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UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Water-Supply Paper 383

SURFACE WATER SUPPLY OF THE UNITED STATES
1914

PART III. OHIO RIVER BASIN

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Prepared in cooperation with the States of
West Virginia and Illinois

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SURFACE WATER SUPPLY OF OHIO RIVER BASIN, 1914.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of fourteen reports presenting results of measurements of flow made on streams in the United States during the year ending September 30, 1914.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

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 relating to irrigation in the arid West. 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 years ending June 30, 1895–1915.

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 1915, 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; cooperation of the second kind is acknowledged on page 18.

Measurements of stream flow have been made at about 3,400 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1914, 1,480 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements are 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 water-supply papers from time to time.

PUBLICATIONS.

A report has been prepared for each year embodying the stream-flow data collected during that year. Previous to 1911 the basis of publication was a calendar year. One volume of the report for 1911 (Part XII), three volumes for 1912 (Parts X, XI, and XII), six volumes for 1913 (Parts III, V, VIII, X, XI, and XII), and all the parts of the report for 1914 contain records for the year ending September 30.

An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119.

Gage heights and discharge measurements prior to 1901 were published in water-supply papers or bulletins and estimates of monthly discharge in annual reports; since 1901 complete records have been published in water-supply papers. They are now being published in 12 parts comprising 14 volumes, as shown in the following table:

Papers on surface water supply of the United States, 1914.

No.	Part.	Title.
381	I	North Atlantic basins.
382	II	South Atlantic and eastern Gulf of Mexico basins.
383	III	Ohio River basin.
384	IV	St. Lawrence River basin.
385	V	Upper Mississippi River and Hudson Bay basins.
386	VI	Missouri River basin.
387	VII	Lower Mississippi River basin.
388	VIII	Western Gulf of Mexico basins.
389	IX	Colorado River basin.
390	X	Great Basin.
391	XI	Pacific drainage basins in California.
	XII	North Pacific drainage basins:
392		A. Pacific basins in Washington and Upper Columbia River basin.
393		B. Snake River basin.
394		C. Lower Columbia River and Pacific basins in Oregon.

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	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	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.
WS 351 to 362 [a]	do	1913.
WS 381 to 394 [a]	do	1914.

[a] In preparation.

NOTE.—The fifteenth and seventeenth annual reports contain no stream-flow records.

The following table gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1914. As a rule, the data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data from 1902 to 1914 for any station in the area covered by Part III are published in Water-Supply Papers 83, 98, 128, 169, 205, 243, 263, 283, 303, 323, 353, and 383, which contain records for the Ohio River basin for those years.

Numbers of water-supply papers containing results of stream measurements, 1899–1914.

Year.	I North Atlantic slope (St. John River to York River).	II South Atlantic slope and eastern Gulf of Mexico (James River to the Mississippi).	III Ohio River.	IV St. Lawrence River and Great Lakes.	V Hudson Bay and upper Mississippi River.	VI Missouri River.	VII Lower Mississippi River.	VIII Western Gulf of Mexico.	IX Colorado River.	X Great Basin.	XI Pacific slope in California.	XII North Pacific slope.		
												Pacific slope in Washington and upper Columbia River.	Snake River.	Lower Columbia River and Pacific slope in Oregon.
1899 *a*	35	*b* 35, 36	36	36	36	*c* 36, 37	37	37	*d* 37, 38	38, *e* 39	38, *f* 39	38	38	38
1900 *g*	47, *h* 48	48	48, *i* 49	49	49	49, *j* 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	*k* 65, 66, 75	66, 75	*k* 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 78	66, 75
1902	82	*b* 82, 83	83	*i* 82, 83	*k* 83, 85	84	*k* 83, 84	84	85	85	85	85	55	85
1903	97	*b* 97, 98	98	97	*h* 98, 99, *m* 100	99	*k* 98, 99	99	100	100	100	100	100	100
1904	*n* 124, *o* 125 *p* 126	*p* 126, 127	128	129	*k* 128, 130	130, *q* 131	*k* 128, 131	132	133	133, *r* 134	134	135	135	135
1905	*n* 165, *o* 166 *p* 167	*p* 167, 168	169	170	171	172	*k* 169, 173	174	175, *t* 177	176, *r* 177	177	178	178	*s* 177, 178
1906	*n* 201, *o* 202 *p* 203	*p* 203, 204	205	206	207	208	*k* 205, 209	210	211	212, *r* 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, *r* 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, *r* 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	351	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394

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 IV.
b James River only.
c Gallatin River.
d Green and Gunnison rivers and Grand River above junction with Gunnison.
e Mohave River only.
f Kings and Kern rivers and South Pacific coast drainage basins.
g 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 IV.
h Wissahickon and Schuylkill rivers to James River.
i Scioto River.
j Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
k Tributaries of Mississippi from east.
l Lake Ontario and tributaries to St. Lawrence River proper.
m Hudson Bay only.
n New England rivers only.
o Hudson River to Delaware River, inclusive.
p Susquehanna River to Yadkin River, inclusive.
q Platte and Kansas rivers.
r Great Basin in California, except Truckee and Carson river basins.
s Below junction with Gila.
t 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 reports may be consulted in the libraries of the principal cities of 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:

Boston, Mass., Customhouse.
Albany, N. Y., room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
St. Paul, Minn., Old Capitol Building.
Austin, Tex., Old Post Office Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 403 New Post Office Building.
Phoenix, Ariz., 417 Fleming Building.
Salt Lake City, Utah, 421 Federal Building.
Boise, Idaho, 615 Idaho Building.
Tacoma, Wash., 406 Federal Building.
Portland, Oreg., 416 Couch Building.
San Francisco, Cal., 328 Customhouse.
Los Angeles, Cal., 619 Federal Building.
Honolulu, Hawaii, Kapiolani Building.

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 that represent the rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second feet per square mile, and (2) those that represent the actual quantity of water, as run-off in depth of inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, acre-feet, and millions of cubic feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the tables of convenient equivalents (pp. 12–14).

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

An "acre-foot," equivalent to 43,560 cubic feet, 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.

"Millions of cubic feet" is applied to quantities of water stored in reservoirs, most frequently in connection with studies of flood control.

The following terms not in common use are here defined:

"Discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," "controlling section," and "point of control," terms used to designate the section or sections of the stream below the gage which determine the discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

The "point of zero flow" for a given gaging station is that point on the gage—the gage height—to which the surface of the river would fall if there were no flow.

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.

Discharge in 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 part of a month multiply the figure for one day by the number of days.

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

Discharge in 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 part of a month multiply the figure for one day by the number of days.

Table for converting discharge in second-feet into run-off in millions of cubic feet.

Discharge in second-feet.	Run-off in millions of cubic feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.0864	2.419	2.506	2.592	2.678
2	.1728	4.838	5.012	5.184	5.356
3	.2592	7.257	7.518	7.776	8.034
4	.3456	9.676	10.024	10.368	10.712
5	.4320	12.095	12.530	12.960	13.390
6	.5184	14.514	15.036	15.552	16.068
7	.6048	16.933	17.542	18.144	18.746
8	.6912	19.352	20.048	20.736	21.424
9	.7776	21.771	22.554	23.328	24.102

NOTE.—For part of a month multiply the figure for one day by the number of days.

Table for converting discharge in second-feet into run-off in millions of gallons.

Discharge in second-feet.	Run-off in millions of gallons.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.6463	18.10	18.74	19.39	20.04
2	1.293	36.20	37.48	38.78	40.08
3	1.939	54.30	56.22	58.17	60.12
4	2.585	72.40	74.96	77.56	80.16
5	3.232	90.50	93.70	96.95	100.2
6	3.878	108.6	112.4	116.3	120.2
7	4.524	126.7	131.2	135.7	140.3
8	5.171	144.8	149.9	155.1	160.3
9	5.817	162.9	168.7	174.5	180.4

NOTE.—For part of a month multiply the figure for one day by the number of days.

Table for converting velocity in feet per second into velocity in miles per hour.

[1 foot per second = 0.681818 mile per hour, or two-thirds mile per hour, very nearly; 1 mile per hour= 1.4666 feet per second. In computing the table the figures 0.68182 and 1.4667 were used.]

Feet per second (units).	Tenths.									
	0	1	2	3	4	5	6	7	8	9
0	0.000	0.068	0.136	0.205	0.273	0.341	0.409	0.477	0.545	0.614
1	.682	.750	.818	.886	.995	1.02	1.09	1.16	1.23	1.30
2	1.36	1.43	1.50	1.57	1.64	1.70	1.77	1.84	1.91	1.98
3	2.05	2.11	2.18	2.25	2.32	2.39	2.45	2.52	2.59	2.66
4	2.73	2.80	2.86	2.93	3.00	3.07	3.14	3.20	3.27	3.34
5	3.41	3.48	3.55	3.61	3.68	3.75	3.82	3.89	3.95	4.02
6	4.09	4.16	4.23	4.30	4.36	4.43	4.50	4.57	4.64	4.70
7	4.77	4.84	4.91	4.98	5.05	5.11	5.18	5.25	5.32	5.39
8	5.45	5.52	5.59	5.66	5.73	5.80	5.86	5.93	6.00	6.07
9	6.14	6.20	6.27	6.34	6.41	6.48	6.55	6.61	6.68	6.75

Table for converting discharge in second-feet into theoretical horsepower per foot of fall.

[1 second-foot=0.1136 theoretical horsepower per foot of fall. Weight of 1 cubic foot of water=62.5 pounds.]

Tens.	Units.									
	0	1	2	3	4	5	6	7	8	9
0	0.00	0.114	0.227	0.341	0.454	0.568	0.682	0.795	0.909	1.02
1	1.14	1.25	1.36	1.48	1.59	1.70	1.82	1.93	2.04	2.16
2	2.27	2.39	2.50	2.61	2.73	2.84	2.95	3.07	3.18	3.29
3	3.41	3.52	3.64	3.75	3.86	3.98	4.09	4.20	4.32	4.43
4	4.54	4.66	4.77	4.88	5.00	5.11	5.23	5.34	5.45	5.57
5	5.68	5.79	5.91	6.02	6.13	6.25	6.36	6.48	6.59	6.70
6	6.82	6.93	7.04	7.16	7.27	7.38	7.50	7.61	7.72	7.84
7	7.95	8.07	8.18	8.29	8.41	8.52	8.63	8.75	8.86	8.97
8	9.09	9.20	9.32	9.43	9.54	9.66	9.77	9.88	10.0	10.1
9	10.2	10.3	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2

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

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

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

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

1 second-foot for one year (365 days) covers 1 square mile 1.131 feet or 13.572 inches deep.

1 second-foot for one year (365 days) equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.

1 second-foot for one year (365 days) equals 724 acre-feet.

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.
1⅓ horsepower equals about 1 kilowatt.

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

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1913, and ending September 30, 1914. At the first of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up; at the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for a year beginning with October 1 is practically all derived from precipitation within that year.

For each regular gaging station the following data, so far as available, are given: Description of the station, list of discharge measurements, table of daily discharge, table of monthly and yearly discharge and run-off. A table of daily gage heights is published only for streams for which the base data are insufficient for estimates of daily or monthly discharge. The maximum and minimum recorded gage heights for each month are included in the monthly discharge table.

In addition to statements regarding the situation and equipment of gaging stations the descriptions give information in regard to any conditions that may affect the constancy of the discharge relation, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions that decrease the total flow at the gage. Statements are made also regarding the accuracy of the data and computed results.

The daily fluctuations of the surface of the river are found from the mean of the gage readings taken each day, usually in the morning and in the evening, though at many stations only one reading is made each day. At many stations automatic gages are used, some of which give a continuous record of river stage in the form of a hydrograph and others a record printed at intervals, from which the mean daily gage height can be computed. The gage heights represent the elevation of the surface of the water above the zero of the gage. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum, in general somewhat below the lowest known flow, to avoid negative readings. When the discharge relation is affected by the presence of ice in the streams or by backwater from

obstructions, the rating table is not applicable unless the proper corrections to the gage heights are known and applied.

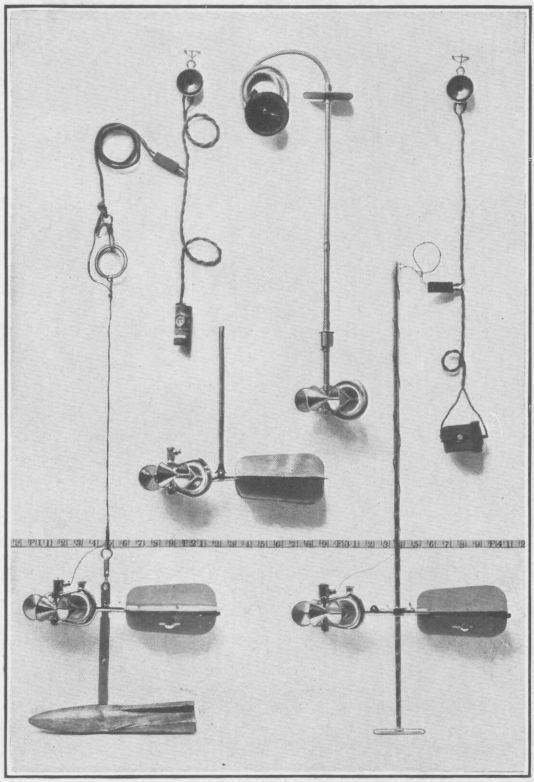
Gages are read to tenths, half-tenths, quarter-tenths, or hundredths, once a day, twice a day, or oftener. The degree of refinement to which the mean daily gage height is computed and used to obtain the daily discharge depends on the degree of refinement to which the gage is read and on the error in the mean daily discharge resulting from not using the mean daily gage heights to half-tenths or hundredths above certain limiting stages. These limiting stages are so selected that the average error in the mean daily discharge, resulting from not using the mean daily gage height to hundredths above that stage, shall not be greater than 2 per cent. For automatic gages the allowable average error of the daily discharge has been taken as 1 per cent. The selection of the percentage is arbitrary, but it should be noted that the maximum error will in all cases be twice the average error. It is the aim to have the gage-height observations at each gaging station recorded to the degree of refinement required by the method of use, but in practice it is found necessary, in order to avoid confusion in the gage-observer's record, to have the observations for all stages recorded to the degree of refinement required for low stages, which usually necessitates readings to hundredths of a foot.

