent drainage area, as follows: Jan. 7–18, 17 second-feet; Feb. 5–13, 7 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of Skillet Fork River near Wayne City, Ill., for 1912.

[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	3,710	.....	501	1.04	1.20	D.
February	6,000	.....	850	1.77	1.91	D.
March	5,800	160	2,770	5.76	6.64	B.
April	6,220	41	1,620	3.37	3.76	B.
May	3,080	13	365	.759	.88	B.
June	5,800	3	684	1.42	1.58	C.
July	2,310	13	483	1.00	1.15	B.
August	586	7	99.9	.208	.24	B.
September	48	1	13.6	.028	.03	D.
October	.....	.....	.....	.....	.....	.....
November	398	3	50.4	.105	.12	C.
December	13	3	7.7	.016	.02	D.

NOTE.—See footnotes to table of daily discharge.

SKILLET FORK RIVER NEAR MILL SHOALS, ILL.

Location.—At Baltimore & Ohio Southwestern Railroad bridge about 1 mile south of Mill Shoals, Ill., and 1½ miles below the mouth of Griffin Creek.

Records available.—October 9, 1908, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—912 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent; old piles in bottom affect measurements at low stages. Point of control at section.

Discharge measurements.—Made from top of downstream plate girder of bridge and long wooden trestle approaches at each end.

Floods.—Maximum gage height since establishment of gage is 24.4, which occurred March 14, 1909. No available records of floods previous to establishment of gage.

Point of zero flow.—Estimated to be at 1.0 foot gage height, from an examination of the station at low water.

Winter flow.—Ice may affect the relation between gage height and discharge during portions of December, January, and February.

Accuracy.—Backwater exists at this station and reliable estimates of flow can not be made, although 18 measurements of discharge were made during 1909–1912.

The following discharge measurement was made by P. S. Monk:
August 15, 1912: Gage height, 5.50 feet; discharge, 243 second-feet.

Daily gage height, in feet, of Skillet Fork River near Mill Shoals, Ill., for 1912.

[John A. Clow, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.4	10.0	20.6	23.0	21.8	12.7	4.0	11.4	2.3	.....	3.4	2.5
2	9.6	7.9	21.0	23.3	21.8	8.3	4.6	9.7	2.2	.....	5.9	2.5
3	7.4	7.0	21.0	23.4	21.5	5.9	8.5	8.0	2.2	.....	6.3	2.5
4	6.9	6.8	20.7	23.4	20.7	5.1	15.6	6.2	2.2	.....	5.5	2.5
5	6.3	5.3	20.2	23.4	20.0	4.8	17.6	4.0	2.2	.....	6.3	2.5
6	5.9	4.5	19.8	23.2	19.7	3.9	17.4	3.8	2.2	.....	7.8	2.4
7	a 5.1	4.1	18.7	23.0	15.4	3.6	17.1	3.3	2.2	.....	.....	2.4
8	5.1	3.9	18.0	22.6	13.7	3.1	17.0	2.7	2.1	.....	9.4	2.4
9	5.1	3.7	17.4	22.2	10.0	3.0	16.5	3.0	2.0	.....	.....	2.4
10	a 5.1	3.6	17.2	21.8	9.7	2.9	16.3	3.0	1.9	.....	6.6	2.4
11	a 4.0	3.4	17.1	21.0	8.9	2.7	16.2	3.8	1.9	.....	6.0	2.4
12	a 3.8	3.3	17.2	19.7	7.9	2.7	15.8	4.4	1.9	.....	5.5	2.4
13	a 3.2	a 3.1	17.6	19.5	9.3	2.7	16.9	4.9	1.8	.....	4.6	2.4
14	a 3.2	3.0	18.1	19.0	10.8	2.6	16.7	.....	1.8	.....	4.1	2.4
15	a 3.1	2.9	18.9	16.9	8.5	2.5	15.3	5.1	1.8	.....	3.6	2.4
16	a 3.1	3.0	19.8	13.6	7.9	2.4	14.9	4.9	1.8	.....	3.4	2.4
17	3.0	3.1	20.3	11.8	8.9	14.5	7.9	4.1	1.8	.....	3.1	2.3
18	3.0	3.3	20.8	9.3	7.8	16.7	6.5	4.0	1.8	.....	3.1	2.3
19	a 5.9	4.0	21.0	8.9	6.4	17.8	4.9	3.8	1.8	.....	3.1	2.4
20	11.4	4.1	21.1	7.4	6.0	18.7	4.0	4.6	2.0	.....	3.1	2.4
21	a 13.8	6.9	21.4	6.7	4.8	19.3	3.9	11.0	3.5	.....	3.1	2.4
22	a 15.6	7.0	21.4	9.0	4.0	19.6	(b)	11.4	3.4	.....	3.1	2.4
23	16.0	6.8	21.4	6.4	3.9	19.7	.....	10.7	3.0	.....	3.0	2.4
24	15.9	6.1	21.6	5.9	3.9	19.1	.....	9.9	2.5	.....	2.9	2.4
25	a 15.4	7.8	21.8	4.9	3.8	18.5	.....	7.7	3.5	.....	2.8	2.4
26	14.4	13.7	21.9	16.9	3.6	13.7	(b)	5.1	.....	.....	2.7	2.4
27	14.3	18.6	21.9	19.3	3.2	9.0	3.4	4.0	7.6	.....	2.6	2.4
28	14.2	19.1	22.0	20.0	5.0	7.8	3.7	3.9	5.9	.....	2.5	2.3
29	13.9	19.8	22.4	20.7	8.7	6.5	3.9	3.0	3.2	.....	2.5	2.2
30	13.5	.....	22.5	21.5	13.3	5.1	4.5	2.9	2.9	.....	2.5	2.0
31	12.1	.....	22.8	.....	.....	.....	10.6	2.4	.....	.....	.....	2.0

a Gage height to top of ice. b Gage out of order.

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 7–19, and Feb. 7–20. Observer reported "ice 10 inches thick, Jan. 19," "water along sides, ice thawing Jan. 20."

TENNESSEE RIVER BASIN.

FRENCH BROAD RIVER AT ASHEVILLE, N. C.

Location.—At highway bridge known as Smith's Bridge, about 1 mile below the Southern Railway station at Asheville, about 2 miles below the mouth of Swannanoa River. Smith's Bridge is one-fourth mile above the new Southern Railway bridge and about one-fourth mile below a concrete highway bridge recently completed.

Records available.—March 19, 1903, to December 31, 1912. The United States Weather Bureau has maintained a gage at this point since March 19, 1903, and during 1904 a number of discharge measurements were made by the United States Geological Survey. Since January 1, 1905, the discharge measurements have been continued by the United States Geological Survey and the gage heights have been furnished by the United States Weather Bureau.

Drainage area.—987 square miles.

Gages.—Vertical staff attached to one of the bridge piers, and an auxiliary chain gage attached to the bridge in the first panel to the left of the staff gage. The staff gage ends at zero and the chain gage is used for readings below zero. Both gages are adjusted to the same datum, which has remained unchanged since they were established.

Channel.—Practically permanent; broken by three piers of the highway bridge. Bed of river is mostly rock, but is not excessively rough. Current good at all points.

Discharge measurements.—Made from the downstream side of the highway bridge.

Floods.—The flood of August 31, 1910, reached a height of about 8.8 feet by the gage datum. Stage of 10.6—"date unknown"—reported by the United States Weather Bureau.

Winter flow.—Ice does not affect the flow.

Accuracy.—The construction of a new railroad bridge across the river about 1,500 feet below the gage in 1907–8 caused changes in channel necessitating revision in the discharge rating curve. The cofferdams caused temporary and variable changes during 1908, but since the completion of the work comparatively permanent conditions of flow have been reestablished.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Discharge measurements of French Broad River at Asheville, N. C., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 27	W. E. Hall	1.28	3,120	Mar. 29	W. E. Hall	4.32	10,200
28	do	4.04	9,700	30	do	3.87	8,930
29	do	4.30	10,200	Sept. 16	do	.30	1,690

Daily gage height, in feet, of French Broad River at Asheville, N. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.5	0.7	1.2	2.1	1.0	0.4	0.5	0.6	−0.2	0.0	−0.4	−0.3
2	1.1	.4	1.0	2.4	.9	.4	.5	.4	− .3	.0	.1	− .3
3	.8	.2	.8	2.0	.8	.7	.8	.1	− .3	− .1	− .1	.1
4	.5	.2	.8	1.7	.7	.8	.7	1.5	− .3	− .2	− .3	− .1
5	.5	.1	.9	1.5	1.4	.7	.8	.7	− .4	− .3	− .4	.2
6	.4	.1	.9	1.3	1.4	.4	1.4	.4	− .4	− .2	− .3	.4
7	.4	.2	1.0	1.3	2.1	.8	1.2	.1	− .4	− .2	.2	.7
8	.3	.2	1.0	1.2	2.0	.8	.9	.1	− .4	− .3	1.4	.4
9	.3	.1	1.0	1.1	1.6	.6	.7	.1	− .4	− .3	.5	.2
10	.5	.1	.9	1.0	1.2	.4	.9	.2	− .4	− .3	.2	− .1
11	.3	.0	.8	.9	1.1	.3	.8	.1	− .4	− .3	.0	− .2
12	.1	− .1	.7	.9	1.8	.2	1.1	.0	− .4	− .4	− .1	− .2
13	.1	− .1	.8	.8	1.3	.3	1.0	− .1	− .4	− .3	− .2	− .2
14	.1	− .1	.7	.8	1.0	.3	.8	.2	− .3	.2	− .2	− .3
15	.1	− .1	2.8	.7	.9	1.5	.9	.0	− .2	.0	− .3	− .3
16	.0	.8	4.2	.8	1.1	.8	.8	.1	.4	− .2	− .3	− .3
17	.0	.8	3.4	1.0	1.2	.5	.9	.3	.0	− .3	− .3	− .3
18	.1	.8	2.4	1.0	.8	.3	1.0	.2	− .1	− .3	− .3	− .3
19	.2	1.0	1.7	.9	.7	.2	1.2	.1	− .2	− .3	− .4	− .3
20	.5	.8	1.4	.8	.6	.2	1.4	.1	− .3	− .3	− .4	− .3
21	.3	.9	2.2	.7	.5	.1	1.7	.0	− .3	− .3	− .3	− .3
22	.1	3.0	1.0	.7	.5	.1	1.1	.1	− .4	− .2	− .3	− .3
23	.1	2.5	1.0	2.3	.4	.1	1.0	.1	1.4	− .2	− .4	− .3
24	.1	1.4	2.0	1.5	.4	.3	.8	− .2	2.5	− .2	− .4	− .3
25	.0	1.5	2.3	1.1	.3	.8	.7	− .2	1.8	− .2	− .4	− .3
26	.0	1.6	1.6	.9	.3	1.9	.6	.1	.5	− .3	− .4	− .2
27	.0	2.7	1.4	.9	.3	1.6	.4	.0	1.0	− .3	− .4	− .2
28	.0	2.1	1.1	1.5	.5	.8	.4	− .1	.5	− .3	− .4	− .2
29	.1	1.5	4.0	1.2	.7	.6	.3	− .2	.3	− .4	− .4	− .3
30	2.0	.....	3.9	1.3	1.2	.6	.2	− .2	.1	− .4	− .4	− .3
31	1.3	.....	3.0	.....	.7	.....	.1	− .2	.....	− .4	.....	.6

Daily discharge, in second-feet, of French Broad River at Asheville, N. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,410	2,190	2,910	4,550	2,600	1,820	1,940	2,060	1,190	1,390	1,010	1,100
2	2,750	1,820	2,600	5,200	2,460	1,820	1,940	1,820	1,100	1,390	1,490	1,100
3	2,320	1,600	2,320	4,350	2,320	2,190	2,320	1,490	1,100	1,290	1,290	1,490
4	1,940	1,600	2,320	3,770	2,190	2,320	2,190	3,410	1,100	1,190	1,100	1,290
5	1,940	1,490	2,460	3,410	3,240	2,190	2,320	2,190	1,010	1,100	1,010	1,600
6	1,820	1,490	2,460	3,070	3,240	1,820	3,240	1,820	1,010	1,190	1,100	1,820
7	1,820	1,600	2,600	3,070	4,550	2,320	2,910	1,490	1,010	1,190	1,600	2,190
8	1,710	1,600	2,600	2,910	4,350	2,320	2,460	1,490	1,010	1,100	3,240	1,820
9	1,710	1,490	2,600	2,750	3,590	2,060	2,190	1,490	1,010	1,100	1,940	1,600
10	1,940	1,490	2,460	2,600	2,910	1,820	2,460	1,600	1,010	1,100	1,600	1,290
11	1,710	1,390	2,320	2,460	2,750	1,710	2,320	1,490	1,010	1,100	1,390	1,190
12	1,490	1,290	2,190	2,460	3,960	1,600	2,750	1,390	1,010	1,010	1,290	1,190
13	1,490	1,290	2,320	2,320	3,070	1,710	2,600	1,290	1,010	1,100	1,190	1,190
14	1,490	1,290	2,190	2,320	2,600	1,710	2,320	1,600	1,100	1,600	1,190	1,100
15	1,490	1,290	6,140	2,190	2,460	3,410	2,460	1,390	1,190	1,390	1,100	1,100
16	1,390	2,320	9,940	2,320	2,750	2,320	2,320	1,490	1,820	1,190	1,100	1,100
17	1,390	2,320	7,690	2,600	2,910	1,940	2,460	1,710	1,390	1,100	1,100	1,100
18	1,490	2,320	5,200	2,600	2,320	1,710	2,600	1,600	1,290	1,100	1,100	1,100
19	1,600	2,600	3,770	2,460	2,190	1,600	2,910	1,490	1,190	1,100	1,010	1,100
20	1,940	2,320	3,240	2,320	2,060	1,600	3,240	1,490	1,100	1,100	1,010	1,100
21	1,710	2,460	4,760	2,190	1,940	1,490	3,770	1,390	1,100	1,100	1,100	1,100
22	1,490	6,640	2,600	2,190	1,940	1,490	2,750	1,490	1,010	1,190	1,100	1,100
23	1,490	5,430	2,600	4,980	1,820	1,490	2,600	1,490	3,240	1,190	1,010	1,100
24	1,490	3,240	4,350	3,410	1,820	1,710	2,320	1,190	5,430	1,190	1,010	1,100
25	1,390	3,410	4,980	2,750	1,710	2,320	2,190	1,190	3,960	1,190	1,010	1,100
26	1,390	3,590	3,590	2,460	1,710	4,150	2,060	1,490	1,940	1,100	1,010	1,190
27	1,390	5,900	3,240	2,460	1,710	3,590	1,820	1,390	2,600	1,100	1,010	1,190
28	1,390	4,550	2,750	3,410	1,940	2,320	1,820	1,290	1,940	1,100	1,010	1,190
29	1,490	3,410	9,360	2,910	2,190	2,060	1,710	1,190	1,710	1,010	1,010	1,100
30	4,350	.....	9,070	3,070	2,910	2,060	1,600	1,190	1,490	1,010	1,010	1,100
31	3,070	.....	6,640	.....	2,190	.....	1,490	1,190	.....	1,010	.....	2,060

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 1912.