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

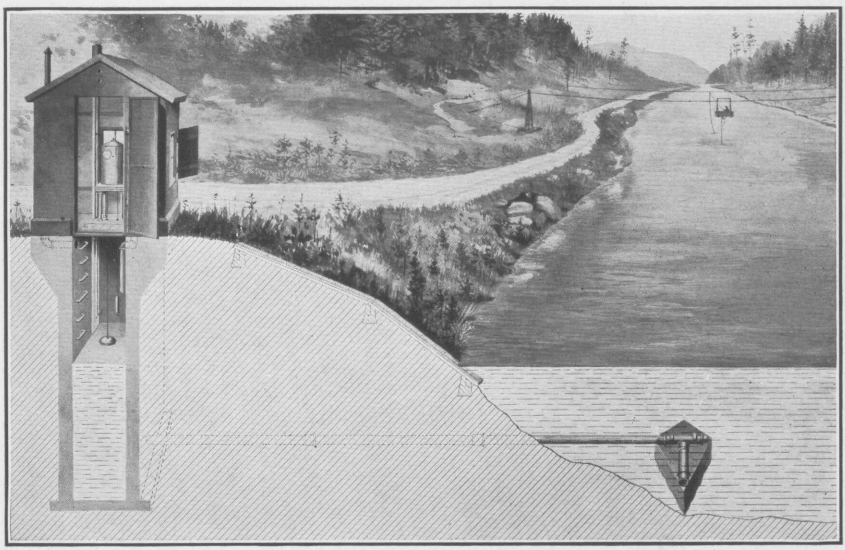
The base data, unless otherwise stated in the descriptions of stations, have been collected by the methods commonly used at current-meter gaging stations and described in standard textbooks. (See Pls. I and II.)

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on pages 11–12, are based.

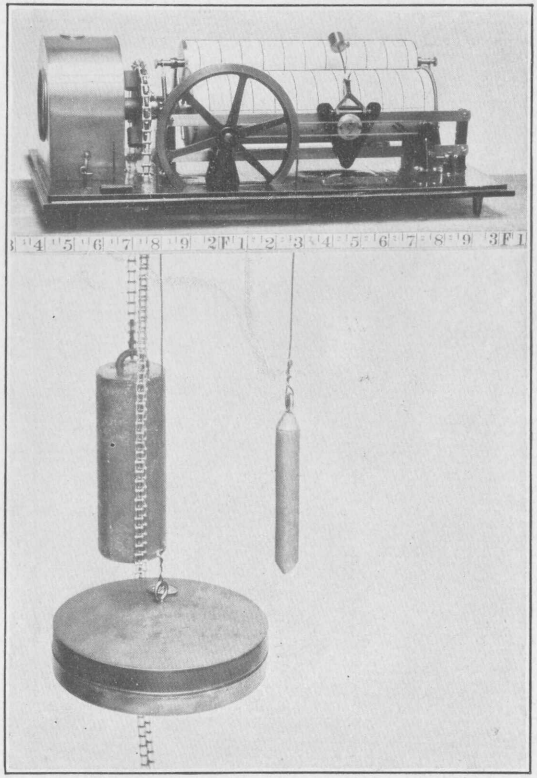
The deficiency table presented for some of the gaging stations shows the number of days in each year on which the mean daily discharge was less than the discharge given in the table. By subtraction the table gives the number of days each year that the mean daily discharge was between the discharges given in the table and, also by subtraction, the number of days that the mean daily dis-



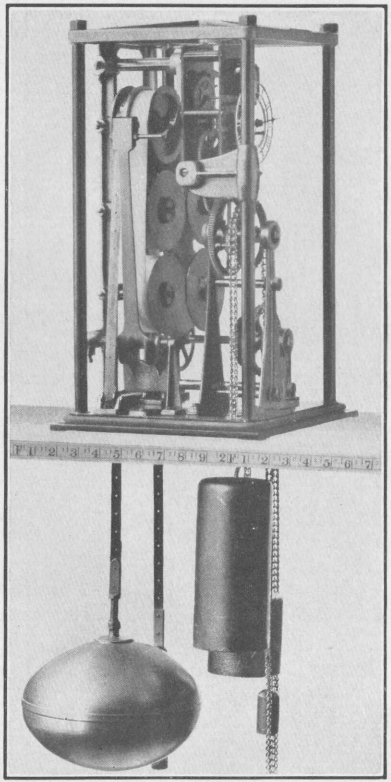
A. PRICE CURRENT METERS.



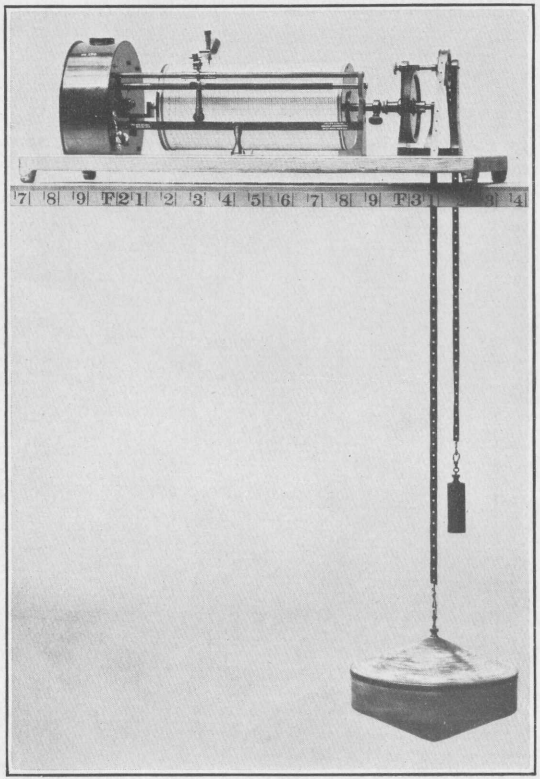
B. TYPICAL GAGING STATIONS.



A. STEVENS.



B. GURLEY PRINTING.



C. FRIEZ.

AUTOMATIC GAGES.

charge was equal to or greater than the discharge given. If one discharge rating table was used throughout the period covered by the deficiency table, gage heights that correspond to the discharges are also given. For convenience the theoretical horsepower per foot fall corresponding to the discharge is given in the table on page 14. In using the table for studies of power allowance should be made for the various losses, the most important being wheel loss and head loss.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of stream-flow data depends primarily (1) on the permanency of the discharge relation and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of records.

In order to give information regarding the probable accuracy of the computed results footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables, "well defined," indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate" within 15 to 25 per cent. These notes are 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 estimate of maximum or minimum discharge nor to that for any one day, but to the monthly mean. It is based on the accuracy of the rating curve, the probable reliability of the observer, the number of gage readings per day, the range of the fluctuation in stage, 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 run-off 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. "Second-feet per square mile" and "run-off (depth in inches)" have therefore not been computed for streams draining areas in which the annual rainfall is less than 20 inches nor for streams draining areas in which the precipitation exceeds 20 inches if such computations might be uncertain or misleading because of the presence

of large noncontributing districts in the measured drainage area, because of the omission of estimates of water diverted for irrigation or other use, or because of artificial control or unusual natural control of the flow of the river above the gaging station. All values of "second-feet per square mile" and "run-off (depth in inches)" previously published by the Survey should be used with care because of possible inherent sources of error not known to the Survey.

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 the preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data already collected and published.

COOPERATION.

Work in West Virginia during the year ending September 30, 1914, was carried on in cooperation with the State Geological Survey, I. C. White, State geologist.

Work in Illinois was done in cooperation with the State of Illinois Rivers and Lakes Commission.

The gaging stations on Beaver River at Wampum, Pa., Connoquenessing Creek near Ellwood City, Pa., Scioto River at Chillicothe, Ohio, Little Miami River at Plainville, Ohio, and Licking River at Falmouth, Ky., were maintained in cooperation with the United States Public Health Service.

The gaging stations on Valley River at Tomotla, N. C., and Nottely River near Ranger, N. C., were maintained in cooperation with H. F. Van Deventer.

DIVISION OF WORK.

Field data for Allegheny River at Red House, N. Y., were collected under the direction of C. C. Covert, district engineer, assisted by C. S. De Golyer.

Field data for the Ohio River basin, except those for the Allegheny at Red House, N. Y., and for the basin of Tennessee River, were collected under the direction of A. H. Horton, district engineer, assisted by C. E. Ellsworth, B. J. Peterson, M. I. Walters, and R. M. Adams.

Field data in the Tennessee River basin were collected under the direction of Warren E. Hall, district engineer, assisted by B. M. Hall, jr.

The ratings, estimates, and studies of the completed data except Allegheny River at Red House, N. Y., were made by W. E. Hall, A. H. Horton, C. E. Ellsworth, and B. J. Peterson.

The computations were made by C. E. Ellsworth, B. J. Peterson, James E. Stewart, and W. A. Elwood.

The data were prepared for publication by B. J. Peterson.

STATION RECORDS.

ALLEGHENY RIVER BASIN.

ALLEGHENY RIVER AT RED HOUSE, N. Y.

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

Drainage area.—1,640 square miles.

Records available.—September 4, 1903, to September 30, 1914.

Gage.—Standard chain, attached to the upstream side of bridge near left bank; read daily, at noon, to half-tenths.

Discharge measurements.—Made from downstream side of bridge.

Channel and control.—Coarse gravel, occasionally shifting. Current good for medium and high stages; rather slow at low stages.

Extremes of discharge.—Maximum stage recorded during year: 11.7 feet at noon March 28, 1914; discharge, 30,000 second-feet. Minimum stage recorded: 3 feet, in July, August, and September; discharge, 200 second-feet.

Winter flow.—Occasionally affected by ice; observations suspended during such periods.

Regulation.—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.

Accuracy.—Results fair.

Discharge measurements of Allegheny River at Red House, N. Y., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 24	C. S. De Golyer	3.62	704
24	do	3.65	734

Daily discharge in second-feet of Allegheny River at Red House, N. Y., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	325	538	1,310	968	.....	.....	19,800	2,110	905	362	260	848
2	585	848	1,380	968	.....	.....	13,300	1,860	968	400	260	790
3	635	1,030	1,310	905	.....	.....	10,300	1,160	1,030	445	205	585
4	538	1,160	1,160	1,100	.....	.....	8,900	1,310	905	400	205	635
5	400	968	1,310	905	.....	.....	10,600	2,110	1,460	400	205	790
6	538	1,160	1,240	905	.....	.....	9,950	8,900	1,030	325	205	480
7	490	1,240	1,310	.....	.....	.....	12,500	7,600	635	362	205	538
8	400	1,160	1,310	.....	3,310	.....	13,300	6,990	790	400	205	490
9	400	4,520	1,460	.....	2,780	.....	12,500	6,690	848	400	232	400
10	538	4,270	1,310	.....	1,540	.....	11,000	6,990	635	400	232	400
11	445	3,780	1,160	.....	2,480	.....	10,600	13,700	400	325	205	445
12	490	4,270	1,310	.....	1,860	.....	8,560	15,000	490	362	205	362
13	538	6,690	1,240	.....	2,020	.....	8,230	22,900	585	400	205	260
14	400	6,690	1,460	.....	1,940	685	9,250	22,900	585	400	260	294
15	445	6,990	1,690	.....	1,690	905	9,600	13,300	635	400	205	294
16	400	6,990	1,540	.....	1,770	1,860	8,900	7,600	585	362	260	292
17	490	6,690	1,460	.....	1,240	2,880	8,900	4,270	490	400	325	260
18	445	5,290	1,460	.....	1,160	10,300	8,230	4,270	738	400	260	292
19	400	5,290	1,380	.....	905	5,830	8,230	2,580	635	362	325	292
20	400	3,310	1,460	.....	.....	3,540	8,230	1,860	685	362	362	260
21	400	2,480	1,160	.....	.....	4,770	8,900	2,020	490	325	260	260
22	445	2,200	1,310	.....	.....	3,310	8,900	2,480	585	362	325	292
23	400	2,020	1,310	.....	.....	2,680	7,600	2,680	685	205	362	292
24	585	2,200	1,310	.....	.....	2,380	6,400	1,940	585	205	635	292
25	635	1,940	1,540	.....	.....	2,680	2,880	2,020	490	292	685	260
26	538	1,940	1,610	.....	.....	10,300	3,310	1,770	490	260	738	232
27	635	1,770	1,160	4,020	.....	16,800	2,780	2,020	538	260	738	205
28	635	1,540	1,030	4,270	.....	30,000	2,290	1,770	400	260	685	232
29	538	1,540	1,100	8,230	.....	28,400	2,380	2,200	400	205	635	205
30	585	1,690	1,030	15,900	.....	24,000	2,480	1,860	400	205	790	205
31	585	.....	905	15,800	.....	22,900	.....	1,770	.....	292	685	.....

NOTE.—Discharge determined from a fairly well-defined rating curve. Mean discharge when ice is present estimated by comparison with records on Genesee River at St. Helena and Chenango River near Chenango Forks as follows: Jan. 7–26, 900 second-feet; Feb. 1–7, 6,900 second-feet; Feb. 20–28, 711 second-feet; Mar. 1–13, 842 second-feet.

Monthly discharge of Allegheny River at Red House, N. Y., for the year ending Sept. 30, 1914.

[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.		
October	635	325	493	0.301	0.35	B.
November	6,990	538	3,070	1.87	2.09	B.
December	1,690	905	1,310	.799	.92	B.
January	15,900	.....	2,320	1.41	1.63	C.
February	.....	.....	2,760	1.68	1.75	C.
March	30,000	.....	5,970	3.64	4.20	B.
April	19,800	2,290	8,630	5.26	5.87	A.
May	22,900	1,160	5,700	3.48	4.01	A.
June	1,460	400	670	.409	.46	B.
July	445	205	340	.207	.24	B.
August	790	205	367	.224	.26	B.
September	848	205	383	.234	.26	B.
The year	30,000	205	2,660	1.62	22.04	

Days of deficiency in discharge of Allegheny River at Red House, N. Y., for the years ending Sept. 30, 1906–1914.

Discharge in second-feet.	Days of deficient discharge.								
	1905–6	1906–7 [a]	1907–8 [a]	1908–9 [a]	1909–10 [a]	1910–11	1911–12	1912–13	1913–14
200	3					1		2	
250	5					1		28	21
300	29					8	12	51	45
400	41					30	29	67	62
550	79					60	82	92	113
700	101					80	95	105	140
850	119					93	121	121	172
1,000	147					111	133	132	204
1,200	167					124	150	152	220
1,500	201					158	169	175	243
1,800	219					175	182	195	257
2,100	236					199	197	212	271
2,400	256					219	222	222	279
2,700	270					227	235	234	287
3,100	285					246	257	248	291
3,500	294					252	268	266	295
4,000	311					271	292	282	297
4,500	318					285	303	294	303
5,000	320					302	311	306	305
6,000	328					317	324	316	308
7,000	338					331	332	325	324
8,000	349					338	338	332	327
10,000	358					349	347	337	342
12,000	362					354	351	344	348
14,000	364					361	353	346	354
18,000	365					365	358	352	358
25,000							365	360	363
35,000							366	363	365
45,000								365	

[a] Not computed because estimates of daily flow during periods when discharge relation was affected by ice are not available.

NOTE.—The table shows the number of days on which the discharge was less than the amount given in the column for discharge. Figures for the years ending Sept. 30, 1911, 1912, and 1914, are in part based upon daily discharge estimates made because of ice.

MONONGAHELA RIVER BASIN.

TYGART RIVER AT BELINGTON, W. VA.

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

Drainage area.—390 square miles.

Records available.—June 5, 1907, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, in the morning, to hundredths. Sea-level elevation of zero of gage, 1,679.89 feet.

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

Channel and control.—Practically permanent. Determination by leveling, August 22, 1910, indicated that there would be no flow past the gage if the river stage were to fall to about 1.6 feet, referred to the gage datum. On November 6, 1913, this stage was found to be 1.4 feet ±0.2 foot.

Extremes of stage.—Maximum stage recorded during year: 14.2 feet at 7 a. m. November 16, 1913. Minimum stage recorded: 1.86 feet at 7 a. m. September 28, 1914. Flood of July, 1912, reached gage height, 20.3 feet.

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

Accuracy.—Gage-height record reliable.

Estimates of discharge withheld for additional data.

Discharge measurements of Tygart River at Belington, W. Va., during the year ending Sept. 30, 1914.

Date.	Made by–	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 6	Peterson and Walters	3.07	178
6	do	3.04	190

Daily gage height, in feet, of Tygart River at Belington, W. Va., for the year ending Sept. 30, 1914.

[S. A. Campbell, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.66	3.8	4.0	4.15	4.8	3.85	5.0	4.7	2.38	2.69	2.81	3.06
2	2.64	3.7	3.00	3.95	5.5	4.0	6.6	3.9	2.47	2.65	2.69	3.65
3	2.81	3.42	4.4	3.7	4.5	4.8	9.3	3.6	2.37	2.33	2.60	3.6
4	3.85	3.30	4.2	3.55	4.35	5.0	8.0	3.18	2.32	2.37	2.59	3.6
5	3.65	3.14	4.0	3.7	4.3	4.9	5.6	3.9	2.58	2.35	2.51	2.48
6	3.26	3.04	3.9	3.65	4.6	4.6	4.8	8.1	2.78	2.29	2.36	2.30
7	3.09	3.00	4.7	3.6	5.8	4.45	4.3	6.5	2.72	2.57	2.29	2.21
8	2.98	2.96	7.2	3.55	5.0	4.35	4.1	5.5	2.67	2.55	2.19	2.33
9	2.84	5.3	6.0	4.8	5.0	4.2	4.0	4.7	2.48	2.33	2.12	2.22
10	4.6	6.4	5.1	7.4	4.7	4.0	5 9	3.13	2.78	2.54	2.29	2.19
11	4.35	5.6	4.6	6.5	4.2	4.05	5.7	3.06	2.31	2.15	2.16	2.20
12	3.6	5.2	4.0	5.2	3.8	4.1	5.6	2.69	2.28	2.09	2.58	2.21
13	2.88	5.6	4.0	4.4	4.5	3.8	5.5	3.6	2.20	2.07	3.28	2.21
14	3.55	11.0	3.9	4.8	6.5	3.7	4.9	3.48	2.20	2.21	3.22	2.20
15	3.01	14.0	3.85	6.4	6.1	5.8	4.1	3.28	2.22	5.8	2.96	2.17
16	3.00	14.2	3.75	6.1	5.9	8.0	7.5	3.26	2.42	6.8	2.81	2.07
17	3.01	12.9	3.7	5.6	5.9	8.9	8.7	3.11	2.26	5.0	2.71	2.07
18	3.00	7.6	3.65	5.1	6.1	7.9	8.5	3.04	2.17	3.8	2.29	2.06
19	2.93	6.8	3.5	4.9	8.6	6.5	8.0	2.98	2.17	3.55	2.38	2.06
20	2.86	4.8	3.6	3.95	12.7	5.4	8.9	2.92	2.17	3.30	2.32	2.06
21	7.9	4.45	3.6	8.9	8.0	4.7	9.7	2.87	2.11	3.06	2.22	2.06
22	5.6	3.9	3.6	8.9	6.8	5.9	6.2	2.81	2.04	2.82	2.16	1.95
23	4.8	3.8	3.6	6.8	5.1	4.0	5.6	2.04	2.27	2.64	2.14	1.95
24	4.5	3.7	3.55	5.1	4.8	4.25	4.5	2.81	2.85	2.55	2.12	1.97
25	8.1	3.65	3.8	8.8	4.05	5.5	4.1	2.68	3.6	2.49	2.87	1.89
26	7.0	3.34	7.0	7.0	4.7	5.7	9.4	2.67	5.2	3.8	3.05	1.90
27	6.6	3.22	6.7	5.8	3.9	5.8	8.2	2.62	3.8	5.2	3.22	1.89
28	5.4	3.5	5.4	5.2	3.85	5.7	6.5	2.51	3.5	5.9	3.20	1.86
29	4.5	3.65	4.7	4.9	.....	5.8	5.6	2.47	2.07	4.2	2.94	1.89
30	4.05	3.42	4.45	4.8	.....	5.8	5.1	2.37	1.91	3.37	2.80	1.87
31	3.8	.....	4.4	4.8	.....	5.2	.....	2.37	.....	3.06	3.42	.....

NOTE.—Discharge relation probably not materially affected by ice during the year.

TYGART RIVER AT FETTERMAN, W. VA.

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

Drainage area.—1,340 square miles.

Records available.—June 3, 1907, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Sea-level elevation of zero of gage, 957.86 feet.

Discharge measurements.—Made from downstream side of bridge.

Channel and control.—Practically permanent.

Extremes of discharge.—Maximum stage recorded during year: 22.1 feet at 6.30 a. m. November 16, 1913; discharge, 39,400 second-feet. Minimum stage recorded: 2.90 feet September 30, 1914.

No records of floods previous to installation of gage; highest stage recorded since station was established, 29.1 feet in July, 1912.

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

Accuracy.—Results good except for extremely low stages.

Discharge measurements of Tygart River at Fetterman, W. Va., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 30	Peterson and Walters	5.20	1,920
31	.....do	4.92	1,530

Daily discharge, in second-feet, of Tygart River at Fetterman, W. Va., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	266	1,160	1,610	2,460	4,560	1,030	7,390	2,630	179	266	354	722
2	220	910	1,530	2,290	4,920	1,610	9,950	1,950	.....	247	256	596
3	247	752	1,450	2,290	2,970	1,700	13,800	1,610	.....	211	191	484
4	336	631	1,450	1,950	2,460	1,610	13,000	1,380	.....	179	.....	381
5	1,030	613	1,700	1,780	2,630	1,780	7,580	2,630	426	171	.....	296
6	1,780	596	1,450	1,610	2,970	1,860	4,560	6,620	381	171	.....	247
7	970	543	1,950	1,610	3,480	2,120	3,140	6,620	296	171	.....	220
8	229	526	9,150	1,700	4,020	2,630	2,800	4,740	281	220	.....	191
9	96	570	6,620	4,020	3,140	1,950	3,480	4,380	256	211	.....	179
10	220	3,660	4,200	10,600	2,630	1,780	6,430	4,740	220	171	.....	.....
11	722	4,560	3,310	11,200	2,290	2,290	4,200	2,630	203	.....	.....	.....
12	1,030	3,840	2,630	6,810	2,120	2,460	3,480	1,450	171	.....	266	.....
13	1,450	7,390	2,120	2,970	1,780	2,200	3,310	1,160	.....	.....	366	.....
14	1,160	26,200	1,780	1,860	1,300	2,120	3,140	970	.....	256	752	.....
15	910	31,600	1,610	1,860	1,030	3,660	4,560	910	.....	4,740	910	.....
16	752	39,100	1,380	2,040	970	10,400	9,150	822	.....	3,140	570	.....
17	596	24,800	1,160	1,950	970	13,200	12,000	703	.....	2,120	458	.....
18	381	13,000	1,160	1,450	1,100	11,000	9,550	631	.....	1,530	381	.....
19	354	7,580	1,160	1,380	14,400	7,390	5,100	543	.....	1,300	296	.....
20	2,290	3,480	1,030	1,700	18,700	5,290	10,200	596	.....	1,030	247	.....
21	7,000	2,970	1,030	7,580	13,200	3,840	15,900	570	.....	781	179	.....
22	5,670	2,460	1,030	13,200	9,550	2,970	9,350	441	.....	752	.....	.....
23	3,660	1,950	1,160	8,560	6,620	2,800	5,290	354	.....	458	.....	.....
24	2,630	1,450	1,950	6,810	3,840	2,630	2,970	336	.....	266	.....	.....
25	6,050	1,230	2,630	5,860	2,290	3,310	2,630	318	203	203	.....	.....
26	9,950	1,030	11,400	7,200	570	5,670	5,670	266	822	.....	404	.....
27	9,550	1,030	9,750	5,670	685	6,050	16,800	256	1,610	3,660	426	.....
28	5,860	1,160	7,980	4,380	752	7,200	8,360	256	800	2,630	484	.....
29	2,800	1,450	4,560	3,310	.....	7,200	4,560	256	336	2,120	822	.....
30	1,950	1,610	2,970	2,970	.....	5,860	3,310	247	296	1,450	1,030	.....
31	1,530	.....	2,630	3,310	.....	4,380	.....	220	.....	685	888	.....

NOTE.—Daily discharge determined from a rating curve fairly well defined above and poorly defined below 170 second-feet; estimates for periods after June 1 when the flow was below 170 second-feet are therefore not published, owing to probability of error. Open-water rating curve used throughout year.

Monthly discharge of Tygart River at Fetterman, W. Va., for the year ending Sept. 30, 1914.

[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.		
October	9,950	96	2,310	1.72	1.98	A.
November	39,100	526	6,260	4.67	5.21	B.
December	11,400	1,030	3,080	2.30	2.65	B.
January	13,200	1,380	4,270	3.19	3.68	B.
February	18,700	570	4,140	3.09	3.22	B.
March	13,200	1,030	4,190	3.13	3.61	A.
April	16,800	2,630	7,060	5.27	5.88	A.
May	6,620	220	1,650	1.23	1.42	A.

Days of deficiency in discharge of Tygart River at Fetterman, W. Va., for the years ending Sept. 30, 1907–1913.

Discharge in second-feet.	Days of deficient discharge.						
	1907[a]	1907–8	1908–9	1909–10	1910–11	1911–12	1912–13
20	.....	.....	33	.....	.....	.....	.....
35	.....	13	64	.....	.....	.....	.....
50	.....	16	66	1	.....	.....	.....
65	.....	21	70	9	20	.....	.....
80	.....	23	70	12	25	.....	.....
100	.....	27	72	19	42	2	.....
130	.....	34	73	24	55	5	5
160	.....	39	78	30	64	7	15
200	.....	42	86	47	83	9	33
250	.....	49	103	57	104	13	47
300	.....	63	118	66	116	15	63
375	.....	66	132	72	142	24	79
450	.....	77	139	76	146	31	92
550	5	91	155	105	163	53	119
700	17	110	182	150	177	69	144
900	30	117	196	179	191	88	155
1,200	55	132	222	209	200	122	191
1,600	65	153	244	232	216	157	211
2,200	74	183	258	260	239	206	236
3,000	84	230	282	284	269	241	271
4,000	94	264	312	309	295	278	292
6,000	103	305	337	328	325	309	321
9,000	110	334	354	345	347	332	344
12,000	113	348	362	355	354	347	353
16,000	115	358	365	358	360	360	358
20,000	118	365	.....	364	360	362	362
26,000	119	366	.....	365	364	365	365
34,000	120	.....	.....	.....	364	365	.....
46,000	.....	.....	.....	.....	365	366	.....