[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.		
January	4,350	1,390	1,850	1.87	2.16	A.
February	6,640	1,290	2,530	2.56	2.76	A.
March	9,940	2,190	4,010	4.06	4.68	A.
April	5,200	2,190	2,990	3.03	3.38	A.
May	4,550	1,710	2,590	2.62	3.02	A.
June	4,150	1,490	2,090	2.12	2.36	A.
July	3,770	1,490	2,390	2.42	2.79	A.
August	3,410	1,190	1,560	1.58	1.82	A.
September	5,430	1,010	1,570	1.59	1.77	A.
October	1,600	1,010	1,160	1.18	1.36	B.
November	3,240	1,010	1,240	1.26	1.41	B.
December	2,190	1,100	1,290	1.31	1.51	B.
The year	9,940	1,010	2,100	2.13	29.02	

TENNESSEE RIVER AT KNOXVILLE, TENN.

Location.—At county highway bridge at Gay Street, in the city of Knoxville, about 4 miles below the junction of French Broad and Holston rivers.

Records available.—January 17, 1899, to December 31, 1912. The United States Weather Bureau began river observations February 1, 1883, but the earlier gage-

height records are not continuous. For a number of years prior to 1899 daily gage readings were made for about one-half of the year, including the winter season.

Drainage area.—8,990 square miles.

Gage.—Vertical gage on one of the county bridge piers; used since January 1, 1909. The original gage on a pier of the old bridge at the same site was used prior to 1899. During construction of the new bridge, January 17, 1899, the gage was removed to the Knoxville & Augusta Railroad bridge one-half mile downstream. Later during the same year a more permanent gage was installed, 1,000 feet still farther downstream at a point on the right bank just below the mouth of West Knoxville Bayou. This gage was set to read the same as the original gage, having its zero point 2.3 feet lower than that of the original gage on account of fall in the river. All gage heights for 1899 were adjusted to conform to this gage, and it was used continuously until December 31, 1908. The present gage at the county bridge reads the same at low stages as the one it supersedes, but the two gages do not read the same at higher stages. A relation based on comparative readings has been computed by the United States Weather Bureau, and has been applied to the discharge rating curve to adapt it to the present gage.

Channel.—Wide and relatively shallow, with rough, rocky bottom. Permanency of flow will depend upon the permanency of some river improvement wing dams below.

Discharge measurements.—Made from the downstream side of the bridge, floor of which is about 100 feet above water.

Floods.—The flood of March, 1875, reached a height of about 39.0 feet by the gage datum (United States Weather Bureau publication).

Point of zero flow.—Assuming that the improved boat channels below the station are 3.0 feet deep at low water, according to the plan for that portion of the river, there would be no flow past the gage if the river stage were to fall to about −4.5 feet by the gage datum.

Winter flow.—Ice does not affect the flow.

Accuracy.—The discharge rating curve for the present gage is based chiefly on the curve for the former gage adjusted according to the relative readings of the two gages. Discharge measurements made during 1909 and 1911 (no discharge measurements made during 1912), referred to the present gage, agree well with the derived curve, but all parts of the curve have not yet been verified by discharge measurements. Estimates of discharge are withheld from publication for the present. (See Water-Supply Paper 283.)

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Daily gage height, in feet, of Tennessee River at Knoxville, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.4	6.0	4.1	8.9	10.5	2.6	2.3	2.4	0.6	1.0	0.0	−0.4
2	3.4	3.8	3.3	12.7	7.8	2.2	2.3	2.5	.5	.8	.0	− .5
3	3.0	3.0	2.9	17.0	5.4	1.7	2.5	1.8	.5	.7	.0	− .5
4	2.8	2.5	2.8	15.9	4.4	1.7	2.4	1.7	.4	.6	− .1	1.0
5	2.5	2.9	2.8	10.5	4.0	2.0	3.8	1.3	.4	.6	− .1	1.5
6	2.4	2.0	2.9	6.5	5.0	2.0	3.0	1.8	.3	.6	− .1	2.5
7	2.0	1.9	3.7	5.1	4.6	1.9	3.4	1.4	.3	.5	.0	2.4
8	1.8	1.8	3.7	4.5	4.9	2.0	2.9	1.3	.3	.4	1.0	2.0
9	1.8	1.8	4.5	4.2	4.7	2.0	2.4	1.0	.2	.0	1.9	1.4
10	2.0	1.7	5.9	3.7	4.0	1.8	2.1	1.1	.2	.0	2.1	1.2
11	2.0	1.8	7.0	3.4	3.5	1.5	2.4	1.2	.2	.0	1.6	1.0
12	1.8	1.6	5.1	3.0	3.0	1.4	2.9	1.0	.1	.0	1.1	.9
13	1.8	1.5	4.5	2.8	2.9	.9	2.8	1.0	.0	.0	.9	.9
14	1.5	1.4	4.5	2.9	2.9	.8	2.4	1.0	.0	.4	.7	.5
15	1.7	1.4	6.5	2.5	2.7	.9	2.2	.9	.0	.5	.7	.8

Daily gage height, in feet, of Tennessee River at Knoxville, Tenn., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	1.0	2.0	11.5	2.8	2.5	2.0	2.0	1.5	−0.1	1.0	0.6	0.5
17	1.1	2.4	12.8	3.2	2.8	2.4	1.9	1.4	.5	1.0	.6	− .5
18	.8	2.4	10.0	3.7	4.4	2.0	1.5	1.0	.8	.7	.6	− .4
19	1.5	2.3	6.5	3.6	3.5	2.0	1.5	1.1	.6	.5	.5	.5
20	1.8	2.3	4.8	3.1	2.9	1.5	2.0	1.4	.5	.4	.4	.0
21	2.0	2.5	4.0	2.9	2.5	1.4	2.8	1.4	.6	.4	.2	.0
22	2.4	4.8	3.5	2.9	2.4	1.0	2.5	1.8	.5	.4	.0	.2
23	2.0	7.5	3.0	6.1	2.2	1.0	2.4	2.4	1.5	.4	.0	− .3
24	1.8	6.5	3.4	6.6	2.0	1.0	2.5	1.8	.9	.4	− .1	.0
25	1.7	4.1	4.0	4.8	1.9	1.0	2.4	1.4	2.5	.4	− .2	.5
26	1.6	3.8	4.5	3.5	1.8	2.5	3.3	1.4	2.4	.2	− .2	.3
27	1.5	4.9	4.5	3.8	1.6	2.4	2.9	1.0	2.0	.2	− .2	.4
28	1.3	6.0	4.0	8.0	2.0	2.4	2.4	1.0	2.0	.1	− .3	.8
29	1.6	5.8	8.9	7.5	2.8	2.4	1.8	1.0	1.5	.1	− .3	.4
30	3.2	.....	13.8	11.5	3.1	2.4	1.5	.8	1.4	.0	− .3	1.4
31	5.6	.....	12.9	.....	3.0	.....	1.2	.6	.....	.0	.....	2.0

TENNESSEE RIVER AT CHATTANOOGA, TENN.

Location.—At Hamilton County highway bridge in the city of Chattanooga, just below Chattanooga Island, 4 miles below South Chickamauga Creek and 3 miles above Chattanooga Creek.

Records available.—January 1, 1879, to December 31, 1912. The United States Weather Bureau began observations of gage heights January 1, 1879. Earlier records beginning in 1875, when the first gage was established, are fragmentary. Discharge measurements were first made by the United States Geological Survey in 1897. Gage heights from January 1, 1900, have been published by the United States Geological Survey. A number of discharge measurements made by the United States Weather Bureau in 1893 have also been published by the United States Geological Survey.

Drainage area.—21,400 square miles (published by the United States Weather Bureau).

Gage.—The present standard gage consists of a sloping iron section (railroad T rail) bolted to rock and a vertical timber attached to the rock cliff on the left bank at the foot of Lookout Street, about 200 feet upstream from the bridge. It was erected October 31, 1884. The original gage was established in 1875. An automatic recording gage, which makes its record in the Weather Bureau office, has been used for several years. There is also a vertical section of brass gage attached to the pier nearest the left bank, and recently half-foot graduations have been painted on the pipe incasing the recording gage float, to be read from the bridge with the aid of a glass. The datum has remained the same for all of the gages.

Channel.—Permanent or nearly so, though a portion of the bed is sand. Current good.

Discharge measurements.—Made from downstream footway of bridge; elevation about 100 feet above water.

Floods.—The flood of March 11, 1867, reached a height of about 58.0 feet by the gage datum (information from United States Weather Bureau).

Point of zero flow.—Reports of the United States engineers show that the bottom of the excavated boat channel at Ross Towhead, 2½ miles below the gage, is about 5 feet lower than gage datum, which indicates that there would be no flow past the gage if the stage were to fall to about −5.0 feet.

Winter flow.—Ice does not appreciably affect the flow.

Artificial control.—None probably at present. A large dam for lock and power plant about 20 miles below will, when completed, raise the water level at Chattanooga, and will entirely destroy the usefulness of the gage heights for estimates of flow.

Accuracy.—Daily gage heights in the following table are as furnished by the United States Weather Bureau and were obtained from the automatic recording gage record with corrections based on periodic readings of the gage painted on the float pipe. The reading of the automatic recording gage has been checked at various times by engineers of the Survey and found to be essentially correct, but on November 25, 1911, a discrepancy of 0.5 foot was noted, the automatic recording gage reading too high by that amount. The discharge measurements made by Survey engineers are referred to the cliff or float pipe gages, to which, therefore, the discharge rating curve refers. The accuracy of daily and monthly discharge obtained by applying this rating curve to the automatic recording gage record is questionable and these discharge values should be used with caution.

Cooperation.—The daily gage heights have all been furnished by the United States Weather Bureau.

The following discharge measurement was made by means of floats by W. E. Hall: March 31, 1912: Gage height, 31.3 feet; discharge, 185,000 second-feet. (Coefficient for reducing surface to mean velocity, 0.90.)

Daily gage height, in feet, of Tennessee River at Chattanooga, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.9	14.3	14.4	29.6	25.4	8.6	6.3	4.8	3.3	3.8	1.9	1.6
2	13.5	14.2	12.3	26.1	26.0	7.4	5.8	4.8	3.1	3.4	1.8	1.6
3	12.1	12.6	10.3	26.3	22.3	6.6	5.7	4.8	2.9	3.1	1.8	1.6
4	10.7	10.4	9.1	29.3	16.7	6.0	5.6	5.2	2.8	2.8	1.8	1.7
5	9.4	7.8	8.5	30.2	12.9	5.7	5.9	4.5	2.7	2.6	1.8	3.2
6	8.2	7.3	8.4	29.2	11.5	5.6	6.2	4.3	2.6	2.5	1.8	7.0
7	7.2	6.7	8.4	22.7	10.9	5.6	7.8	4.2	2.6	2.4	1.8	9.6
8	6.4	5.7	9.2	14.9	11.7	5.8	7.8	4.2	2.5	2.3	1.8	10.2
9	6.3	5.5	10.2	12.4	12.0	5.4	7.6	4.2	2.5	2.2	2.0	8.5
10	6.4	5.2	10.9	11.1	11.0	5.3	7.0	4.1	2.4	2.1	2.7	7.0
11	6.9	5.2	12.1	10.3	10.1	5.1	6.7	4.1	2.4	2.0	3.2	5.9
12	6.7	4.9	12.5	9.5	9.5	4.8	7.9	4.1	2.4	1.9	3.4	5.0
13	6.6	4.9	12.7	8.9	8.8	4.5	8.0	4.0	2.3	1.9	3.3	4.5
14	6.3	4.9	12.0	8.4	8.3	3.9	7.7	3.8	2.2	1.9	3.0	4.0
15	5.8	4.8	13.8	7.9	7.8	3.9	6.8	3.6	2.2	1.9	2.7	3.7
16	5.8	5.5	20.0	7.8	7.5	4.3	6.3	3.6	2.1	1.9	2.5	3.5
17	4.8	6.3	23.9	8.4	7.4	4.4	6.0	3.8	2.0	2.2	2.5	3.3
18	4.6	6.4	23.8	9.4	7.3	4.6	5.7	4.1	2.0	2.4	2.3	3.3
19	4.2	6.2	21.7	9.9	7.3	4.8	5.2	4.0	2.2	2.4	2.1	3.3
20	4.4	6.1	17.5	10.0	7.7	4.6	5.2	3.9	2.4	2.4	2.1	3.5
21	4.9	6.4	13.2	9.0	7.7	4.4	5.4	3.9	2.7	2.7	2.1	3.5
22	5.6	10.9	11.1	8.5	7.0	4.0	5.5	4.0	2.7	2.8	2.0	3.4
23	5.6	14.9	9.4	11.7	6.4	3.8	6.0	4.3	3.8	2.7	2.0	3.2
24	5.9	15.6	9.1	15.5	6.0	3.6	6.0	4.4	4.5	2.4	1.9	3.2
25	5.9	15.1	12.8	14.6	5.7	3.8	5.6	5.2	6.1	2.3	1.9	3.4
26	5.4	13.8	15.5	12.1	5.5	4.9	5.5	4.9	5.0	2.2	1.8	3.9
27	5.1	14.5	13.7	10.5	5.4	5.5	5.4	4.5	4.9	2.1	1.8	4.1
28	4.9	17.6	12.8	14.8	5.2	6.2	5.8	4.1	4.9	2.1	1.8	4.1
29	5.1	16.5	20.2	20.3	5.6	6.5	6.0	3.8	4.8	2.0	1.7	4.0
30	8.8	.....	28.5	22.7	7.8	6.8	5.6	3.6	4.4	2.0	1.6	4.0
31	13.5	.....	31.3	.....	9.8	.....	5.0	3.4	.....	1.9	.....	5.2

Daily discharge, in second-feet, of Tennessee River at Chattanooga, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	76,100	84,800	85,400	180,000	154,000	49,400	35,200	26,000	17,600	20,300	10,800	9,490
2	79,800	84,100	72,400	158,000	157,000	42,000	32,100	26,000	16,500	18,100	10,300	9,490
3	71,100	74,200	60,000	159,000	134,000	37,000	31,400	26,000	15,500	16,500	10,300	9,490
4	62,400	60,600	52,500	178,000	99,600	33,300	30,800	28,400	15,000	15,000	10,300	9,900
5	54,400	44,500	48,800	183,000	76,100	31,400	32,700	24,300	14,500	14,000	10,300	17,000
6	46,900	41,400	48,200	177,000	67,400	30,800	34,500	23,100	14,000	13,600	10,300	39,500
7	40,700	37,600	48,200	137,000	63,700	30,800	44,500	22,500	14,000	13,100	10,300	55,600
8	35,800	31,400	53,100	88,500	68,600	32,100	44,500	22,500	13,600	12,600	10,300	59,300
9	35,200	30,200	59,300	73,000	70,500	29,600	43,200	22,500	13,600	12,100	11,200	48,800
10	35,800	28,400	63,700	64,900	64,300	29,000	39,500	22,000	13,100	11,700	14,500	39,500
11	38,900	28,400	71,100	60,000	58,700	27,800	37,600	22,000	13,100	11,200	17,000	32,700
12	37,600	26,600	73,600	55,000	55,000	26,000	45,100	22,000	13,100	10,800	18,100	27,200
13	37,000	26,600	74,800	51,300	50,700	24,300	45,700	21,400	12,600	10,800	17,600	24,300
14	35,200	26,600	70,500	48,200	47,600	20,800	43,800	20,300	12,100	10,800	16,000	21,400
15	32,100	26,000	81,700	45,100	44,500	20,800	38,300	19,200	12,100	10,800	14,500	19,700
16	32,100	30,200	120,000	44,500	42,600	23,100	35,200	19,200	11,700	10,800	13,600	18,600
17	26,000	35,200	144,000	48,200	42,000	23,700	33,300	20,300	11,200	12,100	13,600	17,600
18	24,800	35,800	144,000	54,400	41,400	24,800	31,400	22,000	11,200	13,100	12,600	17,600
19	22,500	34,500	131,000	57,500	41,400	26,000	28,400	21,400	12,100	13,100	11,700	17,600
20	23,700	33,900	105,000	58,100	43,800	24,800	28,400	20,800	13,100	13,100	11,700	18,600
21	26,600	35,800	77,900	51,900	43,800	23,700	29,600	20,800	14,500	14,500	11,700	18,600
22	30,800	63,700	64,900	48,800	39,500	21,400	30,200	21,400	14,500	15,000	11,200	18,100
23	30,800	88,500	54,400	68,600	35,800	20,300	33,300	23,100	20,300	14,500	11,200	17,000
24	32,700	92,800	52,500	92,200	33,300	19,200	33,300	23,700	24,300	13,100	10,800	17,000
25	32,700	89,700	75,500	86,600	31,400	20,300	30,800	28,400	33,900	12,600	10,800	18,100
26	29,600	81,700	92,200	71,100	30,200	26,600	30,200	26,600	27,200	12,100	10,300	20,800
27	27,800	86,000	81,000	61,200	29,600	30,200	29,600	24,300	26,600	11,700	10,300	22,000
28	26,600	105,000	75,500	87,900	28,400	34,500	32,100	22,000	26,600	11,700	10,300	22,000
29	27,800	98,400	121,000	122,000	30,800	36,400	33,300	20,300	26,000	11,200	9,900	21,400
30	50,700	.....	173,000	137,000	44,500	38,300	30,800	19,200	23,700	11,200	9,490	21,400
31	79,800	.....	190,000	.....	56,900	.....	27,200	18,100	.....	10,800	.....	28,400

NOTE.—Daily discharge computed from a fairly well defined rating curve. Below 33,300 second-feet (gage height 6.0 feet) this curve is the same as that used for 1910–11, the change above 33,300 second-feet being based on the results of discharge measurement made Mar. 31, 1912.