[a] June 3 to Sept. 30.

NOTE.—Figures for the years ending Sept. 30, 1910 and 1911, subject to inaccuracies owing to the fact that the discharge was estimated for periods when the discharge relation was probably affected by ice.

MONONGAHELA RIVER AT MORGANTOWN, W. VA.

Location.—At highway bridge at foot of Pleasant Street about 300 feet from Baltimore & Ohio Railroad station and about half a mile below lock No. 10.

Drainage area.—2,670 square miles.

Records available.—April 1 to September 30, 1914.

Gage.—Chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 3.5, half-tenths from 3.5 to 4.5, and tenths above 4.5 feet.

Discharge measurements.—Made from downstream side of bridge.

Channel and control.—Dam No. 9 forms the control.

Extremes of stage.—Maximum stage recorded during year: 12 feet April 21. Minimum stage recorded: 2.61 feet September 27.

Diversions.—The city of Morgantown obtains its water supply from a point above dam No. 8.

Regulation.—The river is regulated by locks and dams in the interest of navigation.

Accuracy.—Gage-height record reliable.

Data insufficient for estimates of discharge.

Discharge measurements of Monongahela River at Morgantown, W. Va., during the year ending Sept. 30, 1914.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 30	6.55	9,160	Apr. 28	8.85	16,600
Apr. 25	5.37	5,530	May 9	4.35	3,210

NOTE.—The above measurements were made by students of the University of West Virginia.

Daily gage height, in feet, of Monongahela River at Morgantown, W. Va., for the year ending Sept. 30, 1914.

[John Seaman, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.0	5.2	3.16	3.30	3.75	3.95	16	8.6	4.0	3.75	3.32	3.36	2.90
2	10.3	4.9	3.12	3.43	3.7	3.95	17	9.2	3.9	3.34	3.34	3.28	2.84
3	11.2	4.6	3.12	3.37	3.65	3.9	18	7.5	3.85	3.32	3.38	3.22	2.82
4	9.6	4.45	3.22	3.32	3.6	3.9	19	6.6	3.7	3.26	3.44	3.18	2.80
5	7.8	5.1	3.75	3.18	3.55	3.85	20	8.4	3.7	3.15	3.42	3.14	2.78
6	6.3	9.0	3.7	3.14	3.48	3.8	21	12.0	3.65	3.06	3.38	3.12	2.74
7	5.6	8.0	3.7	3.12	3.42	3.8	22	9.2	3.6	3.03	3.26	3.06	2.68
8	5.4	6.7	3.6	3.14	3.42	3.7	23	6.7	3.5	3.04	3.55	3.02	2.68
9	6.9	5.9	3.6	3.12	3.36	3.5	24	6.0	3.44	3.16	3.48	3.06	2.70
10	7.4	5.4	3.5	3.20	3.36	3.34	25	5.4	3.42	3.13	3.7	3.32	2.64
11	6.2	4.9	3.48	3.16	3.47	3.19	26	6.4	3.41	3.15	3.75	4.1	2.62
12	5.6	4.6	3.41	3.13	3.6	3.14	27	11.2	3.34	3.28	3.7	3.75	2.61
13	5.3	4.5	3.38	3.14	3.6	3.12	28	8.8	3.33	3.9	3.8	3.75	2.62
14	5.0	4.4	3.38	3.24	3.6	3.02	29	6.5	3.30	3.65	3.85	3.7	2.68
15	5.3	4.2	3.7	3.34	3.5	2.94	30	5.6	3.25	3.46	3.85	4.15	2.74
							31	.....	3.22	.....	3.8	4.05	.....

WEST FORK RIVER AT ENTERPRISE, W. VA.

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

Drainage area.—750 square miles.

Records available.—June 2, 1907, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, in the morning, to hundredths. Sea-level elevation of zero of gage, 869.91 feet.

Discharge measurements.—Made from downstrenm side of bridge.

Channel and control.—Channel at measuring section broken by one pier; smooth rock bottom. Control practically permanent.

Extremes of discharge.—Maximum stage recorded during year, 18.8 feet at 8 a. m. November 16, 1913; discharge, 19,400 second-feet. Minimum stage recorded, 1.0 foot at 8 a. m. July 11, 1914; discharge 30 second-feet.

Flood of 1888, referred to present gage datum, reached stage of about 33 feet. Maximum gage height recorded since establishment of station, 18.8 feet, at 8 a. m. November 16, 1913.

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

Accuracy.—Records good.

The following discharge measurement was made by wading, by Peterson and Walters:

November 2, 1913: Gage height, 1.82 feet; discharge, 154 second-feet.

Daily discharge, in second-feet, of West Fork River at Enterprise, W. Va., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	64	227	441	829	3,050	4,000	1,160	767	60	44	93	212
2	64	a176	514	707	2,090	1,680	5,970	593	60	49	91	158
3	79	124	566	707	1,300	1,680	5,860	514	57	60	78	127
4	64	79	621	959	1,030	1,530	3,560	418	74	60	73	99
5	64	124	540	1,230	926	1,300	2,270	593	307	62	70	85
6	64	89	465	1,380	1,230	1,600	1,230	6,080	146	63	67	74
7	79	95	2,950	1,530	2,360	3,780	992	2,850	104	54	63	70
8	79	79	4,850	1,680	2,010	3,250	926	1,530	83	48	57	62
9	64	266	3,050	4,420	1,090	2,850	3,780	1,090	74	48	59	60
10	64	649	1,840	9,900	767	2,180	2,650	829	67	46	59	59
11	79	1,840	1,380	4,740	.....	1,530	1,530	593	67	30	67	58
12	64	1,680	1,230	2,550	.....	1,920	1,160	489	72	31	208	58
13	64	2,360	767	1,300	.....	1,600	926	418	89	36	227	57
14	64	11,400	621	650	.....	1,530	798	372	79	43	926	57
15	99	13,400	540	700	.....	4,310	767	307	70	372	737	54
16	64	19,400	489	992	.....	5,400	3,670	266	66	172	621	49
17	72	14,600	418	1,160	.....	3,670	3,150	227	49	124	176	49
18	89	4,200	350	1,230	.....	2,850	2,090	197	42	95	127	48
19	112	1,840	328	1,300	.....	2,460	2,090	172	146	116	81	48
20	172	1,230	286	1,380	.....	1,760	2,010	133	48	152	62	47
21	1,920	798	328	4,200	.....	1,300	6,200	130	54	119	53	45
22	1,920	593	350	3,050	.....	1,230	2,950	119	63	91	50	44
23	1,090	489	395	1,680	.....	1,230	1,680	112	60	76	49	42
24	465	418	2,180	1,300	.....	1,300	1,030	99	52	73	48	42
25	959	350	4,740	6,080	.....	1,380	861	89	52	112	42	42
26	2,950	307	8,530	3,990	.....	1,380	2,180	78	48	102	737	40
27	2,360	307	5,620	2,180	.....	1,090	5,070	83	45	95	540	40
28	1,300	372	3,990	1,380	.....	1,530	2,550	67	43	102	418	40
29	707	418	1,840	1,030	.....	1,380	1,300	59	42	266	395	40
30	441	441	1,160	307	.....	1,300	893	58	40	158	350	37
31	307	.....	959	767	.....	1,680	.....	54	.....	114	246	.....

a Discharge interpolated.

NOTE.—Daily discharge determined from a rating curve well defined below 2,180 second-feet and fairly well defined between 2,180 and 6,460 second-feet. Discharge Jan. 14 and 15, and Mar. 1, estimated on account of ice. Discharge Feb. 11–28 estimated, because of ice, from gage heights, observer's notes and climatic records at 2,100 second-feet.

Monthly Discharge of West Fork River at Enterprise, W. Va., for the year ending Sept. 30, 1914.

[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.		
October	2,950	64	516	0.688	0.79	B.
November	19,400	79	2,610	3.48	3.88	C.
December	8,530	286	1,690	2.25	2.59	B.
January	9,900	307	2,110	2.81	3.24	B.
February	.....	.....	1,920	2.56	2.67	C.
March	5,400	1,090	2,120	2.83	3.26	B.
April	6,200	767	2,380	3.17	3.54	A.
May	6,080	54	625	.833	.96	B.
June	307	40	75.3	.100	.11	B.
July	372	30	97.2	.130	.15	B.
August	926	42	222	.296	.34	B.
September	212	37	64.8	.086	.10	B.
The year	19,400	30	1,190	1.59	21.63	

ELK CREEK NEAR CLARKSBURG, W. VA.

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

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

Records available.—October 11, 1910, to September 30, 1914.

Gage.—Wooden staff gage fastened to a tree near right abutment of footbridge; read daily, in the morning, to half tenths. On November 1, 1913, a metal gage section (0–3 feet) was attached to the gage, which was then lowered 1 foot to avoid negative readings. All gage heights published in this report refer to the new datum. Sea-level elevation of zero of gage, 955.01 feet.

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

Channel and control.—Rocky and practically permanent; banks high, not subject to overflow. A determination on August 30, 1912, indicates that there would be no flow past the gage if the stage were to fall to about 0.9 foot.

Extremes of stage.—Maximum stage recorded during year: 8.9 feet at 9.30 a. m. November 16, 1913. Minimum stage recorded: 1 foot July 10–13, 1914.

The flood of July, 1912, reached stage of 15 feet on the present gage.

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

Accuracy.—Gage-height record reliable.

Data insufficient for estimates of discharge.

The following discharge measurement was made by wading, by M. I. Walters. November 1, 1913: Gage height, 1.73 feet; discharge, 21.7 second-feet.

Daily gage height, in feet, of Elk Creek near Clarksburg, W. Va., for the year ending Sept. 30, 1914.

[E. H. Smith, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1.7	2.1	2.25	3.0	3.8	2.1	2.20	1.4	1.25	1.3	1.65
2	.....	1.7	2.1	2.2	2.6	2.7	4.5	2.10	1.35	1.25	1.25	1.5
3	.....	1.65	2.05	2.35	2.4	2.7	3.5	1.95	1.3	1.2	1.2	1.45
4	1.4	1.65	2.05	2.55	2.3	2.8	3.0	1.9	1.3	1.15	1.2	1.4
5	1.55	1.6	2.0	2.6	2.35	2.8	2.65	2.6	1.45	1.15	1.15	1.4
6	1.5	1.6	1.95	2.6	2.8	2.7	2.65	3.6	1.85	1.1	1.1	1.3
7	1.4	1.55	2.5	2.65	2.85	3.6	2.3	2.8	1.6	1.1	1.1	1.3
8	1.3	1.55	3.5	2.7	2.5	3.3	2.3	2.5	1.45	1.05	1.05	1.3
9	.....	1.9	2.9	4.0	2.3	3.0	3.2	2.35	1.4	1.05	1.05	1.25
10	.....	1.8	2.7	5.0	2.4	2.7	2.75	2.15	1.35	1.0	1.1	1.2
11	.....	1.85	2.5	3.2	2.2	3.1	2.5	2.05	1.3	1.0	1.3	1.2
12	.....	1.8	2.3	2.7	2.2	2.65	2.4	1.95	1.3	1.0	1.5	1.2
13	.....	3.6	2.2	2.65	2.2	2.6	2.3	1.9	1.25	1.0	1.75	1.15
14	.....	6.1	2.1	2.6	2.0	2.6	2.25	1.85	1.2	1.1	1.7	1.15
15	1.4	4.5	2.05	2.25	1.9	3.4	2.25	1.8	1.2	1.2	1.55	1.15
16	1.35	8.9	1.95	2.3	1.9	3.8	3.9	1.75	1.2	1.9	1.4	1.15
17	1.3	4.4	1.9	2.55	1.85	3.4	3.3	1.7	1.15	1.6	1.35	1.15
18	1.3	3.1	1.9	2.4	1.9	3.0	2.8	1.65	1.1	1.5	1.3	1.15
19	.....	2.7	1.9	2.3	7.85	2.95	2.5	1.6	1.1	1.4	1.25	1.1
20	3.4	2.4	1.85	2.6	4.8	2.7	4.2	1.6	1.1	1.35	1.2	1.1
21	3.0	2.2	1.8	2.9	3.0	2.4	3.8	1.55	1.05	1.3	1.2	1.1
22	2.6	2.1	1.9	2.65	2.7	2.5	3.0	1.5	1.05	1.25	1.2	1.1
23	2.2	2.0	1.9	2.5	2.8	2.6	2.6	1.5	1.1	1.2	1.15	1.1
24	1.96	2.05	2.9	2.4	2.7	2.6	2.4	1.5	1.1	1.2	1.2	1.1
25	3.2	2.0	2.5	3.8	2.7	2.55	2.3	1.5	1.1	1.3	1.2	1.1
26	3.3	1.9	5.9	3.05	2.65	2.55	3.3	1.45	1.1	1.4	2.05	1.1
27	2.8	2.0	3.3	2.7	2.7	2.35	3.1	1.45	1.50	1.5	1.75	1.1
28	2.4	2.15	2.8	2.5	3.0	2.3	2.7	1.4	1.45	1.45	1.6	1.1
29	2.1	2.15	2.6	2.35	.....	2.3	2.4	1.4	1.35	1.4	1.8	1.1
30	1.9	2.15	2.45	2.25	.....	2.3	2.3	1.4	1.3	1.4	2.0	1.05
31	1.8	.....	2.3	2.3	.....	2.2	.....	1.35	.....	1.35	1.8	.....

NOTE.—Water did not reach gage Oct. 1–3, 9–4, and 19, 1913. The stage was below gage height 1.3 feet during these periods. Discharge relation probably affected by ice Feb. 12–18, and Feb. 24 to Mar. 6, 1914.

DECKERS CREEK AT MORGANTOWN, W. VA.

Location.—On downstream side of Valley Crossing highway bridge, about 900 feet above the electric power station, and about three-fourths mile east of the Baltimore & Ohio Railroad station in Morgantown.

Drainage area.—Not measured.

Records available.—April 1 to September 30, 1914.

Gage.—Chain gage attached to downstream side of bridge; read daily, morning and evening, to hundredths.

Discharge measurements.—At low and medium stages made by wading about 1,400 feet above gage; at high stages measurements will be made at the Peninsula Bridge about one-fourth mile above gage.

Channel and control.—Probably permanent.

Extremes of stage.—Maximum stage recorded during year: 5.14 feet at 1 p. m. April 20. Minimum stage recorded: 2.81 feet at 4.30 p. m. September 30.

Accuracy.—Gage-height record reliable.

Data insufficient for making estimates of discharge.

No discharge measurements made during year.

Daily gage height, in feet, of Deckers Creek at Morgantown, W. Va., for the year ending Sept. 30, 1914.

[John Seaman, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.92	3.60	3.26	3.24	3.21	3.25	16	4.66	3.39	3.14	3.21	3.39	3.18
2	5.09	3.57	3.24	3.28	3.17	3.22	17	4.29	3.39	3.14	3.20	3.40	3.14
3	5.04	3.54	3.22	3.28	3.13	3.19	18	4.04	3.40	3.12	3.20	3.32	3.12
4	4.59	3.54	3.24	3.26	3.09	3.17	19	4.29	3.37	3.54	3.12	3.28	3.08
5	4.37	3.76	3.81	3.15	3.07	3.13	20	5.14	3.34	3.14	3.12	3.24	3.07
6	4.04	4.96	3.68	3.14	3.12	3.10	21	4.89	3.30	3.14	3.10	3.20	3.06
7	3.92	4.29	3.52	3.12	3.11	3.07	22	4.42	3.29	3.23	3.08	3.20	3.03
8	3.99	4.00	3.36	3.15	3.07	3.06	23	3.99	3.36	3.54	3.14	3.18	3.00
9	4.04	3.79	3.30	3.10	3.24	3.20	24	3.86	3.31	3.66	3.08	3.18	3.05
10	3.91	3.62	3.25	3.06	3.24	3.38	25	3.93	3.30	3.40	3.28	3.44	3.04
11	3.82	3.54	3.22	3.06	3.28	3.33	26	4.54	3.30	3.40	3.32	3.69	3.00
12	3.84	3.48	3.21	3.02	3.36	3.30	27	4.14	3.30	3.34	3.30	3.42	2.98
13	3.77	3.59	3.20	3.01	3.44	3.26	28	4.02	3.30	3.32	3.20	3.38	2.92
14	3.74	3.42	3.16	3.04	3.46	3.23	29	3.90	3.31	3.32	3.28	3.38	2.88
15	4.42	3.42	3.15	3.24	3.42	3.20	30	3.74	3.28	3.25	3.26	3.38	2.82
							31	.....	3.26	.....	3.25	3.28	.....

CHEAT RIVER NEAR PARSONS, W. VA

Location.—At highway bridge 3 miles below the confluence of Shavers and Dry forks and 2 miles due north of Parsons, W. Va.

Records available.—January 1, 1913, to September 30, 1914.

Drainage area.—716 square miles (determined by West Virginia Development Co.).

Gage.—Standard chain gage attached to bridge; read daily morning and evening to tenths.

Channel and control.—Rocky; probably permanent.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Discharge relation affected by ice during severe winters.

Regulation.—A power plant on Dry Fork at Parsons may affect the flow during low water.

Accuracy.—Gage heights may be in error due to the position of the graduations on the scale of the chain gage. The gage-height record for the year ending September 30, 1914, is therefore withheld from publication until additional information is obtained.

Discharge measurements of Cheat River near Parsons, W. Va., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	H. P. Drake[a]	4.69	3,470	Nov. 9	Peterson and Walters	4.96	3,350
22	do	4.67	3,460	Mar. 30	H. P. Drake	6.28	7,250

[a] Engineer of the West Virginia Development Co.

CHEAT RIVER AT ROWLESBURG, W. VA.

Location.—At the Baltimore & Ohio Railroad bridge at Rowlesburg, about 300 feet above Salt Lick Creek.

Drainage area.—960 square miles (includes drainage area of Salt Lick Creek).

Records available.—July 19, 1912, to September 30, 1914.

The United States Weather Bureau has collected gage-height records since 1884.

Gage.—Mott tape gage attached to upstream side of bridge, read once daily to tenths prior to January 17, 1913, and twice daily to tenths subsequent to that date. Limits of use: Half-tenths below and tenths above 4.5 feet.

Discharge measurements.—Made from upstream side of bridge.

Channel and control.—Control consists of small bowlders; probably permanent. Salt Lick Creek enters the river between the control and the gage.

Extremes of stage.—Maximum stage recorded during year ending September 30, 1913: 8.5 feet January 8, 1913. Minimum stage recorded: 1.9 feet October 22, 1912, September 5, 6, and 17, 1913. Maximum stage recorded during year ending September 30, 1914: 11 feet November 16, 1913. Minimum stage recorded: 1.6 feet September 28–30, 1914.

The highest water of which there is any record occurred, according to the records of the United States Weather Bureau, on July 10, 1888, when a stage of 22 feet was reached.

Winter flow.—Affected by ice during extremely cold weather.

Cooperation.—Gage-height record subsequent to January 1, 1913, and results of discharge measurements furnished by F. W. Scheidenhelm, Pittsburgh, Pa. Gage-height record prior to January 1, 1913, furnished by the United States Weather Bureau.

Data insufficient for estimates of discharge.

Discharge measurements of Cheat River at Rowlesburg, W. Va., during the years ending Sept. 30, 1912–1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1911–12.		*Feet.*	*Sec.-ft.*	1912–13.		*Feet.*	*Sec.-ft.*
Oct. 11	H. P. Drake	4.7	4,480	May 16	H. P. Drake	3.50	1,850
Dec. 28	do	5.3	5,020	June 11	do	3.16	1,140
29	do	4.5	3,100	11	do	3.16	1,130
				Sept. 4	do	2.22	a 239
1912–13.				4	do	2.22	a 240
Oct. 10	do	2.51	450				
				1913–14.			
May 16	do	3.50	1,720	Apr. 1	do	5.21	6,390

[a] Measurement made by wading at a section about one-half mile above bridge.

Daily gage height, in feet, of Cheat River at Rowlesburg, W. Va., for the years ending Sept. 30, 1912–1914.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1911–12.				1911–12.				1911–12.			
1	.....	4.3	3.4	11	.....	3.0	2.0	21	5.0	3.6	2.5
2	.....	4.2	3.6	12	.....	2.7	2.3	22	6.6	3.2	2.5
3	.....	3.8	3.3	13	.....	2.7	2.1	23	6.5	3.3	2.8
4	.....	3.5	3.0	14	.....	2.5	1.9	24	4.8	3.1	5.5
5	.....	3.3	3.0	15	.....	2.5	2.2	25	13.2	3.0	6.4
6	.....	3.0	2.8	16	.....	3.0	2.3	26	7.2	2.9	4.8
7	.....	3.0	2.6	17	.....	2.7	3.4	27	5.3	2.6	4.1
8	.....	2.9	2.4	18	.....	2.6	3.8	28	4.4	3.5	4.1
9	.....	2.8	2.2	19	7.4	2.4	3.8	29	3.9	3.1	3.6
10	.....	3.1	2.2	20	5.5	3.4	2.8	30	6.1	4.0	3.4
								31	4.8	3.5	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	3.2	2.6	2.3	5.0	4.1	4.35	3.8	3.9	5.5	2.85	3.1	2.25
2	3.1	2.6	2.3	4.2	3.9	3.9	3.6	3.65	4.6	2.65	3.2	2.15
3	3.0	2.5	.....	4.3	3.8	3.55	3.45	3.5	3.9	2.6	3.0	2.1
4	2.8	2.4	3.0	5.3	5.1	3.5	3.35	3.35	3.65	2.5	2.65	2.05
5	2.7	2.3	3.0	4.4	4.7	3.35	3.3	3.1	3.55	2.65	2.5	1.9
6	2.7	2.2	4.1	4.4	4.2	3.2	3.3	3.0	3.4	3.2	2.35	1.9
7	2.5	2.6	4.7	8.4	4.6	3.1	3.2	2.95	3.45	3.25	2.25	2.0
8	2.6	7.2	4.1	8.5	4.3	3.0	3.1	2.85	3.65	3.0	2.35	2.2
9	2.4	5.3	3.7	8.0	4.0	2.95	3.05	2.8	3.7	2.95	2.25	2.55
10	2.2	4.3	3.3	6.6	3.7	3.3	3.0	2.75	3.3	6.0	2.2	2.5
11	2.4	4.3	3.1	5.0	3.55	3.8	3.0	2.65	3.2	5.2	2.4	2.45
12	2.2	3.5	3.0	5.6	5.1	4.9	3.05	2.6	3.0	3.9	2.85	2.35
13	2.0	3.1	2.8	6.5	4.1	4.4	4.0	2.6	2.85	3.8	4.35	2.2
14	1.9	3.1	2.6	5.1	3.6	5.1	4.8	2.65	2.7	5.0	4.8	2.15
15	2.2	3.2	2.5	4.3	3.35	5.8	4.8	3.1	2.65	5.1	3.7	2.1
16	2.4	3.2	2.4	4.1	3.25	5.1	6.1	3.5	2.5	4.6	3.25	2.0
17	2.3	3.0	2.4	4.5	3.2	4.4	5.1	4.05	2.4	5.0	3.05	1.9
18	2.1	2.8	2.3	4.45	3.0	3.95	4.4	4.6	2.35	5.6	2.7	2.35
19	2.1	2.6	2.6	4.4	2.9	3.75	4.0	4.2	2.35	4.5	2.7	2.95
20	2.0	2.5	2.6	4.1	2.95	3.6	3.9	3.7	2.4	3.9	2.9	2.7
21	2.0	2.5	2.5	4.1	3.35	3.45	3.7	3.4	2.15	3.45	2.9	2.65
22	1.9	2.4	2.5	4.05	3.8	3.3	3.5	4.3	2.15	3.25	2.65	4.4
23	2.1	2.3	2.4	3.85	3.8	3.25	3.35	5.8	2.95	3.1	3.0	3.65
24	2.8	2.3	2.3	4.5	3.6	3.2	3.2	7.8	3.65	3.05	3.4	3.15
25	3.4	2.3	2.2	5.1	3.45	3.1	3.15	5.7	3.6	3.25	3.15	2.9
26	3.4	2.6	2.1	4.8	3.3	3.35	3.05	4.6	3.2	3.4	2.75	2.8
27	3.3	2.6	2.2	4.4	3.25	7.0	3.5	6.7	3.45	3.1	2.6	2.65
28	3.1	2.6	2.3	4.0	3.65	7.2	4.35	8.3	3.6	2.9	2.5	2.45
29	2.8	2.5	2.4	3.8	.....	5.4	4.1	6.1	3.15	2.9	2.35	2.3
30	2.7	2.4	2.5	3.55	.....	4.6	4.05	5.8	3.0	2.9	2.35	2.3
31	2.6	.....	6.5	3.55	.....	4.3	.....	7.8	.....	2.8	2.3	.....