Monthly discharge of Tennessee River at Chattanooga, Tenn., for 1912.

[Drainage area, 21,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.[a]
	Maximum.	Minimum.	Mean.	Per square mile.		
January	79,800	22,500	40,100	1.87	2.16	B.
February	105,000	26,000	53,900	2.52	2.72	B.
March	190,000	48,200	86,000	4.02	4.64	B.
April	183,000	44,500	91,600	4.28	4.78	B.
May	157,000	28,400	58,900	2.75	3.17	B.
June	49,400	19,200	28,600	1.34	1.50	B.
July	45,700	27,200	34,700	1.62	1.87	B.
August	28,400	18,100	22,600	1.06	1.22	B.
September	33,900	11,200	16,900	.790	.88	B.
October	20,300	10,800	13,000	.607	.70	B.
November	18,100	9,490	12,000	.561	.63	B.
December	59,300	9,490	23,800	1.11	1.28	B.
The year	190,000	9,490	40,100	1.87	25.55	

[a] See "Accuracy" in station description.

SOUTH FORK OF HOLSTON RIVER AT BLUFF CITY, TENN.

Location.—At highway bridge at Bluff City, Tenn., 300 feet below Virginia & Southwestern Railway bridge, 1 mile below the mouth of Indian Creek, and about 10 miles above the mouth of Watauga River.

Records available.—July 17, 1900, to December 31, 1912.

Drainage area.—828 square miles.

Gage.—Vertical staff attached to downstream side of bridge pier nearest the right bank; datum unchanged since established.

Channel.—Very irregular in depth and velocity of current; surface height controlled by shallow ledge below; probably permanent.

Discharge measurements.—Made from downstream side of the bridge. Also made from the railroad bridge 300 feet above, where the section is much better except at low stages, when the current there becomes sluggish.

Winter flow.—Ice does not affect the flow. A few days the observer has reported "Frozen," but this has probably referred to the water at the foot of gage rather than in the channel.

Cooperation.—Since January 1, 1905, the gage heights have been furnished by the United States Weather Bureau.

The following discharge measurement was made by W. E. Hall:
June 19, 1912: Gage height, 1.23 feet; discharge, 876 second-feet.

Daily gage height, in feet, of South Fork of Holston River at Bluff City, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.9	3.1	2.5	3.6	3.4	1.6	1.3	1.3	1.0	0.6	0.4	0.3
2	1.9	2.5	2.3	6.4	2.9	1.4	1.5	1.6	.8	.5	.5	.4
3	1.9	2.2	2.1	8.1	2.6	1.4	2.3	1.2	.7	.5	.4	.4
4	1.8	2.0	2.1	5.0	2.6	1.4	1.9	1.2	.6	.5	.3	.6
5	1.6	1.6	2.2	4.0	2.4	1.3	2.5	1.4	.8	.4	.3	1.5
6	1.7	1.7	2.8	3.4	2.2	1.3	2.8	1.2	.8	.4	.3	1.5
7	.....	1.8	2.7	3.0	2.7	1.4	2.3	1.0	.6	.4	.5	1.4
8	.....	1.8	2.9	3.2	3.7	1.4	1.8	.8	.5	.4	1.6	1.2
9	1.9	1.6	4.2	2.8	3.5	1.3	1.6	.8	1.1	.4	1.3	1.0
10	1.8	1.5	5.0	2.6	2.9	1.2	1.5	.9	.7	.3	1.0	.9
11	1.4	1.4	3.8	2.5	2.5	1.0	2.0	1.1	.5	.3	.8	.8
12	1.3	1.4	3.2	2.4	2.4	1.0	2.0	.9	.5	.3	.7	.7
13	1.2	1.3	3.3	2.2	2.2	.9	1.8	.9	.4	.3	.6	.5
14	1.0	1.2	4.0	2.1	2.0	.9	1.5	.9	.4	.4	.7	.3
15	.9	1.2	3.9	2.0	1.9	1.0	1.2	.8	.4	.7	.7	.3
16	.8	1.6	7.2	4.2	4.1	1.3	1.0	.8	.4	.7	.6	.4
17	.8	1.6	4.8	2.8	4.0	1.0	.9	.7	.3	.5	.6	.6
18	1.1	1.6	3.8	2.8	3.1	1.0	.8	.8	.3	.4	.6	.6
19	1.2	1.6	3.2	2.7	2.6	1.2	1.1	1.0	1.3	.6	.6	.6
20	2.7	1.6	2.8	2.4	2.2	1.1	1.2	1.2	1.1	.6	.5	.5
21	2.5	2.0	2.6	2.3	2.0	1.0	1.2	2.9	.8	.5	.5	.5
22	2.2	4.9	2.5	2.2	1.9	.8	1.1	2.0	.5	.4	.5	.4
23	1.7	3.7	2.3	3.0	1.8	.8	1.3	1.8	.7	.5	.5	.4
24	1.5	2.8	2.3	2.7	1.7	.8	1.1	1.5	1.7	.6	.4	.6
25	1.4	2.9	4.0	2.4	1.6	1.1	1.3	1.2	1.3	.5	.4	.6
26	1.4	2.8	3.7	2.2	1.5	1.1	1.8	1.1	1.0	.4	.4	.5
27	1.8	4.4	3.3	2.1	1.4	1.1	1.4	1.4	.9	.4	.5	.3
28	1.7	3.9	2.9	4.0	1.4	1.1	1.0	1.1	.8	.4	.4	.5
29	1.9	3.1	6.1	3.2	1.9	1.6	1.0	1.0	.7	.4	.4	.6
30	4.7	.....	6.3	3.9	2.2	1.2	.9	.9	.6	.4	.3	.9
31	4.2	.....	4.3	.....	1.9	.....	1.2	.9	.....	.4	.....	2.4

Daily discharge, in second-feet, of South Fork of Holston River at Bluff City, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,380	2,760	2,010	3,460	3,180	1,100	860	860	650	420	325	285
2	1,380	2,010	1,790	8,720	2,500	940	1,020	1,100	530	370	370	325
3	1,380	1,680	1,580	12,700	2,130	940	1,790	785	475	370	325	325
4	1,280	1,480	1,580	5,800	2,130	940	1,380	785	420	370	285	420
5	1,100	1,100	1,680	4,060	1,900	860	2,010	940	530	325	285	1,020
6	1,190	1,190	2,370	3,180	1,680	860	2,370	785	530	325	285	1,020
7	1,250	1,280	2,250	2,630	2,250	940	1,790	650	420	325	370	940
8	1,310	1,280	2,500	2,900	3,610	940	1,280	530	370	325	1,100	785
9	1,380	1,100	4,390	2,370	3,320	860	1,100	530	715	325	860	650
10	1,280	1,020	5,800	2,130	2,500	785	1,020	590	475	285	650	590
11	940	940	3,760	2,010	2,010	650	1,480	715	370	285	530	530
12	860	940	2,900	1,900	1,900	650	1,480	590	370	285	475	475
13	785	860	3,040	1,680	1,680	590	1,280	590	325	285	420	370
14	650	785	4,060	1,580	1,480	590	1,020	590	325	325	475	285
15	590	785	3,910	1,480	1,380	650	785	530	325	475	475	285
16	530	1,100	10,600	4,390	4,220	860	650	530	325	475	420	325
17	530	1,100	5,440	2,370	4,060	650	590	475	285	370	420	420
18	715	1,100	3,760	2,370	2,760	650	530	530	285	325	420	420
19	785	1,100	2,900	2,250	2,130	785	715	650	860	420	420	420
20	2,250	1,100	2,370	1,900	1,680	715	785	785	715	420	370	370
21	2,010	1,480	2,130	1,790	1,480	650	785	2,500	530	370	370	370
22	1,680	5,620	2,010	1,680	1,380	530	715	1,480	370	325	370	325
23	1,190	3,610	1,790	2,630	1,280	530	860	1,280	475	370	370	325
24	1,020	2,370	1,790	2,250	1,190	530	715	1,020	1,190	420	325	420
25	940	2,500	4,060	1,900	1,100	715	860	785	860	370	325	420
26	940	2,370	3,610	1,680	1,020	715	1,280	715	650	325	325	370
27	1,280	4,730	3,040	1,580	940	715	940	940	590	325	370	285
28	1,190	3,910	2,500	4,060	940	715	650	715	530	325	325	370
29	1,380	2,760	8,050	2,900	1,380	1,100	650	650	475	325	325	420
30	5,260	.....	8,490	3,910	1,680	785	590	590	420	325	285	590
31	4,390	.....	4,560	.....	1,380	.....	785	590	.....	325	.....	1,900

NOTE.—Daily discharge computed from a rating curve fairly well defined below 3,320 second-feet (gage height 3.5 feet).

Monthly discharge of South Fork of Holston River at Bluff City, Tenn., for 1912.

[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	5,260	530	1,380	1.67	1.92	B.
February	5,620	785	1,860	2.25	2.43	B.
March	10,600	1,580	3,570	4.31	4.97	C.
April	12,700	1,480	3,140	3.79	4.23	C.
May	4,220	940	2,010	2.43	2.80	B.
June	1,100	530	765	.924	1.03	B.
July	2,370	530	1,060	1.28	1.48	B.
August	2,500	475	800	.966	1.11	B.
September	1,190	285	513	.620	.69	B.
October	475	285	352	.425	.49	C.
November	1,100	285	422	.510	.57	B.
December	1,900	285	518	.626	.72	B.
The year	12,700	285	1,370	1.65	22.44	

HOLSTON RIVER NEAR ROGERSVILLE, TENN.

Location.—At Virginia & Southwestern Railway bridge near Austins Mill, a small railroad station, and 3 miles south of Rogersville. Station 150 feet below the mouth of Honeycut Creek and about 2 miles below Dodson Creek, both small streams from the south.

Records available.—March 10, 1902, to December 31, 1912. Gage heights furnished by United States Weather Bureau. Discharge measurements were begun in

Daily discharge, in second-feet, of Holston River near Rogersville, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,930	9,850	6,840	11,400	14,200	3,720	2,350	2,560	1,760	1,570	1,030	1,030
2	5,630	6,840	5,630	24,200	10,600	3,000	2,780	2,560	1,760	1,570	1,210	1,030
3	5,050	5,630	4,770	48,200	8,120	2,780	2,780	2,780	1,570	1,570	1,210	1,210
4	4,500	4,230	4,770	27,000	7,150	2,780	3,720	2,350	1,570	1,390	1,030	1,950
5	3,970	3,970	5,050	14,600	7,150	2,780	3,970	1,950	1,390	1,390	1,030	3,230
6	2,780	3,000	6,530	10,600	6,530	2,780	5,630	1,950	1,390	1,390	1,030	4,500
7	2,350	3,000	7,150	9,140	5,930	2,560	5,050	1,950	1,390	1,210	1,210	3,470
8	2,350	3,000	7,150	8,460	7,150	2,780	4,230	1,760	1,390	1,210	2,350	2,780
9	3,000	3,000	9,850	7,790	7,790	2,560	3,000	1,760	1,390	1,210	3,720	2,150
10	3,000	2,780	16,600	6,840	6,840	2,350	3,230	1,760	1,760	1,210	2,780	2,150
11	2,780	2,780	13,000	6,530	5,930	2,150	4,500	1,950	1,570	1,210	1,950	1,950
12	2,780	2,780	9,490	5,930	5,050	2,150	4,770	2,350	1,390	1,210	1,570	1,760
13	2,350	2,780	9,850	5,340	4,770	1,950	3,970	1,950	1,390	1,210	1,390	1,760
14	1,950	2,560	14,600	4,770	4,770	1,760	3,470	1,760	1,210	1,390	1,390	1,570
15	1,950	2,350	14,600	4,770	4,230	1,760	3,000	1,760	1,210	1,760	1,390	1,570
16	1,950	3,000	25,800	5,050	4,230	3,970	2,780	1,760	1,390	1,760	1,570	1,210
17	1,950	3,230	24,200	8,800	11,000	3,720	2,350	1,950	1,390	1,570	1,390	1,210
18	1,950	3,230	12,600	7,150	9,850	2,780	2,150	1,570	1,390	1,570	1,390	1,390
19	2,780	3,230	9,490	7,150	7,150	2,780	1,950	1,570	1,760	1,570	1,390	1,390
20	3,470	3,230	8,120	6,230	5,930	2,780	2,780	2,350	1,950	1,390	1,390	1,390
21	5,930	5,050	7,150	5,340	5,050	2,560	3,720	2,780	1,950	1,570	1,210	1,210
22	5,050	11,000	5,930	5,050	3,970	2,350	3,720	5,340	1,570	1,390	1,210	1,210
23	3,970	14,600	5,630	8,460	3,470	1,950	3,470	3,970	2,150	1,210	1,030	1,210
24	3,230	8,120	5,930	8,460	3,470	2,350	3,470	3,230	2,350	1,210	1,030	1,390
25	3,000	7,150	7,790	6,530	3,470	2,560	7,790	3,470	3,230	1,210	1,030	1,210
26	2,780	7,150	10,600	5,630	3,230	2,560	4,230	2,780	2,560	1,210	1,030	1,210
27	2,780	8,460	9,140	6,530	3,230	2,560	4,770	2,350	1,950	1,210	1,030	1,210
28	3,000	11,400	7,150	12,200	2,780	2,780	3,470	2,150	1,760	1,210	1,030	1,390
29	4,500	8,800	17,000	12,600	3,720	3,230	3,000	1,760	1,760	1,210	1,210	1,390
30	10,600	.....	31,000	17,000	4,770	2,780	2,350	1,760	1,760	1,210	1,210	2,560
31	16,200	.....	17,400	.....	4,770	.....	2,150	1,950	.....	1,210	.....	4,770

NOTE.—Daily discharge computed from a rating curve fairly well defined between 1,030 and 12,600 second-feet (gage heights, 1.5 and 5.5 feet), and assumed a tangent above 10,600 second-feet (gage height, 5.0 feet). See "Accuracy," in station description.