Daily gage height, in feet, of Cheat River at Rowlesburg, W. Va., for the years ending Sept. 30, 1912–1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	2.25	3.2	3.25	3.3	6.0	3.5	6.0	3.9	2.0	2.35	2.75	2.95
2	2.5	3.0	3.15	3.2	4.9	3.5	8.0	3.6	2.0	2.2	2.6	2.75
3	3.3	2.95	3.2	3.1	4.35	3.5	7.7	3.45	2.1	2.15	2.5	2.6
4	4.0	2.9	3.4	3.1	4.0	3.5	5.6	3.3	2.4	2.0	2.4	2.5
5	3.5	2.85	3.35	3.1	3.8	3.5	4.6	4.0	2.85	2.45	2.3	2.4
6	3.2	2.7	3.3	3.0	3.5	3.5	4.2	6.1	3.2	3.2	2.3	2.3
7	2.9	2.6	3.95	3.0	3.75	3.5	4.15	5.2	2.95	2.75	2.2	2.3
8	2.8	2.6	5.8	3.05	4.2	3.5	4.8	4.4	2.7	2.55	2.2	2.2
9	3.6	3.25	5.2	4.2	4.1	3.5	5.8	4.0	2.55	2.4	2.1	2.2
10	4.6	4.35	3.9	5.2	3.85	3.5	4.6	3.8	2.4	2.3	2.2	2.2
11	4.0	4.1	3.85	4.35	3.75	3.5	4.25	3.55	2.3	2.25	2.55	2.1
12	3.6	3.9	3.45	3.75	3.6	3.5	3.95	3.4	2.1	2.25	2.85	2.1
13	3.45	6.4	3.3	3.15	3.55	3.5	3.75	3.3	2.1	2.35	3.4	2.0
14	3.25	10.4	3.3	3.0	3.5	3.5	3.7	3.2	2.0	2.7	3.05	2.0
15	3.1	9.0	3.45	2.9	3.5	4.0	5.4	3.1	2.0	4.6	2.75	2.0
16	2.95	11.0	3.5	2.8	3.5	5.3	7.7	3.0	2.0	4.8	2.45	2.0
17	2.9	7.6	3.2	2.8	3.5	6.8	6.5	2.9	1.9	4.05	2.3	1.9
18	3.1	5.8	3.05	2.8	3.5	5.9	5.2	2.8	1.8	3.55	2.3	1.9
19	3.65	4.8	3.3	2.8	6.3	5.0	4.6	2.8	1.85	3.35	2.2	1.8
20	4.8	4.3	3.2	4.7	7.2	4.5	5.8	2.65	2.1	3.1	2.2	1.8
21	5.4	3.9	3.0	7.4	5.3	4.05	6.6	2.55	2.0	2.8	2.1	1.8
22	4.6	3.8	3.05	5.9	4.6	3.6	5.6	2.55	2.05	2.65	2.1	1.7
23	4.2	3.6	3.25	5.0	4.25	3.4	4.4	2.65	2.6	2.5	2.0	1.7
24	5.3	3.5	3.45	5.1	4.0	3.35	4.1	2.5	3.1	2.4	2.15	1.7
25	6.2	3.35	3.8	5.8	3.85	4.5	3.9	2.4	3.5	2.25	2.75	1.7
26	5.5	3.2	4.5	5.2	3.75	6.4	7.5	2.4	3.95	2.7	2.8	1.7
27	5.0	3.2	4.3	4.7	3.5	7.0	6.6	2.3	3.1	3.7	2.85	1.7
28	4.35	3.2	3.95	4.8	3.4	6.8	5.0	2.3	2.85	3.75	3.1	1.6
29	4.0	3.4	3.55	5.1	.....	6.6	4.6	2.3	2.75	4.1	3.45	1.6
30	3.8	3.35	3.4	5.2	.....	5.8	4.2	2.2	2.55	3.3	3.25	1.6
31	3.4	.....	3.3	5.4	.....	5.8	.....	2.15	.....	2.95	3.1	.....

NOTE.—Discharge relation probably affected by ice Feb. 14–18 and Mar. 1–14, 1914.

CHEAT RIVER NEAR MORGANTOWN, W. VA.[1]

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

Drainage area.—1,380 square miles.

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 September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths.

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

Channel and control.—Probably permanent.

Extremes of discharge.—Maximum stage recorded during year: 11.5 feet at 5 p. m. November 16, 1913: discharge, 40,200 second-feet. Minimum stage recorded: 1.92 feet September 26–27, 1914; discharge, 227 second-feet.

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

Accuracy.—Records good.

[1] For history of station see Water-Supply Papers 263 and 283.

Discharge measurements of Cheat River near Morgantown, W. Va., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 3	Peterson and Walters	3.22	1,260
4	do	3.14	1,130
Apr. 2	H. P. Drake[a]	7.54	18,600

[a] Engineer of the West Virginia Development Co.

Daily discharge, in second-feet, of Cheat River near Morgantown, W. Va., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	452	1,730	1,620	1,960	15,200	2,200	9,550	[a]3,340	512	512	758	915
2	[a]538	1,520	1,520	1,730	8,020	1,840	22,300	2,710	452	480	625	710
3	625	1,260	1,840	1,730	5,110	980	20,300	[a]2,280	400	375	545	545
4	3,620	1,120	1,730	1,730	3,790	1,520	13,100	1,840	400	375	480	480
5	2,080	1,040	1,620	1,520	3,300	1,520	8,530	9,040	452	[a]522	425	425
6	1,340	915	1,520	1,340	3,000	1,340	6,021	16,200	980	668	400	375
7	980	860	2,200	1,340	2,860	1,340	4,140	10,600	1,120	860	352	352
8	758	865	12,100	1,340	4,140	1,340	3,960	5,550	758	625	330	400
9	668	1,520	7,000	2,580	3,790	1,340	11,100	3,960	545	545	310	352
10	1,960	5,110	4,700	10,600	3,000	1,180	6,500	3,000	480	452	330	330
11	3,150	3,790	3,620	8,020	2,710	1,120	4,320	2,450	425	425	710	310
12	1,730	3,300	2,860	4,510	2,450	1,620	3,460	2,080	400	375	758	310
13	1,620	5,550	2,200	2,710	5,110	2,320	3,000	1,620	375	352	1,340	290
14	1,340	28,400	1,960	2,320	2,710	1,520	2,580	1,430	352	352	1,180	290
15	1,120	28,400	[a]1,840	1,730	1,520	2,580	3,960	1,260	330	3,460	805	310
16	860	39,600	1,730	1,730	915	12,100	19,200	1,180	330	5,550	585	310
17	805	26,400	1,730	1,620	710	18,700	15,700	980	330	3,790	480	290
18	758	12,600	1,730	1,960	860	16,200	9,550	860	310	1,960	425	272
19	758	8,020	1,730	1,260	11,600	9,550	7,510	758	290	1,430	375	248
20	3,620	5,550	1,730	1,730	22,800	6,020	12,600	668	290	1,180	330	[a]239
21	9,040	3,960	1,520	21,800	11,600	3,460	15,700	668	290	805	310	230
22	6,020	3,000	1,620	14,100	6,500	3,150	9,040	585	310	625	290	241
23	3,620	2,320	1,620	8,020	5,110	2,580	4,700	585	400	512	290	255
24	3,150	2,200	2,860	6,020	3,620	2,320	3,960	545	915	480	272	248
25	14,600	1,840	3,000	11,600	3,300	3,460	3,300	512	1,430	452	1,040	241
26	12,100	1,620	9,550	10,100	2,710	12,100	17,200	512	1,960	400	860	227
27	8,020	1,520	6,500	7,000	2,580	18,200	17,700	512	1,620	805	[a]1,020	227
28	5,110	1,520	3,960	6,020	2,580	16,700	10,100	512	980	2,320	1,180	255
29	3,460	1,520	3,000	8,020	.....	18,200	6,020	452	758	4,140	1,520	238
30	2,580	1,730	2,580	8,530	.....	12,100	3,960	425	625	1,730	1,430	234
31	2,200	.....	2,200	8,530	.....	11,100	.....	452	.....	1,040	1,180	.....

[a] Discharge interpolated.

NOTE.—Daily discharge determined from a rating curve well defined between 115 and 47,800 second-feet. Discharge relation not materially affected by ice; open-water curve used throughout the year.

Monthly discharge of Cheat River near Morgantown, W. Va., for the year ending Sept. 30, 1914.

[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.		
October	14,600	452	3,180	2.30	2.65	A.
November	39,600	805	6,620	4.80	5.36	B.
December	12,100	1,520	3,080	2.23	2.57	A.
January	21,800	1,260	5,260	3.81	4.39	B.
February	22,800	710	5,060	3.67	3.82	B.
March	18,700	980	6,120	4.43	5.11	A.
April	22,300	2,580	9,300	6.74	7.52	A.
May	16,200	425	2,500	1.81	2.09	A.
June	1,960	290	627	.454	.51	A.
July	5,550	352	1,210	.877	1.01	A.
August	1,520	272	675	.489	.56	B.
September	915	227	338	.245	.27	B.
The year	39,600	227	3,650	2.64	35.86	

BLACKWATER RIVER AT HENDRICKS, W. VA.

Location.—At highway bridge at Hendricks, about one-eighth mile above mouth of river.

Drainage area.—148 square miles (determined by West Virginia Development Co.).

Records available.—October 13, 1911, to September 30, 1914.

Gage.—Standard chain gage attached to upstream side of bridge; read morning and evening, as follows: October to December, 1911, to half-tenths; January, 1912, to September, 1914, to tenths.

Discharge measurements.—Made from bridge at all except low stages, when they are made by wading.

Channel and control.—Coarse gravel and stones; may shift slightly during high floods.

Winter flow.—Probably not affected by ice except during extremely cold weather.

Accuracy.—On account of the uncertainty of corrections to gage readings, records from May 1, 1912, to March 31, 1913, may not be as accurate as those for other periods.

Cooperation.—Station maintained and records furnished by the West Virginia Development Co.

Discharge measurements of Blackwater River at Hendricks, W. Va., during the years ending Sept. 30, 1912–1914.

[Made by H. P. Drake.[a]]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1911–12.	*Feet.*	*Sec.-ft.*	1912–13—Contd.	*Feet.*	*Sec.-ft.*	1913–14—Contd.	*Feet.*	*Sec.-ft.*
Oct. 13	3.02	455	Sept. 5	1.77	19.4	Nov. 17	5.06	3,210
Dec. 11	2.50	192	5	1.77	19.4	17	4.87	2,650
July 20	3.49	927				17	4.87	2,650
20	3.56	946	1913–14.			18	4.03	1,320
			Oct. 21	3.97	1,170	18	4.03	1,320
1912–13.			21	3.97	1,180	Mar. 28	5.27	3,900
May 10	2.28	131	23	3.23	551	28	5.27	3,900
10	2.28	132	23	3.23	550	31	3.89	1,210
June 12	2.25	127	Nov. 17	5.06	3,240	31	3.89	1,200
12	2.25	126						

[a] Engineer of the West Virginia Development Co.

Daily discharge, in second-feet, of Blackwater River at Hendricks, W. Va., for the years ending Sept. 30, 1912–1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.												
1	.....	173	200	1,200	363	430	559	258	48	69	258	492
2	.....	160	230	559	314	333	559	230	30	58	169	492
3	.....	142	200	461	287	230	842	193	30	48	169	314
4	.....	131	173	384	230	193	709	207	39	69	169	230
5	.....	131	160	.....	.....	200	526	207	30	69	52	249
6	.....	200	160	.....	.....	200	752	173	48	461	48	249
7	.....	937	160	.....	.....	200	1,200	200	48	80	52	160
8	.....	492	160	.....	.....	323	1,260	287	48	80	30	145
9	.....	300	173	.....	.....	752	631	292	48	104	92	117
10	.....	245	183	.....	.....	430	237	752	30	69	131	104
11	.....	207	193	.....	.....	287	151	937	145	80	117	92
12	.....	218	200	.....	.....	278	166	1,090	145	595	131	145
13	430	230	200	.....	.....	888	193	709	131	492	131	104
14	384	207	193	.....	.....	[a] 595	200	314	145	461	131	92
15	888	207	323	.....	.....	4,080	200	314	145	363	559	117
16	709	258	842	.....	.....	2,560	230	249	160	211	270	888
17	461	218	670	.....	.....	1,310	237	595	363	1,140	160	249
18	1,890	1,140	430	.....	.....	888	795	292	631	2,070	176	193
19	937	752	237	.....	.....	[a] 752	709	211	595	1,890	292	176
20	559	1,090	173	752	595	1,890	300	526	670	752	888	131
21	413	492	230	419	631	1,890	237	176	670	888	338	80
22	363	237	258	323	937	1,890	230	48	709	986	160	48
23	461	230	1,090	287	559	795	278	80	888	[b] 3,000	270	314
24	333	314	559	258	402	1,720	245	39	842	1,370	270	1,640
25	278	270	492	218	348	1,370	200	30	888	2,990	193	1,720
26	230	207	795	173	2,990	709	193	30	249	2,780	230	1,040
27	207	230	1,570	173	3,330	492	258	54	230	338	314	1,090
28	200	363	752	207	1,430	461	230	52	230	176	249	526
29	183	430	492	631	752	2,460	200	52	211	169	1,260	419
30	166	222	430	986	.....	2,560	258	50	211	169	842	492
31	151	.....	2,460	559	.....	752	.....	48	.....	183	390	.....
1912–13.												
1	310	128	114	461	795	526	353	262	1,570	136	109	25
2	226	190	128	379	282	305	282	204	631	109	109	25
3	190	142	413	842	407	241	241	169	461	109	84	25
4	173	114	266	752	.....	222	204	169	300	84	84	25
5	157	102	358	595	.....	241	241	169	258	122	62	25
6	142	89	795	1,640	.....	204	204	139	218	631	62	25
7	142	1,040	752	3,820	.....	154	204	139	258	278	62	122
8	128	1,500	526	3,820	.....	186	169	139	492	122	62	136
9	114	1,040	245	1,980	.....	204	169	112	300	122	62	84
10	114	595	142	670	.....	430	169	112	183	2,560	42	62
11	102	310	142	937	559	986	222	86	136	631	25	42
12	102	245	142	1,370	670	631	305	84	114	323	96	42
13	128	226	142	795	305	353	795	73	136	323	1,200	42
14	114	310	142	595	241	1,430	461	122	109	2,460	323	42
15	114	245	142	379	204	1,200	752	348	109	1,310	136	42
16	102	190	142	937	186	795	752	373	109	631	84	73
17	89	173	142	842	241	526	461	492	84	1,200	84	96
18	89	173	142	752	186	305	353	526	84	1,570	62	200
19	157	142	226	595	186	328	282	300	62	709	62	151
20	173	142	173	379	241	222	262	218	62	373	42	109
21	142	142	142	282	492	241	241	237	62	258	62	2,070
22	102	142	142	353	595	204	204	595	96	218	136	1,430
23	266	142	142	407	430	186	186	2,160	278	430	300	492
24	461	142	142	595	328	169	169	2,560	559	2,070	151	166
25	413	142	114	795	262	169	169	1,200	258	795	96	109
26	310	114	114	595	204	461	139	559	166	218	62	84
27	266	114	142	559	282	2,990	407	2,780	1,040	136	42	62
28	226	114	142	353	670	1,200	379	2,360	430	122	42	62
29	173	114	142	262	.....	709	407	1,090	218	136	42	42
30	173	114	888	204	.....	492	353	670	166	136	42	42
31	142	.....	842	1,140	.....	407	.....	3,100	.....	109	42	.....