Monthly discharge of Holston River near Rogersville, Tenn., for 1912.

[Drainage area, 3,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.[a]
	Maximum.	Minimum.	Mean.	Per square mile.		
January	16,200	1,950	3,980	1.30	1.50	B.
February	14,600	2,350	5,390	1.76	1.90	B.
March	31,000	4,770	11,000	3.59	4.14	C.
April	48,200	4,770	10,600	3.46	3.86	C.
May	14,200	2,780	6,010	1.96	2.26	B.
June	3,970	1,760	2,650	.866	.97	A.
July	7,790	1,950	3,570	1.17	1.35	A.
August	5,340	1,570	2,320	.758	.87	A.
September	3,230	1,210	1,700	.556	.62	B.
October	1,760	1,210	1,360	.444	.51	B.
November	3,720	1,030	1,410	.461	.51	B.
December	4,770	1,030	1,850	.605	.70	B.
The year	48,200	1,030	4,320	1.41	19.19	

[a] See "Accuracy" in station description.

1904 by the United States Geological Survey. No gage heights or estimates of flow have been published by the United States Geological Survey prior to January 1, 1904, but it is thought that the 1904 discharge rating curve is applicable to the United States Weather Bureau gage heights back to the beginning.

Drainage area.—3,060 square miles.

Gage.—Vertical staff attached to downstream side of bridge pier nearest the right bank; datum unchanged.

Channel.—Practically permanent; section good for measurements.

Discharge measurements.—Made from top of the high-decked steel railroad bridge. A new highway bridge has recently been built half a mile above. The section at the new bridge appears to be good for measurements, and if it proves so it will be the regular place for future measurements.

Floods.—The flood of January 23 and 24, 1906, reached a maximum height of 17.5 feet by the gage datum. The stage was 15.0 feet on the morning of January 24.

Winter flow.—Ice does not affect the flow to any considerable extent.

Accuracy.—Discharge measurements made November 28, 1911, and June 21, 1912, indicate a change in the relation of gage height to discharge as expressed by the discharge rating curve used from 1906 to 1910. The last previous discharge measurement was made March 16, 1909. Estimates of discharge for 1911 and 1912 are based on a new rating curve. Published estimates of discharge for 1910 should be used with caution as noted in the last paragraph of the description of this station in Water-Supply Paper 283. The change may be due to some change in the gage when the bridge was reconstructed during 1910, but this probably does not affect the 1911 or 1912 data.

Cooperation.—The United States Weather Bureau has maintained the gage and furnished all the gage-height records.

The following discharge measurement was made by W. E. Hall:

June 21, 1912: Gage height, 2.12 feet; discharge, 2,130 second-feet.

Daily gage height, in feet, of Holston River near Rogersville, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	4.8	3.9	5.2	5.9	2.8	2.2	2.3	1.9	1.8	1.5	1.5
2	3.5	3.9	3.5	8.4	5.0	2.5	2.4	2.3	1.9	1.8	1.6	1.5
3	3.3	3.5	3.2	14.4	4.3	2.4	2.4	2.4	1.8	1.8	1.6	1.6
4	3.1	3.0	3.2	9.1	4.0	2.4	2.8	2.2	1.8	1.7	1.5	2.0
5	2.9	2.9	3.3	6.0	4.0	2.4	2.9	2.0	1.7	1.7	1.5	2.6
6	2.4	2.5	3.8	5.0	3.8	2.4	3.5	2.0	1.7	1.7	1.5	3.1
7	2.2	2.5	4.0	4.6	3.6	2.3	3.3	2.0	1.7	1.6	1.6	2.7
8	2.2	2.5	4.0	4.4	4.0	2.4	3.0	1.9	1.7	1.6	2.2	2.4
9	2.5	2.5	4.8	4.2	4.2	2.3	2.5	1.9	1.7	1.6	2.8	2.1
10	2.5	2.4	6.5	3.9	3.9	2.2	2.6	1.9	1.9	1.6	2.4	2.1
11	2.4	2.4	5.6	3.8	3.6	2.1	3.1	2.0	1.8	1.6	2.0	2.0
12	2.4	2.4	4.7	3.6	3.3	2.1	3.2	2.2	1.7	1.6	1.8	1.9
13	2.2	2.4	4.8	3.4	3.2	2.0	2.9	2.0	1.7	1.6	1.7	1.9
14	2.0	2.3	6.0	3.2	3.2	1.9	2.7	1.9	1.6	1.7	1.7	1.8
15	2.0	2.2	6.0	3.2	3.0	1.9	2.5	1.9	1.6	1.9	1.7	1.8
16	2.0	2.5	8.8	3.3	3.0	2.9	2.4	1.9	1.7	1.9	1.8	1.6
17	2.0	2.6	8.4	4.5	5.1	2.8	2.2	2.0	1.7	1.8	1.7	1.6
18	2.0	2.6	5.5	4.0	4.8	2.4	2.1	1.8	1.7	1.8	1.7	1.7
19	2.4	2.6	4.7	4.0	4.0	2.4	2.0	1.8	1.9	1.8	1.7	1.7
20	2.7	2.6	4.3	3.7	3.6	2.4	2.4	2.2	2.0	1.7	1.7	1.7
21	3.6	3.3	4.0	3.4	3.3	2.3	2.8	2.4	2.0	1.8	1.6	1.6
22	3.3	5.1	3.6	3.3	2.9	2.2	2.8	3.4	1.8	1.7	1.6	1.6
23	2.9	6.0	3.5	4.4	2.7	2.0	2.7	2.9	2.1	1.6	1.5	1.6
24	2.6	4.3	3.6	4.4	2.7	2.2	2.7	2.6	2.2	1.6	1.5	1.7
25	2.5	4.0	4.2	3.8	2.7	2.3	4.2	2.7	2.6	1.6	1.5	1.6
26	2.4	4.0	5.0	3.5	2.6	2.3	3.0	2.4	2.3	1.6	1.5	1.6
27	2.4	4.4	4.6	3.8	2.6	2.3	3.2	2.2	2.0	1.6	1.5	1.6
28	2.5	5.2	4.0	5.4	2.4	2.4	2.7	2.1	1.9	1.6	1.5	1.7
29	3.1	4.5	6.6	5.5	2.8	2.6	2.5	1.9	1.9	1.6	1.6	1.7
30	5.0	.....	10.1	6.6	3.2	2.4	2.2	1.9	1.9	1.6	1.6	2.3
31	6.4	.....	6.7	.....	3.2	.....	2.1	2.0	.....	1.6	.....	3.2

DOE RIVER AT VALLEY FORGE, TENN.

Location.—At Eastern Tennessee & Western North Carolina Railroad bridge at Valley Forge, about 4 miles above the mouth of the river.

Records available.—December 11, 1911, to December 31, 1912.

Drainage area.—132 square miles.

Gage.—Standard chain gage attached to bridge.

Channel.—Bottom sandy, may shift.

Discharge measurements.—Made from the upstream side of the bridge or by wading at a section about 40 feet above the bridge. The direction of the current makes a decided angle with the bridge.

Point of zero flow.—A determination by leveling on September 9, 1912, indicated that there would be no flow past the gage if the river were to fall to a stage of about −0.1 foot.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods, but only during unusually severe winters.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by wading by A. H. Horton: September 7, 1912: Gage height, 1.24 feet; discharge, 82 second-feet.

Daily gage height, in feet, of Doe River at Valley Forge, Tenn., for 1912.

[W. C. Garrison, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.66	1.68	1.72	2.18	2.37	1.63	1.52	1.40	1.18	1.22	1.10	1.20
2	1.54	1.60	1.62	3.21	2.15	1.61	1.50	1.37	1.15	1.20	1.20	1.34
3	1.54	1.35	1.59	2.62	2.24	1.84	1.50	1.45	1.15	1.16	1.12	1.35
4	1.48	1.48	1.58	2.28	2.10	1.63	1.60	1.46	1.15	1.16	1.10	1.31
5	1.14	1.36	1.69	2.05	2.03	1.53	1.94	1.37	1.30	1.14	1.10	1.34
6	1.19	1.42	1.72	1.91	2.00	1.61	1.72	1.33	1.19	1.14	1.10	1.36
7	1.40	1.30	1.77	2.01	2.00	1.57	1.50	1.30	1.30	1.12	1.94	1.32
8	1.42	1.38	1.85	1.78	1.95	1.48	1.47	1.29	1.30	1.10	1.70	1.26
9	1.49	1.33	2.27	1.74	1.87	1.43	1.66	1.29	1.24	1.10	1.42	1.20
10	1.35	1.36	2.12	1.70	1.77	1.41	1.64	1.36	1.14	1.10	1.32	1.19
11	1.36	1.33	1.99	1.65	1.73	1.35	1.67	1.30	1.11	1.10	1.26	1.22
12	1.32	1.33	1.99	1.62	1.72	1.33	1.70	1.26	1.10	1.08	1.21	1.20
13	1.30	1.33	2.07	1.60	1.63	1.33	1.58	1.21	1.19	1.10	1.19	1.06
14	1.25	1.30	2.07	1.58	1.58	1.45	1.60	1.17	1.18	1.24	1.35	1.15
15	1.30	1.40	3.7	1.56	1.64	2.23	1.47	1.21	1.16	1.28	1.24	1.21
16	1.00	1.40	3.17	1.56	2.00	1.95	1.42	1.21	1.11	1.15	1.20	1.21
17	1.22	1.43	2.67	1.67	1.82	1.67	1.40	1.22	1.14	1.12	1.14	1.16
18	1.31	1.48	2.12	1.57	1.73	1.73	1.40	1.24	1.15	1.12	1.18	1.22
19	1.60	1.42	1.95	1.55	1.65	1.63	2.50	1.32	1.34	1.20	1.18	1.19
20	1.30	1.48	1.91	1.51	1.63	1.52	2.14	1.32	1.16	1.18	1.18	1.04
21	1.32	1.98	1.82	1.51	1.58	1.49	1.92	1.60	1.10	1.11	1.16	1.12
22	1.26	2.08	1.75	2.15	1.53	1.41	1.99	1.65	1.11	1.11	1.15	1.10
23	1.29	1.38	1.72	2.14	1.52	1.45	1.87	1.39	1.60	1.20	1.15	1.10
24	1.28	1.73	2.04	1.90	1.44	1.53	1.72	1.22	1.45	1.18	1.15	1.19
25	1.30	1.80	2.00	1.80	1.64	1.47	1.96	1.22	1.30	1.10	1.14	.95
26	1.32	2.00	1.90	1.71	1.46	1.42	1.78	1.25	1.28	1.10	1.10	1.15
27	1.32	2.13	1.85	2.15	1.49	1.49	1.68	1.22	1.45	1.09	1.06	1.30
28	1.30	1.96	1.82	2.10	1.89	1.36	1.59	1.19	1.30	1.10	1.11	1.10
29	1.65	2.79	3.37	2.52	.....	1.32	1.53	1.18	1.30	1.10	1.22	1.25
30	2.10	.....	2.66	2.83	1.99	1.50	1.50	1.28	1.25	1.10	1.19	1.60
31	1.78	.....	2.21	.....	1.76	.....	1.49	1.25	.....	1.10	.....	1.52

NOTE.—Observer made no report relative to ice.

DOE RIVER AT ELIZABETHTON, TENN.

Location.—About 1 mile above mouth of river.

Records available.—June 15, 1907, to June 30, 1908; September 8 to December 31, 1912.

Drainage area.—139 square miles.

DOE RIVER AT BLEVINS, TENN.

Location.—At Eastern Tennessee & Western North Carolina Railroad bridge, one-fourth mile west of Blevins, Tenn., 4½ miles above the mouth of Little Doe River.

Records available.—December 16, 1911, to December 31, 1912.

Drainage area.—62.2 square miles.

Gage.—Standard chain gage attached to bridge.

Channel.—Bottom sandy; may shift.

Discharge measurements.—Made from upstream side of bridge or by wading at section about one-fourth mile above bridge.

Point of zero flow.—A determination by leveling September 10, 1912, indicates that there would be no flow past the gage if the river were to fall to a stage of about 1.2 feet.

Winter flow.—The relation of gage height to discharge may be occasionally affected by ice, but only for short periods during unusually severe winters.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by wading by A. H. Horton: September 11, 1912: Gage height, 1.69 feet; discharge, 24.8 second-feet.

Daily gage height, in feet, of Doe River at Blevins, Tenn., for 1912.

[C. A. Johnson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.10	2.15	.....	2.46	2.46	1.93	1.88	1.89	1.72	1.74	1.72	2.00
2	2.04	2.03	.....	2.93	2.30	1.91	1.84	1.87	1.72	1.72	1.72	1.99
3	2.02	2.06	.....	2.59	2.33	2.11	1.87	1.91	1.73	1.72	1.71	1.88
4	1.98	2.08	2.05	2.40	2.24	1.97	2.24	1.91	1.71	1.72	1.72	1.88
5	1.84	2.00	2.04	2.27	2.24	1.95	2.24	1.84	1.71	1.70	1.69	1.92
6	2.10	2.10	2.06	2.21	2.22	1.99	2.06	1.84	1.62	1.70	1.70	1.92
7	2.20	2.10	2.06	2.22	2.25	1.97	1.92	1.82	1.73	1.70	2.52	1.88
8	2.14	2.08	2.11	2.13	2.22	1.89	2.26	1.80	1.82	1.70	2.06	1.82
9	2.11	1.96	2.32	2.07	2.12	1.86	2.16	1.81	1.73	1.70	1.95	1.79
10	2.06	1.98	2.22	2.07	2.10	1.87	2.04	1.86	1.72	1.69	1.86	1.81
11	[a]2.10	2.06	2.14	2.04	2.06	1.83	2.21	1.82	1.70	1.70	1.83	1.80
12	[a]2.00	2.07	2.32	2.01	2.04	1.83	2.09	1.74	1.70	1.68	1.80	1.75
13	2.00	2.13	2.35	2.01	1.97	1.81	2.00	1.77	1.88	1.70	1.82	1.71
14	1.86	1.92	2.32	1.97	1.98	1.91	2.04	1.78	1.74	1.81	1.87	1.66
15	.....	1.95	3.75	1.98	2.36	2.20	1.89	1.78	1.74	1.80	1.82	1.64
16	.....	1.92	2.85	1.96	2.07	2.04	1.87	1.78	1.74	1.70	1.79	1.61
17	.....	1.92	2.39	2.00	2.13	1.91	1.84	1.78	1.72	1.70	1.78	1.63
18	.....	1.94	2.29	2.01	2.03	2.10	1.89	1.76	1.80	1.70	1.79	1.75
19	2.22	1.94	2.23	2.02	2.01	1.94	2.86	1.88	1.81	1.77	1.78	1.80
20	2.16	1.95	2.21	1.98	1.99	1.88	2.39	1.86	1.71	1.72	1.74	1.80
21	2.08	2.40	2.17	1.94	1.97	1.82	2.27	1.92	1.70	1.66	1.76	1.80
22	2.06	2.35	2.11	2.34	1.95	1.83	2.24	1.96	1.70	1.70	1.76	1.78
23	2.05	2.22	2.07	2.20	1.93	1.88	2.16	1.88	2.21	1.74	1.75	1.82
24	1.86	2.28	2.35	2.12	1.91	1.85	2.07	1.78	1.94	1.67	1.72	1.80
25	1.86	2.18	2.25	2.06	2.06	1.86	2.45	1.78	1.85	1.70	1.72	1.79
26	1.88	2.63	2.17	2.03	1.91	1.84	2.11	1.78	1.85	1.70	1.74	1.80
27	1.88	2.62	2.15	2.32	1.90	1.83	2.07	1.78	1.89	1.69	1.76	1.92
28	1.84	2.22	2.23	2.26	1.95	1.83	1.98	1.74	1.82	1.68	1.76	1.82
29	2.28	2.20	3.21	2.61	2.28	1.83	1.97	1.72	1.80	1.70	1.72	1.92
30	2.32	.....	2.69	3.25	2.05	1.86	1.97	1.78	1.78	1.68	1.84	2.28
31	2.20	.....	2.41	.....	1.98	.....	1.90	1.76	.....	1.70	.....	1.98

[a] Gage height to top of ice.

NOTE.—Observer reported ice 1 to 3 inches thick Jan. 11–14; ice broken up, Jan. 13; ice broken up, slush ice, Jan. 20. Feb. 29 p. m. to Mar. 4 a. m., gage broken.

Gage.—Staff gage attached to tree on right bank.

Channel.—Gravel, probably permanent.

Discharge measurements.—Made from covered highway bridge about one-half mile below gage, or by wading.

Winter flow.—Ice may affect relation of gage height to discharge for short periods, but only during unusually severe winters.

Artificial control.—The operation of a small power plant above the gage may affect the normal flow of the stream to some extent.

Accuracy.—Gage readings are considered reliable and accurate.

No discharge measurements were made at this station during 1912.

Daily gage height, in feet, of Doe River near Elizabethton, Tenn., for 1912.

[G. C. Dougherty, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	0.62	0.52	0.58	16	0.60	0.59	0.59	0.63
2	.....	.59	.39	.59	17	.57	.56	.58	.58
3	.....	.58	.54	.61	18	.61	.55	.64	.59
4	.....	.53	.52	.60	19	.87	.58	.63	.61
5	.....	.54	.54	.68	20	.61	.62	.59	.57
6	.....	.56	.54	.75	21	.54	.53	.58	.57
7	0.67	.55	.59	.61	22	.53	.52	.57	.59
8	.70	.51	1.05	.65	23	.72	.61	.57	.54
9	.66	.50	.82	.64	24	.80	.61	.55	.59
10	.59	.51	.69	.59	25	.72	.57	.51	.46
11	.51	.54	.65	.61	26	.66	.53	.53	.48
12	.56	.52	.64	.58	27	.84	.52	.56	.80
13	.55	.50	.59	.41	28	.71	.50	.55	.49
14	.61	.59	.69	.51	29	.67	.51	.51	.57
15	.55	.76	.66	.55	30	.63	.51	.54	.67
					31	.....	.53	.....	.96

LITTLE TENNESSEE RIVER AT JUDSON, N. C.

Location.—At Southern Railway bridge one-fourth mile north of the Southern Railway station at Judson, 2½ miles below the mouth of Nantahala River, 1 mile below Alarka Creek, one-fourth mile below Sawyer Branch, and 3 miles above the mouth of Tuckasegee River.

Records available.—June 25, 1896, to December 31, 1912.

Drainage area.—675 square miles.

Gage.—The present gage is a vertical staff in two sections on right bank 100 feet above the bridge. Lower section bolted to rock; upper section on tree. This gage superseded the chain gage on the bridge on July 1, 1905. The staff gage set to read the same as the chain gage at stage 3.0 feet, but owing to slope of water surface its datum was raised 0.5 foot. The original gage was first a wire gage, but afterward a boxed chain gage was used. Although the continuity of the record was interrupted by broken wires and stolen chains the datum of the original gage was not changed.

Channel.—Rough, rocky bottom; section divided by two piers. Current swift and irregular.

Discharge measurements.—Made from downstream side of railroad bridge. Some recent measurements have been made at a trestle for small flume crossing the river about one-fourth mile above the gage, where the section is better.

Winter flow.—Not affected by ice.

Accuracy.—Relation of gage height to discharge does not appear permanent, probably because of moving bowlders at and below the station during floods, when current is very swift. The discharge measurement made September 13, 1912, indicates material change in the channel and as the available data are not sufficient for the development of a new discharge rating curve, estimates of daily and monthly discharge are withheld.

The following discharge measurement was made by W. E. Hall:
September 13, 1912: Gage height, 3.42 feet; discharge, 915 second-feet.

Daily gage height, in feet, of Little Tennessee River at Judson, N. C., for 1912.

[Miss E. G. Enloe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.4	5.8	5.8	7.6	6.5	4.4	4.4	5.2	3.3	3.5	3.2	3.2
2	5.8	5.2	5.8	7.3	6.1	4.4	4.4	4.2	3.3	3.5	3.6	3.3
3	5.6	5.0	5.8	6.8	5.7	4.4	4.8	4.0	3.25	3.4	3.3	3.6
4	5.4	5.0	5.8	6.4	5.9	4.5	5.0	4.4	3.2	3.4	3.3	3.5
5	5.1	5.0	5.8	6.1	5.4	4.4	5.2	4.2	3.5	3.4	3.3	4.4
6	5.0	4.8	6.2	6.1	5.7	4.5	5.5	4.0	3.35	3.35	3.2	5.1
7	4.9	4.7	5.8	5.9	6.2	4.7	5.2	3.9	3.3	3.3	4.2	4.6
8	5.0	4.6	5.8	5.8	6.0	4.4	4.8	3.9	3.3	3.3	4.0	4.3
9	5.7	4.5	5.9	5.7	5.8	4.2	4.9	4.0	3.4	3.3	3.6	3.9
10	5.0	4.5	5.6	5.7	5.5	4.1	5.1	4.1	3.3	3.2	3.5	3.8
11	4.9	4.5	5.5	5.6	5.4	4.0	5.8	3.9	3.3	3.2	3.4	3.7
12	4.8	4.4	5.6	5.5	5.5	4.0	5.2	3.8	3.35	3.2	3.4	3.6
13	4.8	4.4	5.6	5.4	5.2	4.0	4.8	3.7	3.3	3.2	3.35	3.5
14	4.6	4.4	5.4	5.4	5.1	4.4	4.8	3.7	4.2	3.45	3.6	3.5
15	4.4	5.6	10.4	5.3	5.1	4.8	4.6	3.7	4.2	3.6	3.45	3.4
16	4.3	5.8	9.4	5.4	5.3	4.5	4.5	4.0	3.9	3.35	3.35	3.4
17	4.3	5.5	7.3	5.6	5.1	4.3	4.6	4.0	3.5	3.3	3.3	3.4
18	4.6	5.4	6.6	5.6	5.0	4.1	4.8	4.0	3.6	3.2	3.3	3.6
19	4.9	5.5	6.3	5.3	4.9	4.0	5.0	3.8	3.7	3.8	3.2	3.6
20	4.7	5.5	6.0	5.2	4.8	4.0	5.4	3.7	3.3	4.2	3.2	3.45
21	4.4	7.3	5.8	5.3	4.8	3.9	5.3	3.7	3.3	3.6	3.2	3.4
22	4.3	7.6	5.6	6.6	4.7	3.8	4.9	3.8	3.2	3.4	3.2	3.4
23	4.3	6.4	6.3	6.9	4.7	4.2	4.6	3.8	6.4	3.4	3.2	3.4
24	4.3	6.1	7.8	6.1	4.6	4.5	4.5	3.6	4.8	3.3	3.2	4.0
25	4.2	6.2	7.3	5.7	4.5	5.7	4.4	3.5	4.0	3.3	3.15	3.6
26	4.2	8.6	6.4	5.5	4.5	5.4	4.2	3.6	3.7	3.25	3.1	3.6
27	4.2	7.2	6.1	6.6	4.7	5.0	4.1	3.8	4.1	3.2	3.1	3.8
28	4.1	6.5	6.0	6.7	6.2	4.8	4.0	3.6	3.8	3.2	3.1	3.7
29	7.5	6.2	6.2	6.4	5.2	4.8	4.0	3.45	3.9	3.15	3.2	3.5
30	8.0	.....	12.1	7.0	4.7	4.4	4.0	3.4	3.8	3.15	3.1	4.8
31	6.3	.....	7.8	.....	4.5	.....	4.0	3.4	.....	3.15	.....	4.4

LITTLE TENNESSEE RIVER AT McGHEE, TENN.

Location.—At Louisville & Nashville Railroad bridge, one-third mile south of McGhee and one-half mile below the mouth of Tellico River.

Records available.—November 29, 1904, to December 31, 1912.

Drainage area.—2,470 square miles.

Gage.—Chain gage on crossties, upstream side of the railroad bridge, owned by United States Weather Bureau. Prior to December 1, 1905, the same gage was on the old railroad bridge 1,000 feet below. The present datum is 0.3 foot higher than the original datum, allowing for slope in river measured at gage height 4.0 feet.

Channel.—Mostly sand and gravel but practically permanent.

Discharge measurements.—Made from the downstream side of the railroad bridge.

Floods.—The flood of February 22, 1906, reached a height of 22.2 feet by the gage datum. The United States Weather Bureau reports a height of 39.0 feet March, 1867, and 38.5 feet in 1884.

Point of zero flow.—Report of the United States Engineers shows the controlling ledge below the gage to be about 2.5 feet lower than low water at the gage. Assuming their low water to be the same as lowest records places the point of zero flow at about —0.3 foot by the gage datum.

Winter flow.—Ice does not affect the flow.

Cooperation.—Gage-height records furnished by the United States Weather Bureau.

No discharge measurements were made at this station during 1912.

Daily gage height, in feet, of Little Tennessee River at McGhee, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.6	5.7	5.9	8.2	8.2	4.3	4.1	5.3	3.0	3.1	2.7	2.6
2	5.5	5.2	5.5	11.3	6.8	4.2	4.1	4.6	2.9	3.1	2.9	2.6
3	5.5	4.8	5.2	9.3	6.4	4.1	4.0	3.8	2.9	3.0	3.2	3.1
4	5.3	4.6	5.6	7.8	6.0	4.0	4.3	3.7	2.9	3.0	2.8	3.7
5	4.7	4.4	5.0	6.9	6.3	4.2	4.9	4.1	2.8	2.9	2.7	4.2
6	4.3	4.1	5.9	6.5	6.3	4.0	5.2	3.7	3.2	2.9	2.7	6.8
7	4.3	3.9	5.8	6.2	6.6	4.0	5.0	3.6	2.9	2.9	3.1	5.6
8	4.0	3.7	5.6	6.6	6.9	4.4	4.8	3.4	2.9	2.8	4.3	4.
9	4.7	4.0	6.2	5.6	6.5	4.0	4.3	3.5	2.9	2.8	3.7	3.9
10	4.3	3.9	6.6	5.4	5.7	3.9	5.1	4.0	2.8	2.8	3.2	3.5
11	4.3	4.0	5.7	5.4	5.3	3.7	4.8	3.8	2.8	2.8	3.0	3.5
12	4.2	4.0	5.3	5.2	5.1	3.7	5.7	3.7	2.8	2.7	3.0	3.4
13	4.2	3.8	5.9	5.1	5.1	3.6	4.9	3.5	2.8	3.1	2.9	3.4
14	4.0	3.8	6.0	5.0	4.9	3.6	4.7	3.4	2.8	3.3	2.9	3.3
15	4.0	4.2	6.7	5.2	4.7	4.4	4.5	3.7	2.8	3.5	2.9	3.2
16	3.8	5.6	12.6	5.7	4.6	4.2	4.6	3.5	3.7	3.3	2.9	3.2
17	3.4	5.2	8.6	5.3	5.0	4.1	4.2	3.5	3.2	3.1	2.8	3.1
18	3.2	4.8	7.0	5.8	4.9	3.9	4.2	3.8	2.9	2.8	2.8	3.2
19	3.8	4.4	6.5	5.5	4.4	3.7	4.4	3.7	3.9	2.8	2.8	3.4
20	4.0	4.4	6.5	5.3	4.4	3.6	4.4	3.5	3.2	3.9	2.8	3.3
21	4.0	4.9	5.7	5.1	4.3	3.6	4.6	3.5	2.9	3.4	2.8	3.1
22	3.8	10.3	5.3	5.5	4.2	3.5	4.5	3.4	2.8	3.2	2.7	3.0
23	3.8	6.8	5.3	11.0	4.1	3.5	4.4	3.8	4.5	3.0	2.7	3.0
24	3.7	5.8	7.1	6.8	4.1	3.5	4.4	3.5	6.0	3.0	2.7	3.9
25	3.7	5.9	8.6	5.9	4.1	4.0	4.0	3.4	4.0	2.9	2.7	3.6
26	3.6	6.6	6.7	5.4	4.0	6.0	3.8	3.4	3.5	2.9	2.7	3.4
27	3.6	11.5	6.0	5.9	3.9	4.9	3.7	3.5	4.1	2.8	2.6	3.3
28	3.6	8.0	5.5	10.2	4.1	4.2	3.6	3.4	3.8	2.8	2.6	3.7
29	4.3	6.7	15.0	7.0	4.5	4.6	3.5	3.2	3.6	2.7	2.6	3.4
30	10.9	.....	14.8	12.1	6.6	4.2	3.5	3.1	3.4	2.7	2.6	3.6
31	7.2	.....	9.6	.....	5.3	.....	3.4	3.1	.....	2.7	.....	6.5