[a] Discharge estimated by adding 1 foot to observer's gage reading. [b] Discharge estimated.

Daily discharge, in second-feet, of Blackwater River at Hendricks, W. Va., for the years ending Sept. 30, 1912–1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913-14.												
1	109	258	166	160	1,200	305	795	348	42	84	136	84
2	166	200	166	160	752	305	3,570	278	25	84	109	84
3	1,570	166	200	160	430	262	2,070	237	25	62	109	62
4	559	200	200	193	358	262	795	218	25	62	84	62
5	430	166	166	160	310	262	402	709	888	42	84	42
6	300	136	166	160	310	186	430	1,430	237	42	84	42
7	200	109	2,160	160	384	204	373	526	136	42	62	25
8	136	122	1,090	160	245	262	526	323	109	25	52	25
9	1,310	200	559	363	157	262	461	237	109	25	42	42
10	1,200	348	430	1,140	207	204	373	200	84	46	42	42
11	526	492	278	492	190	183	323	166	84	39	109	62
12	402	348	278	338	226	151	278	136	62	25	278	109
13	526	1,720	237	292	266	151	278	166	62	62	200	84
14	402	5,680	237	249	266	151	218	166	42	323	109	62
15	323	4,340	200	193	266	258	559	136	42	1,090	84	62
16	183	5,950	166	176	262	842	2,670	136	42	888	84	84
17	136	3,100	218	193	262	1,500	1,310	136	25	559	84	84
18	430	1,200	237	160	305	1,370	709	109	25	323	84	136
19	526	559	237	193	3,330	595	461	84	25	183	62	109
20	1,890	430	237	1,890	1,640	461	1,200	84	25	96	62	109
21	1,370	373	278	3,570	670	348	1,200	84	25	62	42	84
22	430	323	278	1,370	305	278	559	109	25	62	42	62
23	258	402	300	492	262	258	348	109	84	62	42	84
24	1,890	348	373	670	262	402	258	84	278	73	25	109
25	2,070	278	323	1,260	305	595	278	84	200	166	42	84
26	1,040	237	461	631	305	2,780	3,820	84	122	109	136	62
27	461	200	278	595	305	2,560	1,890	62	84	166	166	62
28	373	200	183	888	305	3,570	709	62	62	1,640	136	42
29	323	166	166	1,200	.....	2,260	492	62	62	631	200	42
30	402	166	136	1,200	.....	1,260	402	42	42	237	278	42
31	348	.....	166	1,260	.....	986	.....	42	.....	166	136	.....

NOTE.—Daily discharge determined from a rating curve well defined between 25 and 4,340 second-feet Discharge estimated, because of ice, from gage heights, observer's notes, and climatic records, as follows: Jan. 5–19, 1912, 300 second-feet; Feb. 5–19, 1912, 200 second-feet; Feb. 4–10, 1913, 260 second-feet.

Monthly discharge of Blackwater River at Hendricks, W. Va., for the years ending Sept. 30, 1912–1914.

[Drainage area, 148 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1911-12.						
October 13–31	1,890	151	486	3.29	2.32	B.
November	1,140	131	348	2.35	2.62	A.
December	2,460	160	464	3.14	3.62	B.
January	.....	.....	390	2.64	3.04	C.
February	3,330	.....	558	3.77	4.07	C.
March	4,080	193	1,030	6.96	8.02	B.
April	1,260	151	426	2.88	3.21	B.
May	1,090	30	280	1.89	2.18	
June	888	30	289	1.95	2.18	
July	[a] 3,000	48	716	4.84	5.58	
August	1,260	30	276	1.86	2.14	
September	1,720	48	404	2.73	3.05	

[a] Estimated.

Monthly discharge of Blackwater River at Hendricks, W. Va., for the years ending Sept. 30, 1912–1914—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1912–13.						
October	461	89	179	1.21	1.40	
November	1,500	89	279	1.89	2.11	
December	888	114	265	1.79	2.06	
January	3,820	204	906	6.12	7.06	
February	795	.....	342	2.31	2.40	
March	2,990	154	539	3.64	4.20	
April	795	139	318	2.15	2.40	B.
May	3,100	73	695	4.70	5.42	A.
June	1,570	62	298	2.01	2.24	A.
July	2,560	84	595	4.02	4.64	B.
August	1,200	25	125	.845	.97	A.
September	2,070	25	198	1.34	1.50	B.
The year	3,820	25	397	2.68	36.40	
1913–14.						
October	2,070	109	654	4.42	5.10	B.
November	5,950	109	947	6.40	7.14	A.
December	2,160	136	341	2.30	2.65	B.
January	3,570	160	649	4.39	5.06	B.
February	3,330	157	503	3.40	3.54	C.
March	3,570	151	757	5.11	5.89	B.
April	3,820	218	925	6.25	6.97	B.
May	1,430	42	214	1.45	1.67	A.
June	888	25	103	.696	.78	B.
July	1,640	25	241	1.63	1.88	B.
August	278	25	103	.696	.80	A.
September	136	25	69.5	.470	.52	A.
The year	5,950	25	458	3.09	42.00	

SHAVERS FORK AT PARSONS, W. VA.

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

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

Records available.—October 14, 1910, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to tenths. Sea-level elevation of zero of gage, 1,631.70 feet.

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

Channel and control.—Channel rocky. Control, coarse gravel and rocks; probably permanent. Levels run September 4, 1912, indicate that there would be no flow past the gage if the river were to fall to a stage of 1.8 feet ±0.2 foot. On November 8, 1913, this stage was found to be 1.9 feet ±0.1 foot.

Extremes of discharge.—Maximum stage recorded during year: 8.6 feet at 5 p. m. November 16; discharge 9,180 second-feet. Minimum stage recorded: 2.2 feet, September 25; discharge 4 second-feet. High waters of 1888 and 1907 reached a height of approximately 12.5 feet referred to present gage datum.

Winter flow.—Discharge relation affected by ice during severe winters.

Accuracy.—Records fair.

Discharge measurements of Shavers Fork at Parsons, W. Va., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	H. P. Drake [a]	4.13	846	Mar. 30	H. P. Drake [a]	5.18	2,320
22	do	4.13	844	30	do	5.18	2,320
Nov. 8	Peterson and Walters	3.28	175				

[a] Engineer of the West Virginia Development Co.

Daily discharge, in second-feet, of Shavers Fork at Parsons, W. Va., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	100	520	440	440	.....	295	3,260	480	34	144	113	88
2	128	440	440	365	.....	208	4,000	365	28	88	88	68
3	365	330	480	264	.....	183	3,000	233	34	88	88	52
4	605	164	480	233	.....	144	1,590	208	52	68	68	52
5	440	128	402	183	.....	183	1,140	295	60	88	68	68
6	264	113	365	.....	.....	233	750	2,140	295	108	78	52
7	183	144	605	.....	.....	183	562	1,320	113	128	68	52
8	144	164	480	.....	.....	183	605	750	78	113	60	52
9	264	233	264	.....	.....	144	2,360	520	60	68	68	52
10	800	264	233	.....	520	144	2,070	295	52	52	88	46
11	520	562	183	.....	440	183	1,320	233	46	52	78	46
12	520	520	144	.....	365	144	605	208	34	52	113	39
13	440	1,460	164	.....	330	183	520	183	28	68	164	28
14	330	5,170	183	.....	264	233	480	183	19	128	100	39
15	264	5,070	330	.....	233	365	905	208	19	905	88	39
16	233	8,460	330	.....	208	1,080	3,080	208	12	1,390	68	39
17	208	4,180	295	.....	183	1,720	2,290	183	12	480	68	39
18	233	1,790	295	.....	295	1,460	1,520	128	19	295	52	28
19	295	1,320	233	.....	1,660	1,390	800	113	19	233	68	19
20	1,320	960	183	.....	4,090	905	2,220	100	28	208	52	19
21	1,860	800	113	.....	2,070	905	2,360	88	19	183	52	19
22	960	700	164	.....	700	905	905	78	28	128	56	16
23	800	605	233	.....	562	480	852	65	60	88	60	12
24	1,320	480	233	.....	365	562	800	52	1,200	88	64	7
25	3,170	402	183	.....	365	1,460	960	39	1,080	68	68	4
26	2,830	330	1,020	.....	330	3,000	5,070	46	1,200	88	88	7
27	1,390	295	905	.....	365	3,080	3,350	46	1,140	88	164	7
28	1,020	365	800	.....	365	3,350	1,320	46	800	365	233	7
29	750	440	700	.....	.....	3,350	905	52	233	144	164	7
30	700	365	700	.....	.....	1,930	750	46	183	113	144	12
31	605	.....	480	.....	.....	3,350	.....	39	.....	88	113	.....

NOTE.—Daily discharge determined from a rating curve well defined between 39 and 7,740 second-feet. Open-water rating curve used throughout the year; discharge relation probably not materially affected by ice. No record January 6 to February 9.

Monthly discharge of Shavers Fork at Parsons, W. Va., for the year ending Sept. 30, 1914.

[Drainage area 210 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	3,170	100	744	3.54	4.08	B.
November	8,460	113	1,230	5.86	6.54	B.
December	1,020	113	389	1.85	2.13	B.
February 10-28	4,090	183	722	3.44	2.43	C.
March	3,350	144	1,030	4.90	5.65	B.
April	5,070	480	1,680	8.00	8.93	B.
May	2,140	39	289	1.38	1.59	B.
June	1,200	12	233	1.11	1.24	B.
July	1,390	52	200	.952	1.10	B.
August	233	52	91.7	.437	.50	B.
September	88	4	33.8	.161	.18	C.

BIG SANDY CREEK AT ROCKVILLE, W. VA.

Location.—At the highway bridge at Rockville, about 5 miles above mouth of creek and 6 miles below Bruceton Mills.

Drainage area.—202 square miles (determined by West Virginia Development Co.).

Records available.—May 7, 1909, to September 30, 1914.

Gage.—Standard chain gage attached to downstream side of bridge; read morning and evening, as follows: May to October, 1909, to hundredths; November, 1909, to September, 1914, to half-tenths.

Discharge measurements.—Made from bridge at all except low stages when they are made by wading.

Channel and control.—Channel bed consists of bowlders and bed rock. Control practically permanent.

Winter flow.—Probably not affected by ice except during periods of extremely cold weather.

Regulation.—Gristmills at Rockville, Clifton Mills, and Bruceton Mills, operated by water power, may produce fluctuations in stage during low water.

Accuracy.—Conditions favorable for good results.

Cooperation.—Station maintained by the West Virginia Development Co., which has furnished results of discharge measurements and gage-height record.

Discharge measurements of Big Sandy Creek at Rockville, W. Va., during the years ending Sept. 30, 1909–1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1908-9.		*Feet.*	*Sec.-ft.*	1911-12.		*Feet.*	*Sec.-ft.*
May 12	Hammel and Lenhardt.	4.92	225	Dec. 28	H. P. Drake	7.30	1,600
25	Scheidenhelm and Hammel	4.32	104	Feb. 27	do	8.69	3,550
June 2	Hammel and Spiker	6.62	842	28	do	7.32	1,540
5	V. F. Hammel	10.50	6,970	Aug. 29	do	6.72	958
18	F. W. Scheidenhelm	6.45	791	29	do	6.72	957
July 14	V. F. Hammel	3.98	67.4	1912-13.			
1911-12.				Oct. 8	do	4.57	132
Dec. 8	H. P. Drake	5.00	226	May 15	do	5.22	275
8	do	5.10	262	15	do	5.22	277
9	do	5.30	331	June 10	do	4.64	135
9	do	5.32	342	10	do	4.64	137
28	do	7.34	1,620	Sept. 3	do	3.18	11.2
				3	do	3.18	11.2

NOTE.—Measurements made by engineers of the West Virginia Development Co.