Daily discharge, in second-feet, of Little Tennessee River at McGhee, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10,000	10,300	10,900	18,200	18,200	6,220	5,680	9,120	2,990	3,200	2,420	2,250
2	9,720	8,820	9,720	28,800	13,700	5,950	5,680	7,060	2,790	3,200	2,790	2,250
3	9,720	7,640	8,820	21,800	12,500	5,680	5,410	4,890	2,790	2,990	3,420	3,200
4	9,120	7,060	10,000	16,900	11,200	5,410	6,220	4,630	2,790	2,990	2,600	4,630
5	7,350	6,500	8,220	14,000	12,200	5,950	7,930	5,680	2,600	2,790	2,420	5,950
6	6,220	5,680	10,900	12,800	12,200	5,410	8,820	4,630	3,420	2,790	2,420	13,700
7	6,220	5,150	10,600	11,800	13,100	5,410	8,220	4,380	2,790	2,790	3,200	10,000
8	5,410	4,630	10,000	13,100	14,000	6,500	7,640	3,890	2,790	2,600	6,220	6,500
9	7,350	5,410	11,800	10,000	12,800	5,410	6,220	4,130	2,790	2,600	4,630	5,150
10	6,220	5,150	13,100	9,420	10,300	5,150	8,520	5,410	2,600	2,600	3,420	4,130
11	6,220	5,410	10,300	9,420	9,120	4,630	7,640	4,890	2,600	2,600	2,990	4,130
12	5,950	5,410	9,120	8,820	8,520	4,630	10,300	4,630	2,600	2,420	2,990	3,890
13	5,950	4,890	10,900	8,520	8,520	4,380	7,930	4,130	2,600	3,200	2,790	3,890
14	5,410	4,890	11,200	8,220	7,930	4,380	7,350	3,890	2,600	3,650	2,790	3,650
15	5,410	5,950	13,400	8,820	7,350	6,500	6,780	4,630	2,600	4,130	2,790	3,420
16	4,890	10,000	33,500	10,300	7,060	5,950	7,060	4,130	4,630	3,650	2,790	3,420
17	3,890	8,820	19,500	9,120	8,220	5,680	5,950	4,130	3,420	3,200	2,600	3,200
18	3,420	7,640	14,300	10,600	7,930	5,150	5,950	4,890	2,790	2,600	2,600	3,420
19	4,890	6,500	12,800	9,720	6,500	4,630	6,500	4,630	5,150	2,600	2,600	3,890
20	5,410	6,500	12,800	9,120	6,500	4,380	6,500	4,130	3,420	5,150	2,600	3,650
21	5,410	7,930	10,300	8,520	6,220	4,380	7,060	4,130	2,790	3,890	2,600	3,200
22	4,890	25,300	9,120	9,720	5,950	4,130	6,780	3,890	2,600	3,420	2,420	2,990
23	4,890	13,700	9,120	27,700	5,680	4,130	6,500	4,890	6,780	2,990	2,420	2,990
24	4,630	10,600	14,600	13,700	5,680	4,130	6,500	4,130	11,200	2,990	2,420	5,150
25	4,630	10,900	19,500	10,900	5,680	5,410	5,410	3,890	5,410	2,790	2,420	4,380
26	4,380	13,100	13,400	9,420	5,410	11,200	4,890	3,890	4,130	2,790	2,420	3,890
27	4,380	29,500	11,200	10,900	5,150	7,930	4,630	4,130	5,680	2,600	2,250	3,650
28	4,380	17,500	9,720	24,900	5,680	5,950	4,380	3,890	4,890	2,600	2,250	4,630
29	6,220	13,400	42,600	14,300	6,780	7,060	4,130	3,420	4,380	2,420	2,250	3,890
30	27,400	.....	41,900	31,700	13,100	5,950	4,130	3,200	3,890	2,420	2,250	4,380
31	15,000	.....	22,900	.....	9,120	.....	3,890	3,200	.....	2,420	.....	12,800

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 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 feet).

Monthly discharge of Little Tennessee River at McGhee, Tenn., for 1912.

[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	27,400	3,420	6,930	2.81	3.24	B.
February	29,500	4,630	9,460	3.83	4.13	B.
March	42,600	8,220	14,700	5.95	6.86	B.
April	31,700	8,220	13,700	5.55	6.19	B.
May	18,200	5,150	9,110	3.69	4.25	B.
June	11,200	4,130	5,590	2.26	2.52	A.
July	10,300	3,890	6,470	2.62	3.02	A.
August	9,120	3,200	4,530	1.83	2.11	A.
September	11,200	2,600	3,750	1.52	1.70	A.
October	5,150	2,420	3,000	1.21	1.40	A.
November	6,220	2,250	2,830	1.15	1.28	A.
December	13,700	2,250	4,720	1.91	2.20	A.
The year	42,600	2,250	7,060	2.86	38.90	

TUCKASEGEE RIVER AT BRYSON, N. C.

Location.—At highway bridge in the town of Bryson, half a mile below the mouth of Deep Creek and about 15 miles above the junction of Tuckasegee River with Little Tennessee River.

Records available.—November 7, 1897, to December 31, 1912.

Drainage area.—662 square miles.

Gage.—Vertical staff attached to the right bank bridge pier; datum unchanged.

Channel.—Permanent, or nearly so, as to relation of gage height to discharge, though sandy at section.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Ice does not affect the relation of gage height to discharge.

Accuracy.—Excellent for low and ordinary stages; discharge rating curves not so well defined for high stages, depending upon one discharge measurement made in 1901.

Discharge measurements of Tuckasegee River at Bryson, N. C., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 13	W. E. Hall	1.32	697
14	....do	1.32	681

Daily gage height, in feet, of Tuckasegee River at Bryson, N. C., for 1912.

[J. M. Welch, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.9	2.3	2.5	3.8	3.0	2.0	1.8	2.4	1.35	1.48	1.30	1.20
2	2.5	2.15	2.4	4.0	2.8	1.9	1.8	1.8	1.35	1.40	1.30	1.40
3	2.45	2.0	2.4	3.6	2.6	1.95	1.8	1.9	1.3	1.40	1.25	1.5
4	2.2	2.0	2.35	3.3	2.8	2.0	2.0	2.3	1.35	1.40	1.28	1.65
5	1.95	1.85	2.35	3.0	2.8	1.95	2.15	2.05	1.40	1.45	1.30	2.4
6	1.9	1.9	2.6	2.8	2.7	2.15	2.2	1.75	1.35	1.35	1.6	2.8
7	1.9	1.8	2.4	3.0	3.1	2.2	2.25	1.8	1.35	1.32	1.85	2.0
8	1.9	1.8	2.45	2.8	2.8	1.95	2.9	1.85	1.35	1.30	1.8	1.7
9	2.15	1.75	2.6	2.6	2.6	1.9	2.15	2.05	1.35	1.30	1.55	1.6
10	1.9	1.8	2.45	2.5	2.45	1.8	2.05	1.9	1.3	1.30	1.40	1.5
11	1.85	1.7	2.3	2.4	2.6	1.75	2.8	1.6	1.3	1.30	1.35	1.5
12	1.8	1.7	2.4	2.4	2.5	1.7	2.4	1.55	1.3	1.25	1.30	1.45
13	1.8	1.65	2.4	2.3	2.4	1.7	2.15	1.6	1.32	1.25	1.30	1.45
14	1.7	1.7	2.3	2.35	2.3	2.15	2.1	1.5	1.30	1.5	1.30	1.38
15	1.7	2.0	6.0	2.3	2.2	1.95	2.0	1.75	1.48	1.55	1.30	1.35
16	1.55	2.0	4.2	2.3	2.6	1.85	2.05	1.6	1.45	1.35	1.25	1.35
17	1.8	1.9	3.4	2.4	2.2	1.7	1.95	1.85	1.32	1.30	1.25	1.35
18	1.65	1.9	3.2	2.5	2.1	1.7	2.1	1.8	1.55	1.30	1.25	1.5
19	2.0	1.8	2.8	2.3	2.1	1.65	2.2	1.7	1.30	1.7	1.25	1.45
20	1.8	1.9	2.6	2.25	2.0	1.6	2.2	1.6	1.25	1.6	1.25	1.35
21	1.7	3.4	2.6	2.2	1.95	1.6	2.3	1.55	1.25	1.40	1.25	1.35
22	1.6	2.9	2.5	3.2	1.9	1.6	2.1	1.6	1.28	1.35	1.25	1.35
23	1.6	2.6	2.7	3.9	1.9	1.65	2.0	1.6	3.5	1.35	1.25	1.40
24	1.6	2.5	4.0	2.6	1.9	1.75	1.9	1.5	1.9	1.32	1.25	1.40
25	1.6	2.5	3.2	2.45	1.85	3.2	2.15	1.45	1.6	1.30	1.20	1.45
26	1.6	4.4	2.8	2.4	1.8	2.2	1.8	1.5	1.85	1.30	1.20	1.38
27	1.6	3.8	2.7	3.2	1.9	2.0	1.7	1.6	1.9	1.28	1.20	1.5
28	1.55	3.2	2.6	2.9	2.05	1.9	1.7	1.4	1.6	1.30	1.22	1.42
29	4.2	2.8	6.4	3.4	3.3	1.9	1.65	1.4	1.55	1.30	1.15	1.40
30	3.6	.....	4.2	3.6	2.4	1.9	1.65	1.45	1.5	1.45	1.20	2.6
31	2.7	.....	3.6	.....	2.15	.....	1.6	1.4	.....	1.32	.....	2.15

Daily discharge, in second-feet, of Tuckasegee River at Bryson, N. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,290	2,160	2,520	5,290	3,490	1,660	1,350	2,340	755	906	700	600
2	2,520	1,900	2,340	5,800	3,090	1,500	1,350	1,350	755	810	700	810
3	2,430	1,660	2,340	4,800	2,710	1,580	1,350	1,500	700	810	650	930
4	1,990	1,660	2,250	4,110	3,090	1,660	1,660	2,160	755	810	680	1,130
5	1,580	1,420	2,250	3,490	3,090	1,580	1,900	1,740	810	870	700	2,340
6	1,500	1,500	2,710	3,090	2,900	1,900	1,990	1,280	755	755	1,060	3,090
7	1,500	1,350	2,340	3,490	3,690	1,990	2,080	1,350	755	722	1,420	1,660
8	1,500	1,350	2,430	3,090	3,090	1,580	3,290	1,420	755	700	1,350	1,200
9	1,900	1,280	2,710	2,710	2,710	1,500	1,900	1,740	755	700	995	1,060
10	1,500	1,350	2,430	2,520	2,430	1,350	1,740	1,500	700	700	810	930
11	1,420	1,200	2,160	2,340	2,710	1,280	3,090	1,060	700	700	755	930
12	1,350	1,200	2,340	2,340	2,520	1,200	2,340	995	700	650	700	870
13	1,350	1,130	2,340	2,160	2,340	1,200	1,900	1,060	722	650	700	870
14	1,200	1,200	2,160	2,250	2,160	1,900	1,820	930	700	930	700	788
15	1,200	1,660	13,200	2,160	1,990	1,580	1,660	1,280	906	995	700	755
16	995	1,660	6,350	2,160	2,710	1,420	1,740	1,060	870	755	650	755
17	1,350	1,500	4,330	2,340	1,990	1,200	1,580	1,420	722	700	650	755
18	1,130	1,500	3,900	2,520	1,820	1,200	1,820	1,350	995	700	650	930
19	1,660	1,350	3,090	2,160	1,820	1,130	1,990	1,200	700	1,200	650	870
20	1,350	1,500	2,710	2,080	1,660	1,060	1,990	1,060	650	1,060	650	755
21	1,200	4,330	2,710	1,990	1,580	1,060	2,160	995	650	810	650	755
22	1,060	3,290	2,520	3,900	1,500	1,060	1,820	1,060	680	755	650	755
23	1,060	2,710	2,900	5,540	1,500	1,130	1,660	1,060	4,560	755	650	810
24	1,060	2,520	5,800	2,710	1,500	1,280	1,500	930	1,500	722	650	810
25	1,060	2,520	3,900	2,430	1,420	3,900	1,900	870	1,060	700	600	870
26	1,060	6,920	3,090	2,340	1,350	1,990	1,350	930	1,420	700	600	788
27	1,060	5,290	2,900	3,900	1,500	1,660	1,200	1,060	1,500	680	600	930
28	995	3,900	2,710	3,290	1,740	1,500	1,200	810	1,060	700	620	834
29	6,350	3,090	15,500	4,330	4,110	1,500	1,130	810	995	700	550	810
30	4,800	.....	6,350	4,800	2,340	1,500	1,130	870	930	870	600	2,710
31	2,900	.....	4,800	.....	1,900	.....	1,060	810	.....	722	.....	1,900

NOTE.—Daily discharge determined by means of a discharge rating curve that is well defined below 3,460 second-feet (gage height, 3.0 feet) and poorly defined above that point.

Monthly discharge of Tuckasegee River at Bryson, N. C., for 1912.

[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	6,350	995	1,780	2.69	3.10	B.
February	6,920	1,130	2,210	3.34	3.60	B.
March	15,500	2,160	3,870	5.85	6.74	C.
April	5,800	1,990	3,200	4.83	5.39	B.
May	4,110	1,350	2,340	3.53	4.07	B.
June	3,900	1,060	1,540	2.33	2.60	B.
July	3,290	1,060	1,760	2.66	3.07	B.
August	2,340	810	1,230	1.86	2.14	A.
September	4,560	650	984	1.49	1.66	A.
October	1,200	650	782	1.18	1.36	A.
November	1,420	550	735	1.11	1.24	B.
December	3,090	600	1,100	1.66	1.91	B.
The year	15,500	550	1,790	2.70	36.88	

NOTE.—See footnote to table of daily discharge and discussion under "Accuracy" in station description.

HIWASSEE RIVER AT MURPHY, N. C.

Location.—At highway bridge near the Louisville & Nashville Railroad station, half a mile above the mouth of Valley River.

Records available.—June 26, 1896, to August 8, 1897; October 19, 1897, to December 31, 1912.

Drainage area.—410 square miles.

Gage.—Chain gage attached to downstream side of bridge. Original wire-rope gage was near the same point on bridge. Datum unchanged since October 20, 1897. Record of datum of former gage was lost when wire rope broke August 8, 1897.

Channel.—Permanent; rough; rock bottom at measuring section. Controlling bar below is of less permanent nature, being of rock and gravel. Rebuilding railroad bridge piers 80 feet downstream has also changed channel and relation of gage height to discharge to some extent.

Discharge measurements.—Made from the upstream side of bridge.

Winter flow.—Ice does not affect the relation of gage height to discharge.

The following discharge measurement was made by W. E. Hall:
September 12, 1912: Gage height, 5.22 feet; discharge, 345 second-feet.

Daily gage height, in feet, of Hiwassee River at Murphy, N. C., for 1912.

[Miss Willie Mingus, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.9	6.45	6.6	7.2	7.8	6.0	6.0	6.3	5.28	5.4	5.3	5.25
2	6.45	6.25	6.4	7.2	6.7	5.9	6.05	5.7	5.28	5.35	5.5	5.25
3	6.4	6.05	6.3	7.0	6.55	5.9	6.0	5.65	5.28	5.3	5.3	5.5
4	6.15	6.1	6.4	6.8	6.45	5.8	6.35	6.05	5.23	5.3	5.3	5.35
5	6.0	5.85	6.25	6.7	6.4	5.85	6.2	5.7	5.43	5.45	5.3	5.95
6	5.85	5.95	6.7	6.6	6.3	5.85	6.4	5.6	5.28	5.35	5.25	6.55
7	5.85	5.85	6.4	6.55	6.6	6.0	6.35	5.55	5.28	5.3	5.6	6.05
8	5.8	5.8	6.35	6.6	6.4	5.8	6.1	5.55	5.23	5.3	5.7	5.8
9	6.4	5.75	6.55	6.45	6.3	5.75	6.0	5.7	5.33	5.25	5.5	5.65
10	6.0	5.75	6.4	6.4	6.2	5.7	6.3	5.95	5.23	5.25	5.45	5.55
11	5.9	5.75	6.3	6.35	6.15	5.65	6.05	5.65	5.23	5.2	5.4	5.5
12	5.9	5.7	6.3	6.3	6.2	5.6	6.2	5.55	5.23	5.2	5.4	5.5
13	5.85	5.7	6.4	6.25	6.1	5.6	6.0	5.5	5.25	5.2	5.35	5.5
14	5.8	5.7	6.3	6.2	6.0	5.6	6.0	5.5	5.2	5.3	5.6	5.4
15	5.85	6.55	9.1	6.2	6.0	6.1	6.05	5.5	5.6	5.5	5.4	5.4
16	5.6	7.1	8.0	6.55	6.1	6.0	9.0	5.5	5.4	5.3	5.35	5.4
17	5.9	6.55	7.2	6.35	6.05	5.85	5.9	5.43	5.3	5.2	5.3	5.35
18	5.65	6.45	6.9	6.55	5.9	5.75	9.0	5.8	5.2	5.2	5.3	5.5
19	5.75	6.4	6.7	6.25	5.9	5.7	9.4	5.5	5.35	5.5	5.3	5.4
20	5.75	6.3	6.55	6.2	5.8	5.7	6.7	5.43	5.2	6.1	5.3	5.4
21	5.7	6.35	6.45	6.2	5.8	5.6	6.4	5.38	5.2	5.6	5.3	5.35
22	5.65	7.4	6.35	6.4	5.8	5.6	6.15	5.5	5.2	5.5	5.3	5.35
23	5.6	6.85	6.3	7.1	5.8	5.55	6.0	5.6	7.9	5.5	5.3	5.35
24	5.6	6.55	7.6	6.65	5.75	5.7	5.9	5.43	5.95	5.4	5.25	5.5
25	5.6	6.6	7.4	6.45	5.7	7.0	5.85	5.38	5.6	5.55	5.25	5.45
26	5.6	7.2	7.8	6.35	5.7	6.3	5.8	5.38	5.5	5.25	5.25	5.45
27	5.55	7.8	6.65	6.55	6.0	6.0	5.7	5.43	5.6	5.3	5.25	5.5
28	5.55	7.1	6.55	7.0	6.05	5.9	5.75	5.38	5.45	5.3	5.25	5.5
29	6.85	6.8	11.7	7.0	7.2	7.0	5.6	5.28	5.45	5.3	5.25	5.5
30	7.9	.....	8.3	7.2	6.65	6.0	5.6	5.28	5.45	5.25	5.25	5.55
31	6.9	.....	9.5	.....	6.2	.....	6.3	5.28	.....	5.25	.....	5.85

Daily discharge, in second-feet, of Hiwassee River at Murphy, N. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,990	1,440	1,610	2,430	3,470	975	975	1,270	391	475	405	370
2	1,440	1,220	1,380	2,430	1,730	885	1,020	710	391	440	550	370
3	1,380	1,020	1,270	2,130	1,550	885	975	670	391	405	405	550
4	1,120	1,070	1,380	1,860	1,440	795	1,320	1,020	356	405	405	440
5	975	840	1,220	1,730	1,380	840	1,170	710	498	512	405	930
6	840	930	1,730	1,610	1,270	840	1,380	630	391	440	370	1,550
7	840	840	1,380	1,550	1,610	975	1,320	590	391	405	630	1,020
8	795	795	1,320	1,610	1,380	795	1,070	590	356	405	710	795
9	1,380	752	1,550	1,440	1,270	752	975	710	426	370	550	670
10	975	752	1,380	1,380	1,170	710	1,270	930	356	370	512	590
11	885	752	1,270	1,320	1,120	670	1,020	670	356	335	475	550
12	885	710	1,270	1,270	1,170	630	1,170	590	356	335	475	550
13	840	710	1,380	1,220	1,070	630	975	550	370	335	440	550
14	795	710	1,270	1,170	975	630	975	550	335	405	630	475
15	840	1,550	6,170	1,170	975	1,070	1,020	550	630	550	475	475
16	630	2,280	3,850	1,550	1,070	975	5,950	550	475	405	440	475
17	885	1,550	2,430	1,320	1,020	840	885	498	405	335	405	440
18	670	1,440	1,990	1,550	885	752	5,950	795	335	335	405	550
19	752	1,380	1,730	1,220	885	710	6,860	550	440	550	405	475
20	752	1,270	1,550	1,170	795	710	1,730	498	335	1,070	405	475
21	710	1,320	1,440	1,170	795	630	1,380	461	335	630	405	440
22	670	2,760	1,320	1,380	795	630	1,120	550	335	550	405	440
23	630	1,920	1,270	2,280	795	590	975	630	3,660	550	405	440
24	630	1,550	3,110	1,670	752	710	885	498	930	475	370	550
25	630	1,610	2,760	1,440	710	2,130	840	461	630	590	370	512
26	630	2,430	3,470	1,320	710	1,270	795	461	550	370	370	512
27	590	3,470	1,670	1,550	975	975	710	498	630	405	370	550
28	590	2,280	1,550	2,130	1,020	885	752	461	512	405	370	550
29	1,920	1,860	12,700	2,130	2,430	2,130	630	391	512	405	370	550
30	3,660	.....	4,450	2,430	1,670	975	630	391	512	370	370	590
31	1,990	.....	7,090	.....	1,170	.....	1,270	391	.....	370	.....	840

NOTE.—Daily discharge computed from a rating curve well defined between 270 and 3,290 second-feet (gage heights 5.1 and 7.7 feet), above which it is poorly defined.

Monthly discharge of Hiwassee River at Murphy, N. C., for 1912.

[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	3,660	590	1,040	2.54	2.93	B.
February	3,470	710	1,420	3.46	3.73	B.
March	12,700	1,220	2,510	6.12	7.06	C.
April	2,430	1,170	1,620	3.95	4.41	A.
May	3,470	710	1,230	3.00	3.46	B.
June	2,130	590	900	2.20	2.46	A.
July	6,860	630	1,550	3.78	4.36	B.
August	1,270	391	607	1.48	1.71	A.
September	3,660	335	553	1.35	1.51	A.
October	1,070	335	452	1.10	1.27	A.
November	710	370	443	1.08	1.20	A.
December	1,550	370	589	1.44	1.66	A.
The year	12,700	335	1,080	2.63	35.76	

HIWASSEE RIVER AT RELIANCE, TENN.

Location.—At Louisville & Nashville Railroad bridge at Reliance, Tenn., 1 mile below the mouth of Lost Creek and 2 miles above Spring Creek.

Records available.—August 17, 1900, to December 31, 1911.

Drainage area.—1,180 square miles.

Gage.—Vertical staff attached to a tree on right bank 150 feet above the bridge. On August 3, 1911, the gage was raised 0.10 foot to agree with the original datum.

Channel.—Section is in a pool above a rock ledge diagonally across the river. At lower end of ledge is a small corn mill with some addition to the natural dam, probably varying in extent.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Ice does not affect the relation of gage height to discharge.

Artificial control.—None above. The small mill below may affect the low-water flow.

The following discharge measurement was made by W. E. Hall:

September 10, 1912: Gage height, 1.28 feet; discharge, 1,020 second-feet.

Daily gage height, in feet, of Hiwassee River at Reliance, Tenn., for 1912.

[C. V. Higdon, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.5	2.6	2.8	3.6	3.4	2.2	2.2	2.0	1.3	1.4	1.3	1.25
2	2.7	2.35	2.6	3.7	3.0	2.05	2.2	2.0	1.25	1.4	1.3	1.25
3	2.45	2.15	2.6	3.4	2.8	2.0	2.1	1.7	1.15	1.65	1.4	1.35
4	2.3	2.1	2.6	3.0	2.8	2.0	2.1	1.7	1.15	1.65	1.35	1.5
5	2.2	2.05	2.4	2.9	2.7	2.0	2.7	1.75	1.2	1.7	1.3	1.55
6	1.9	1.85	2.6	2.8	2.6	2.0	2.9	1.65	1.25	1.4	1.35	2.7
7	1.9	1.8	2.6	2.8	3.0	2.1	2.6	1.55	1.35	1.25	1.45	2.4
8	1.85	1.8	2.5	2.9	3.0	2.0	2.6	1.5	1.35	1.3	2.2	2.0
9	2.4	1.75	2.8	2.7	2.6	1.9	2.6	1.65	1.3	1.2	1.7	1.8
10	2.25	1.7	2.7	2.6	2.5	1.8	2.5	2.15	1.3	1.25	1.45	1.7
11	2.15	1.8	2.45	2.5	2.4	1.75	2.5	1.85	1.2	1.25	1.45	1.6
12	1.95	1.7	2.45	2.45	2.4	1.75	2.9	1.65	1.2	1.2	1.45	1.55
13	1.9	1.7	2.5	2.4	2.35	1.7	2.3	1.6	1.2	1.2	1.4	1.5
14	1.9	1.8	2.5	2.35	2.35	2.9	2.2	1.55	1.15	1.25	1.4	1.4
15	1.95	2.8	3.8	2.35	2.2	3.0	2.25	1.85	1.2	1.7	1.4	1.4
16	2.0	3.4	5.3	2.4	2.3	2.8	2.25	1.7	1.7	1.5	1.35	1.4
17	1.6	3.0	3.7	2.6	2.25	2.8	2.2	1.5	1.45	1.3	1.35	1.4
18	1.7	2.5	3.3	3.0	2.1	2.5	2.25	1.7	1.4	1.3	1.35	1.55
19	1.8	2.7	2.7	2.6	2.1	1.9	2.3	1.6	1.4	1.5	1.35	1.65
20	1.9	2.6	2.6	2.4	2.0	1.85	2.3	1.5	1.35	3.2	1.3	1.6
21	1.95	2.4	2.6	2.4	2.0	1.75	2.6	1.5	1.25	1.9	1.3	1.5
22	1.65	4.3	2.5	2.8	1.95	1.7	2.2	1.7	1.2	1.65	1.3	1.4
23	1.65	3.2	2.4	4.3	1.95	1.65	2.0	1.9	2.5	1.45	1.3	1.4
24	1.6	2.8	3.5	3.8	1.9	1.65	2.0	1.6	2.7	1.5	1.25	1.6
25	1.6	2.8	4.0	2.8	1.9	1.75	1.9	1.5	1.9	1.45	1.3	1.75
26	1.55	3.7	3.1	2.6	1.85	2.8	1.8	1.4	1.6	1.4	1.3	1.6
27	1.55	5.0	2.9	3.4	1.8	2.6	1.7	1.4	1.6	1.35	1.3	1.6
28	1.5	4.1	2.7	4.2	1.65	2.2	1.6	1.4	1.65	1.3	1.25	1.7
29	2.6	3.1	9.3	3.4	2.7	2.05	1.65	1.35	1.5	1.3	1.25	1.6
30	4.9	.....	5.9	3.8	3.8	2.2	1.6	1.35	1.5	1.3	1.25	1.8
31	3.2	.....	4.1	.....	2.5	.....	1.6	1.35	.....	1.3	.....	2.2

Daily discharge, in second-feet, of Hiwassee River at Reliance, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,590	3,730	4,300	6,940	6,240	2,710	2,710	2,260	1,040	1,180	1,040	975
2	4,010	3,080	3,730	7,300	4,910	2,370	2,710	2,260	975	1,180	1,040	975
3	3,330	2,600	3,730	6,240	4,300	2,260	2,480	1,660	850	1,580	1,180	1,110
4	2,950	2,480	3,730	4,910	4,300	2,260	2,480	1,660	850	1,580	1,110	1,330
5	2,710	2,370	3,200	4,600	4,010	2,260	4,010	1,760	910	1,660	1,040	1,410
6	2,050	1,950	3,730	4,300	3,730	2,260	4,600	1,580	975	1,180	1,110	4,010
7	2,050	1,850	3,730	4,300	4,910	2,480	3,730	1,410	1,110	975	1,260	3,200
8	1,950	1,850	3,460	4,600	4,910	2,260	3,730	1,330	1,110	1,040	2,710	2,260
9	3,200	1,760	4,300	4,010	3,730	2,050	3,730	1,580	1,040	910	1,660	1,850
10	2,830	1,660	4,010	3,730	3,460	1,850	3,460	2,600	1,040	975	1,260	1,660
11	2,600	1,850	3,330	3,460	3,200	1,760	3,460	1,950	910	975	1,260	1,490
12	2,160	1,660	3,330	3,330	3,200	1,760	4,600	1,580	910	910	1,260	1,410
13	2,050	1,660	3,460	3,200	3,080	1,660	2,950	1,490	910	910	1,180	1,330
14	2,050	1,850	3,460	3,080	3,080	4,600	2,710	1,410	850	975	1,180	1,180
15	2,160	4,300	7,660	3,080	2,710	4,910	2,830	1,950	910	1,660	1,180	1,180
16	2,260	6,240	13,700	3,200	2,950	4,300	2,830	1,660	1,660	1,330	1,110	1,180
17	1,490	4,910	7,300	3,730	2,830	4,300	2,710	1,330	1,260	1,040	1,110	1,180
18	1,660	3,460	5,900	4,910	2,480	3,460	2,830	1,660	1,180	1,040	1,110	1,410
19	1,850	4,010	4,010	3,730	2,480	2,050	2,950	1,490	1,180	1,330	1,110	1,580
20	2,050	3,730	3,730	3,200	2,260	1,950	2,950	1,330	1,110	5,560	1,040	1,490
21	2,160	3,200	3,730	3,200	2,260	1,760	3,730	1,330	975	2,050	1,040	1,330
22	1,580	9,550	3,460	4,300	2,160	1,660	2,710	1,660	910	1,580	1,040	1,180
23	1,580	5,560	3,200	9,550	2,160	1,580	2,260	2,050	3,460	1,260	1,040	1,180
24	1,490	4,300	6,590	7,660	2,050	1,580	2,260	1,490	4,010	1,330	975	1,490
25	1,490	4,300	8,400	4,300	2,050	1,760	2,050	1,330	2,050	1,260	1,040	1,760
26	1,410	7,300	5,230	3,730	1,950	4,300	1,850	1,180	1,490	1,180	1,040	1,490
27	1,410	12,400	4,600	6,240	1,850	3,730	1,660	1,180	1,490	1,110	1,040	1,490
28	1,330	8,780	4,010	9,160	1,580	2,710	1,490	1,180	1,580	1,040	975	1,660
29	3,730	5,230	31,600	6,240	4,010	2,370	1,580	1,110	1,330	1,040	975	1,490
30	12,000	.....	16,300	7,660	7,660	2,710	1,490	1,110	1,330	1,040	975	1,850
31	5,560	.....	8,780	.....	3,460	.....	1,490	1,110	.....	1,040	.....	2,710

NOTE.—Daily discharge computed from a rating curve well defined between 490 and 3,460 second-feet (gage heights 0.8 and 2.5 feet), and fairly well defined between 3,730 and 6,590 second-feet (gage heights 2.6 and 3.5 feet).

Monthly discharge of Hiwassee River at Reliance, Tenn., for 1912.

[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	12,000	1,330	2,770	2.35	2.71	B.
February	12,400	1,660	4,060	3.44	3.71	B.
March	31,600	3,200	6,120	5.19	5.98	C.
April	9,550	3,080	4,930	4.18	4.66	B.
May	7,660	1,580	3,350	2.84	3.27	B.
June	4,910	1,580	2,590	2.19	2.44	B.
July	4,600	1,490	2,810	2.38	2.74	B.
August	2,600	1,110	1,570	1.33	1.53	A.
September	4,010	850	1,310	1.11	1.24	A.
October	5,560	910	1,350	1.14	1.31	A.
November	2,710	975	1,170	.992	1.11	A.
December	4,010	975	1,610	1.36	1.57	A.
The year	31,600	850	2,800	2.37	32.27	

OCOEE RIVER AT COPPER HILL, TENN.

Location.—At new highway bridge recently built on site of suspension footbridge, from which discharge measurements were formerly made, in town of Copper Hill, Tenn., one-half mile above the mouth of Fightingtown Creek.

Records available.—March 21, 1903, to December 31, 1912.

Drainage area.—374 square miles.

Gage.—Chain gage attached to upstream side of the bridge, installed August 2, 1911. This gage is near the location of the original sloping gage, a portion of which was cut away for the bridge pier. A temporary vertical staff gage was set September 16, 1910, to read the same as the original sloping gage, and the standard chain gage was set August 2, 1911, to read the same as the temporary gage. The chain gage should therefore read the same as the original sloping gage, i. e., both refer to the same datum. On August 2, 1911, a discrepancy of 0.10 foot between the bench mark and the two gages was found by wye levels, the gages being too high by that amount. It has been assumed that the error was made in the original levels and the recorded elevation of the bench mark changed to agree with the gages. The discharge measurements have been referred to the gages, and so the records of discharge need no revision.

Channel.—Is not permanent, but the relation of gage height to discharge has remained fairly constant.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Ice does not affect the relation of gage height to discharge.

Accuracy.—A new discharge rating curve was used for 1912 which differs from the previous curves principally above 1,200 second-feet, the new curve giving the larger discharge for a given gage height above that point. The change in rating is based chiefly on four discharge measurements made in 1913 (before this report was prepared) and the new curve is well defined between 350 and 3,100 second-feet (gage heights, 0.7 and 4.4 feet) and fairly well defined between 3,200 and 8,700 second-feet (gage heights, 4.5 and 8.0 feet). The highest discharge measurement prior to 1913 was at gage height 3.4 feet, whereas two of the 1913 measurements are at a stage of about 7.5 feet. Errors in estimates of discharge published for previous years, due to what now appears to have been erroneous extensions of the discharge rating curves used, are less than 10 per cent below discharge

3,000 second-feet, but above that point the discharge computations should be revised by those using them on the basis of a rating table derived (as explained on p. 12) from the 1912 data published below. The data for 1911 published in Water-Supply Paper 303 are within the accuracy ratings assigned, but the new 1912 rating curve should probably have been used beginning about October 17, 1911.

The following discharge measurement was made by W. E. Hall:
September 11, 1912: Gage height, 0.93 foot; discharge, 465 second-feet.

Daily gage height, in feet, of Ocoee River at Copper Hill, Tenn., for 1912.

[H. J. Lance, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	2.0	2.4	3.5	2.8	2.0	1.8	1.8	0.95	1.1	1.2	0.85
2	2.1	1.8	2.4	3.4	2.6	1.9	1.7	1.4	.9	1.0	1.05	.9
3	1.8	1.6	2.4	3.1	2.4	1.8	1.8	1.3	.9	.95	1.0	.85
4	1.6	1.5	2.4	3.0	2.5	2.0	1.6	1.2	.9	1.4	.95	.85
5	1.5	1.5	2.4	2.8	2.4	1.9	2.2	1.3	.95	1.2	.95	1.3
6	1.4	1.5	2.6	2.7	2.4	1.8	2.4	1.2	1.0	1.1	1.0	2.4
7	1.4	1.5	2.4	2.8	2.5	2.0	1.6	1.2	1.0	1.1	1.8	1.6
8	1.5	1.4	2.3	2.6	2.5	1.6	1.8	1.3	1.0	1.0	1.6	1.4
9	2.2	1.35	2.3	2.5	2.4	1.7	1.45	1.35	1.0	.9	1.3	1.3
10	1.6	1.3	2.2	2.5	2.2	1.6	1.6	1.8	.9	.9	1.2	1.25
11	1.5	1.5	2.1	2.4	2.2	1.7	1.1	1.45	.9	.95	1.1	1.2
12	1.45	1.5	2.2	2.4	2.2	1.6	1.6	1.3	.9	.95	1.1	1.2
13	1.4	1.35	2.2	2.3	2.1	1.6	1.6	1.25	.8	.9	1.25	1.1
14	1.35	1.4	2.2	2.3	2.0	2.4	1.1	1.2	.85	1.4	1.3	1.1
15	1.2	4.2	5.8	2.9	2.0	2.8	1.8	1.3	1.3	1.25	1.2	1.1
16	1.3	3.2	3.8	3.0	2.0	2.3	1.8	1.2	1.25	1.1	1.1	1.05
17	1.3	2.4	3.2	2.8	1.9	2.2	1.8	1.2	1.1	1.0	1.0	1.05
18	1.3	2.3	2.8	2.5	1.9	1.6	2.0	1.2	1.4	.95	.9	1.1
19	1.45	2.2	2.6	2.2	1.8	1.4	1.6	1.25	1.3	2.6	.9	1.2
20	1.3	2.0	2.5	2.2	1.8	1.7	2.0	1.2	.9	1.9	.9	1.1
21	1.3	3.0	2.4	2.2	1.8	1.6	1.9	1.1	.9	1.5	.9	1.05
22	1.2	2.9	2.3	3.7	1.8	1.6	1.8	2.0	2.1	1.4	.9	1.05
23	1.15	2.2	2.4	3.2	1.7	1.5	1.7	1.4	5.2	1.2	.9	1.3
24	1.1	2.3	4.6	2.7	1.7	1.8	1.7	1.25	2.0	1.1	.9	1.6
25	1.1	2.7	3.2	2.4	1.7	2.6	1.7	1.2	1.6	1.0	.9	1.3
26	1.1	4.4	2.8	2.3	2.2	2.8	1.6	1.1	1.4	1.0	.9	1.2
27	1.1	3.9	2.6	3.6	2.8	2.5	1.5	1.05	1.4	1.0	.9	1.3
28	1.1	3.1	2.9	3.0	3.0	2.0	1.4	1.05	1.3	.95	.9	1.2
29	3.6	2.6	7.7	3.3	6.2	1.6	1.4	1.05	1.3	.95	.9	1.2
30	3.4	.....	4.4	3.1	2.8	1.8	1.4	1.0	1.25	.95	.85	1.5
31	2.3	.....	3.6	.....	2.3	.....	1.3	.95	.....	.95	.....	1.7

Daily discharge, in second-feet, of Ocoee River at Copper Hill, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,560	1,110	1,400	2,300	1,720	1,110	975	975	465	545	600	415
2	1,180	975	1,400	2,220	1,560	1,040	910	720	440	490	518	440
3	975	845	1,400	1,960	1,400	975	975	660	440	465	490	415
4	845	780	1,400	1,880	1,480	1,110	845	600	440	720	465	415
5	780	780	1,400	1,720	1,400	1,040	1,260	660	465	600	465	660
6	720	780	1,560	1,640	1,400	975	1,400	600	490	545	490	1,400
7	720	780	1,400	1,720	1,480	1,110	845	600	490	545	975	845
8	780	720	1,330	1,560	1,480	845	975	660	490	490	845	720
9	1,260	690	1,330	1,480	1,400	910	750	690	490	440	660	660
10	845	660	1,260	1,480	1,260	845	845	975	440	440	600	630
11	780	780	1,180	1,400	1,260	910	545	750	440	465	545	600
12	750	780	1,260	1,400	1,260	845	845	660	440	465	545	600
13	720	690	1,260	1,330	1,180	845	845	630	390	440	630	545
14	690	720	1,260	1,330	1,110	1,400	545	600	415	720	660	545
15	600	2,910	4,780	1,800	1,110	1,720	975	660	660	630	600	545
16	660	2,050	2,560	1,880	1,110	1,330	975	600	630	545	545	518
17	660	1,400	2,050	1,720	1,040	1,260	975	600	545	490	490	518
18	660	1,330	1,720	1,480	1,040	845	1,110	600	720	465	440	545
19	750	1,260	1,560	1,260	975	720	845	630	660	1,560	440	600
20	660	1,110	1,480	1,260	975	910	1,110	600	440	1,040	440	545
21	660	1,880	1,400	1,260	975	845	1,040	545	440	780	440	518
22	600	1,800	1,330	2,480	975	845	975	1,110	1,180	720	440	518
23	572	1,260	1,400	2,050	910	780	910	720	3,970	600	440	660
24	545	1,330	3,300	1,640	910	975	910	630	1,110	545	440	845
25	545	1,640	2,050	1,400	910	1,560	910	600	845	490	440	660
26	545	3,100	1,720	1,330	1,260	1,720	845	545	720	490	440	600
27	545	2,640	1,560	2,390	1,720	1,480	780	518	720	490	440	660
28	545	1,960	1,800	1,880	1,880	1,110	720	518	660	465	440	600
29	2,390	1,560	8,100	2,140	5,390	845	720	518	660	465	440	600
30	2,220	.....	3,100	1,960	1,720	975	720	490	630	465	415	780
31	1,330	.....	2,390	.....	1,330	.....	660	465	.....	465	.....	910

NOTE.—See "Accuracy" in station description.

Monthly discharge of Ocoee River at Copper Hill, Tenn., for 1912.

[Drainage area, 374 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.[a]
	Maximum.	Minimum.	Mean.	Per square mile.		
January	2,390	545	874	2.34	2.70	A.
February	3,100	660	1,320	3.53	3.81	A.
March	8,100	1,180	1,970	5.27	6.08	B.
April	2,480	1,260	1,710	4.57	5.10	A.
May	5,390	910	1,410	3.77	4.35	A.
June	1,720	720	1,060	2.83	3.16	A.
July	1,400	545	895	2.39	2.76	A.
August	1,110	465	649	1.74	2.01	A.
September	3,970	390	698	1.87	2.09	B.
October	1,560	440	583	1.56	1.80	A.
November	975	415	527	1.41	1.57	B.
December	1,400	415	629	1.68	1.94	A.
The year	8,100	390	1,030	2.75	37.37	

[a] See "Accuracy" in station description.

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous measurements were made in the Ohio River basin in 1912:

Miscellaneous measurements in Monongahela River basin in 1912.

[By H. P. Drake, an engineer of the West Virginia Development Co.]

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.	Drainage area.	Discharge per square mile.
				Feet.	*Sec.-ft.*	*Sq. miles.*	*Sec.-ft.*
Aug. 24	Cheat River...	Monongahela River.	At highway bridge 3 miles below the confluence of Shavers and Dry forks and 2 miles due north of Parsons, W. Va.	2.93	704	[a] 716	0.98
24	.....do.....	.....do.....	.....do.....	2.93	708	[a] 716	.99
Dec. 20	.....do.....	.....do.....	.....do.....	2.60	454	[a] 716	.63

[a] Determined by West Virginia Development Co.

Miscellaneous measurements on New and Green rivers in 1912.

[By C. T. Bailey.]

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.	Drainage area.	Discharge per square mile.
				Feet.	*Sec.-ft.*	*Sq. miles.*	*Sec.-ft.*
Sept. 23	New River....	Ohio River....	Newbern, Va.....	(a)	3,470	2,390	1.45
June 10	Green River...	.....do.....	Rockport, Ky.....	(b)	1,910	6,080	.314
8	.....do.....	.....do.....	Livermore, Ky.....	(c)	2,400	7,260	.331

[a] Water surface 27.66 feet below top of upstream bar of lower chord, 2 feet to right of third vertical from left end of bridge, upstream side.
[b] Water surface 43.9 feet below top of upstream girder of third-floor beam to left of pier under left end of drawspan.
[c] Water surface 35.4 feet below top of third floor beam from right abutment at upstream end.

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 system. 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 river stations in the Ohio River drainage basin in 1912.

Station.	Drainage area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	Sq. mi.													
Allegheny River at Red House, N. Y..	1,640	0.98	0.34	3.37	5.78	1.98	0.30	0.29	0.47	1.54	1.26	1.55	1.84	1.64
Allegheny River at Kittanning, Pa....	9,010	1.45	1.32	4.70	5.05	2.09	.40	.62	.88	1.98	1.72	1.40	1.62	1.94
Kiskiminetas River at Avonmore, Pa..	1.720	1.87	2.55	6.45	2.77	2.31	1.55	2.85	1.55	3.64	1.66	1.24	1.16	2.47
Blacklick Creek at Blacklick, Pa.....	386	1.75	2.61	6.69	3.15	2.35	1.78	2.05	1.27	4.45	2.21	1.08	1.61	2.58
Tygart River at Belington, W. Va....	390	3.13	3.13	4.95	2.02	3.21	.77	5.13	.63	.64	.23	.85	1.19	2.16
Tygart River at Fetterman, W. Va....	1,340	3.11	2.96	5.09	1.95	2.52	.68	3.76	.66	.87	.23	.89	1.20	2.00
West Fork River at Enterprise, W. Va.	750	2.21	2.67	4.53	1.52	.67	.22	1.77	.59	.75	.15	.31	.73	1.35
Cheat River near Morgantown, W. Va.	1,380	2.57	4.36	6.89	2.52	2.98	1.09	5.59	1.24	2.13	.73	1.68	1.46	2.77
New River at Radford, Va.....	2,720	1.04	1.64	3.32	2.03	2.32	1.10	1.12	.89	.94	.61	.73	.66	1.37
Greenbrier River at Alderson, W. Va..	1,340	1.66	2.62	5.19	2.21	2.99	.37	.78	.16	.30	.19	.57	.78	1.49
Dix River near Burgin, Ky.....	416	3.70	3.51	7.09	3.61	2.43	.23	1.24	.42	.20	.06	.26	1.89	2.06
Embarrass River near Oakland, Ill....	535	.65	.82	3.50	2.34	1.31	.26	.19	.14	.04	....	.02	.02	....
Embarrass River at Ste. Marie, Ill....	1,540	.61	.77	2.58	2.01	1.43	.36	.88	.41	.10	....	.11	.07	....
East Branch of White River at Shoals, Ind.....	4,900	1.59	1.64	4.49	3.65	2.98	.45	.76	.65	.29	.18	.20	.16	1.42
Skillet Fork River near Wayne City, Ill.....	481	1.04	1.77	5.76	3.37	.76	1.42	1.00	.21	.03	....	.10	.02	....
French Broad River at Asheville, N. C.	987	1.87	2.56	4.06	3.03	2.62	2.12	2.42	1.58	1.59	1.18	1.26	1.31	2.13
Tennessee River at Chattanooga, Tenn.	21,400	1.87	2.52	4.02	4.28	2.75	1.34	1.62	1.06	.79	.61	.56	1.11	1.87
South Fork of Holston River at Bluff City, Tenn.....	828	1.67	2.25	4.31	3.79	2.43	.92	1.28	.97	.62	.42	.51	.63	1.65
Holston River near Rogersville, Tenn..	3,060	1.30	1.76	3.59	3.46	1.96	.87	1.17	.76	.56	.44	.46	.60	1.41
Little Tennessee River at McGhee, Tenn.....	2,470	2.81	3.83	5.95	5.55	3.69	2.26	2.62	1.83	1.52	1.21	1.15	1.91	2.86
Tuckasegee River at Bryson, N. C.....	662	2.69	3.34	5.85	4.83	3.53	2.33	2.66	1.86	1.49	1.18	1.11	1.66	2.70
Hiwassee River at Murphy, N. C.....	410	2.54	3.46	6.12	3.95	3.00	2.20	3.78	1.48	1.35	1.10	1.08	1.44	2.63
Hiwassee River at Reliance, Tenn.....	1,180	2.35	3.44	5.19	4.18	2.84	2.19	2.38	1.33	1.11	1.14	.99	1.36	2.37
Ocoee River at Copper Hill, Tenn.....	374	2.34	3.53	5.27	4.57	3.77	2.83	2.39	1.74	1.87	1.56	1.41	1.68	2.75

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