Daily discharge, in second-feet, of Big Sandy Creek at Rockville, W. Va., for the years ending Sept. 30, 1909–1914.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1908-9.						1908-9.					
1	.....	262	276	102	65	16	168	276	37	20	26
2	.....	862	189	65	44	17	149	366	26	124	20
3	.....	505	140	41	33	18	132	931	17	89	16
4	.....	415	109	31	72	19	116	486	32	60	13
5	.....	2,640	102	22	102	20	124	334	20	64	10
6	.....	2,640	77	31	77	21	116	236	14	744	10
7	398	862	60	33	72	22	116	200	17	249	13
8	382	800	48	17	51	23	102	290	96	140	14
9	319	800	59	10	47	24	102	304	83	102	83
10	334	931	43	33	38	25	89	200	89	67	39
11	319	1,560	24	18	38	26	83	140	63	56	22
12	224	931	38	10	24	27	132	189	32	56	28
13	200	648	77	8	18	28	189	200	38	52	18
14	189	505	83	8	16	29	178	1,010	34	102	38
15	168	415	54	10	16	30	140	486	89	109	16
						31	132	.....	158	72	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1909-10.												
1	33	96	65	450	398	3,080	109	290	800	96	48	56
2	16	89	28	1,430	290	2,360	89	249	1,950	83	41	77
3	11	46	32	6,920	450	1,430	83	209	1,010	124	16	319
4	8	77	46	2,500	486	931	116	200	694	149	11	415
5	7	65	35	1,200	486	800	132	168	800	109	15	200
6	7	77	32	2,080	398	694	116	149	2,080	132	14	140
7	7	58	46	2,640	262	648	116	140	1,010	319	10	415
8	7	83	276	1,200	334	524	132	67	648	382	10	168
9	6	124	189	744	398	382	116	224	524	189	10	132
10	6	116	212	524	564	350	116	200	1,430	189	10	124
11	12	124	262	319	450	276	102	415	1,310	236	17	89
12	124	102	168	415	450	249	109	1,560	931	189	15	67
13	96	89	334	350	398	212	89	862	694	398	9	52
14	58	77	1,200	1,690	319	200	77	544	544	350	8	102
15	58	77	564	862	304	178	96	432	415	236	8	72
16	56	67	415	564	1,690	189	96	366	398	189	11	67
17	17	83	236	524	2,080	189	116	304	432	149	14	40
18	15	48	200	7,970	1,690	149	132	334	524	124	14	33
19	34	60	200	4,230	862	132	140	304	9,020	96	19	28
20	36	60	290	1,430	648	140	168	249	1,430	89	18	19
21	58	46	432	2,220	1,690	149	486	334	862	62	10	20
22	77	62	415	2,080	4,760	140	648	290	605	43	17	19
23	132	67	432	1,010	2,220	140	432	276	450	37	21	15
24	524	102	382	694	1,560	124	564	224	382	14	13	12
24	350	67	432	544	605	132	862	334	319	34	10	9
26	236	77	366	468	564	109	931	334	200	23	13	7
27	168	89	382	1,560	800	132	694	290	189	18	11	14
28	132	41	319	1,010	2,640	109	524	236	212	20	9	8
29	116	46	249	800	.....	102	432	212	189	26	10	8
30	89	58	450	648	.....	102	366	212	116	36	6	13
31	63	.....	524	486	.....	109	.....	276	.....	30	5	.....

Daily discharge, in second-feet, of Big Sandy Creek at Rockville, W. Va., for the years ending Sept. 30, 1909–1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1910–11.												
1	11	26	262	1,310	1,010	648	468	505	96	304	34	1,820
2	11	42	236	1,820	862	524	450	1,100	72	189	20	800
3	12	14	212	2,080	648	415	564	648	48	158	56	450
4	11	8	168	1,100	1,100	350	931	505	26	132	56	304
5	9	7	178	694	800	304	4,580	398	33	96	31	224
6	9	9	168	694	648	564	2,640	319	54	83	54	694
7	13	8	200	524	605	648	2,080	276	178	212	48	505
8	14	17	200	350	505	564	1,560	236	224	415	46	505
9	13	14	189	605	564	564	1,820	212	96	290	83	800
10	8	14	262	366	524	862	1,310	200	61	109	83	862
11	9	12	189	432	366	800	862	178	54	83	43	862
12	12	16	189	1,310	398	648	648	149	224	83	37	544
13	33	17	236	18,600	415	648	564	140	334	564	43	366
14	8	12	200	3,720	605	564	605	124	524	200	149	304
15	5	14	178	2,930	862	505	1,200	124	200	116	694	1,950
16	7	14	212	1,950	648	450	800	109	149	89	648	3,230
17	4	10	212	931	544	319	694	89	319	72	249	2,080
18	5	14	200	694	544	468	524	89	4,580	67	140	800
19	6	19	415	505	564	564	486	58	1,430	41	89	744
20	8	22	544	382	524	1,430	1,200	62	605	41	67	862
21	7	17	505	450	468	862	1,310	62	382	212	83	744
22	8	23	544	605	432	744	1,100	72	262	66	50	605
23	11	23	382	505	415	648	1,430	61	189	30	38	450
24	11	26	1,430	334	382	415	1,010	83	168	72	29	334
25	9	25	744	334	382	366	694	58	189	89	50	262
26	8	52	524	744	744	350	605	72	505	52	432	224
27	8	96	432	1,430	1,200	334	486	54	1,690	31	236	168
28	19	694	334	2,220	931	304	415	31	1,100	26	249	189
29	20	800	2,080	2,080	.....	276	415	50	648	14	3,890	744
30	24	450	4,400	7,550	.....	398	432	50	366	10	4,230	800
31	44	.....	1,950	2,080	.....	505	.....	72	.....	18	4,230	.....
1911–12.												
1	505	319	382	1,690	382	648	694	1,010	116	1,100	299	523
2	2,220	158	334	800	366	398	648	800	96	564	215	3,720
3	1,310	140	290	694	236	382	744	648	102	382	191	1,820
4	931	132	262	648	200	398	564	486	96	694	150	862
5	648	132	224	382	.....	319	524	398	72	648	118	543
6	505	212	168	262	.....	224	468	382	72	415	104	395
7	1,690	648	224	.....	.....	262	486	648	72	262	98	330
8	1,310	486	224	.....	.....	334	544	432	140	189	85	255
9	694	415	319	.....	.....	564	486	398	44	149	85	203
10	605	350	382	.....	.....	468	432	319	48	124	58	126
11	744	290	290	.....	.....	450	398	334	67	116	111	111
12	931	319	334	.....	.....	432	350	334	36	140	180	126
13	744	350	366	.....	149	1,010	366	450	56	124	118	104
14	564	304	319	.....	140	744	366	382	48	72	111	104
15	1,200	319	1,690	.....	109	4,400	366	350	62	65	543	74
16	1,010	290	2,930	.....	62	2,780	334	2,500	168	2,500	241	104
17	862	262	1,690	.....	96	1,560	366	1,820	450	1,560	150	104
18	3,890	862	862	524	116	1,010	1,200	800	249	931	126	85
19	1,690	800	648	2,780	200	744	744	648	158	1,560	447	299
20	1,010	648	432	1,200	605	1,690	544	544	124	648	1,310	169
21	648	524	486	744	1,690	13,500	468	450	109	1,200	633	111
22	1,100	415	564	524	1,820	5,510	432	366	189	2,500	362	79
23	564	319	862	544	744	1,950	415	304	276	1,010	378	633
24	648	450	800	564	564	3,230	334	236	149	10,300	269	2,780
25	350	486	744	544	544	2,500	319	200	124	6,100	203	1,200
26	319	450	1,560	450	3,390	1,010	290	168	124	1,690	543	862
27	290	486	3,890	366	4,940	862	1,430	158	178	862	484	2,780
28	262	524	1,430	249	1,430	648	1,200	140	109	503	255	1,010
29	224	505	862	350	862	1,430	862	168	96	684	586	633
30	189	415	694	432	.....	1,690	1,200	168	3,890	633	395	465
31	189	.....	2,780	415	.....	931	.....	149	.....	798	412	.....

Daily discharge, in second-feet, of Big Sandy Creek at Rockville, W. Va., for the years ending Sept. 30, 1909–1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	346	142	68	1,010	633	739	503	395	1,430	126	191	8.4
2	284	133	118	798	412	633	503	346	862	118	91	11
3	215	150	284	2,500	543	503	862	284	543	98	63	8.4
4	191	133	203	1,820	633	447	586	255	412	91	52	8.0
5	169	98	241	586	523	314	523	203	314	74	47	7.0
6	133	104	543	633	412	395	412	191	269	98	56	6.0
7	126	284	633	5,900	346	284	378	180	241	118	36	6.0
8	203	1,010	465	7,550	228	255	314	180	269	79	27	7.0
9	91	633	378	2,640	269	346	269	150	169	68	22	10
10	79	412	228	1,200	203	465	228	150	150	862	20	8.0
11	74	314	241	2,780	429	1,200	269	133	133	314	16	9.0
12	63	269	191	8,390	1,010	862	503	126	126	269	52	10
13	58	215	118	2,780	684	1,010	484	111	111	169	104	10
14	91	299	203	1,200	465	1,010	465	126	118	543	68	12
15	91	299	299	739	429	862	523	284	91	1,100	43	9.0
16	45	241	241	862	447	739	586	412	58	523	43	8.0
17	35	228	126	1,010	330	543	484	378	63	525	35	10
18	49	215	142	1,690	269	362	378	314	63	586	29	6.0
19	51	191	299	1,200	269	299	362	255	68	395	24	21
20	45	191	269	1,430	346	346	314	215	63	269	20	19
21	85	118	191	931	523	378	269	284	126	203	16	31
22	68	91	111	798	633	255	241	1,690	118	142	14	41
23	104	133	150	862	633	241	215	4,760	111	104	14	38
24	150	126	150	1,820	503	255	180	3,550	160	118	10	26
25	633	241	126	1,100	378	228	160	1,310	330	142	16	21
26	633	104	91	739	346	1,200	169	1,010	1,200	85	13	14
27	378	126	191	543	378	5,130	395	3,080	633	68	20	14
28	269	104	314	447	1,010	2,220	395	3,720	503	74	18	9.0
29	215	118	299	447	.....	1,430	523	1,690	228	63	14	7.0
30	180	79	2,220	429	.....	633	465	4,060	160	53	10	8.0
31	133	.....	2,500	523	.....	633	.....	4,400	.....	228	6.4	.....
1913–14.												
1	17	314	142	284	798	284	684	150	142	29	5.4	9.6
2	38	228	126	228	684	255	4,400	104	91	13	4.7	7.4
3	142	203	142	228	586	269	2,080	85	55	8.8	7.4	4.2
4	104	180	133	255	429	203	1,010	118	79	6.0	5.4	2.9
5	54	160	142	241	395	160	862	798	543	4.9	7.4	3.2
6	40	133	142	215	314	150	684	1,950	284	4.5	6.4	1.7
7	26	111	180	228	255	169	586	1,560	180	5.4	5.4	9.6
8	19	150	362	269	269	169	543	798	104	4.5	7.4	11
9	14	241	633	633	284	169	523	465	74	6.0	7.4	20
10	13	412	465	1,430	255	160	484	330	58	4.7	14	13
11	17	362	362	739	228	203	429	269	51	5.4	68	9.6
12	23	395	314	586	215	203	362	228	43	6.4	104	8.4
13	19	1,950	314	346	150	169	429	215	35	10	74	7.4
14	14	7,130	269	.....	.....	180	362	191	29	11	58	5.4
15	17	3,720	284	.....	.....	395	739	169	20	11	39	6.4
16	14	9,880	269	.....	.....	3,080	3,720	180	17	9.6	24	6.4
17	10	4,760	255	.....	.....	4,230	1,010	169	15	18	14	4.2
18	14	1,310	228	.....	191	1,100	633	142	14	14	6.4	2.5
19	26	684	203	203	3,550	739	1,100	118	20	10	5.4	.9
20	378	523	180	412	2,080	633	1,560	104	24	8.4	4.5	1.2
21	314	412	191	362	862	633	798	98	16	6.4	3.5	1.2
22	255	228	215	284	523	447	739	91	18	4.5	2.7	4.2
23	180	284	362	255	412	378	684	79	24	4.1	1.7	3.2
24	180	228	447	299	299	362	543	74	17	3.5	1.7	5.4
25	465	150	684	931	269	633	633	74	14	4.5	180	4.2
26	1,430	150	1,430	739	378	1,950	3,720	68	16	4.2	111	2.2
27	684	169	1,200	633	284	1,690	1,560	68	32	7.4	79	2.7
28	633	180	1,100	684	299	1,200	633	74	58	79	43	1.2
29	523	160	739	798	.....	684	586	98	47	43	22	2.2
30	412	150	543	633	.....	633	330	74	43	22	16	3.2
31	346	.....	395	633	.....	429	.....	51	.....	8.4	13	.....

NOTE.—Daily discharge determined as follows: May 7, 1909, to July 24, 1912, from a rating curve well defined between 58 and 7,970 second-feet and poorly defined below 58 second-feet; July 25, 1912, to Sept. 30, 1914, from a rating curve fairly well defined between 9 and 58 second-feet and well defined between 58 and 7,970 second-feet. Discharge estimated, because of ice, from gage heights, and climatic records as follows: Jan. 7–17, 1912, 300 second-feet; Feb. 5–12, 1912, 200 second-feet; Jan. 14–18, 1914, 200 second-feet; and Feb. 14–17, 1914, 150 second-feet.

Monthly discharge of Big Sandy Creek at Rockville, W. Va., for the years ending Sept. 30, 1909–1914.

[Drainage area, 202 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908–9.						
May 7–31	398	83	184	0.911	0.85	B.
June	2,640	140	681	3.37	3.76	B.
July	276	14	71.7	.355	.41	A.
August	744	8	82.1	.406	.47	B.
September	102	10	36.0	.178	.20	C.
1909–10.						
October	524	6	82.5	.408	.47	C.
November	124	41	75.8	.375	.42	B.
December	1,200	28	297	1.47	1.70	C.
January	7,970	319	1,600	7.92	9.13	C.
February	4,760	262	993	4.92	5.12	C.
March	3,080	102	466	2.31	2.66	B.
April	931	77	273	1.35	1.51	B.
May	1,560	67	331	1.64	1.89	B.
June	9,020	116	1,010	5.00	5.58	B.
July	398	14	135	.668	.77	B.
August	48	5	14.3	.071	.08	D.
September	415	7	91.3	.452	.50	B.
The year	9,020	5	443	2.19	29.83	
1910–11.						
October	44	4	12.2	.060	.07	D.
November	800	7	83.8	.415	.46	C.
December	4,400	168	580	2.87	3.31	B.
January	18,600	334	1,910	9.46	10.91	B.
February	1,200	366	632	3.13	3.26	C.
March	1,430	276	550	2.72	3.14	B.
April	4,580	415	1,060	5.25	5.86	B.
May	1,100	31	200	.990	1.14	B.
June	4,580	26	494	2.45	2.73	B.
July	564	10	128	.634	.73	B.
August	4,230	20	522	2.58	2.97	B.
September	3,230	168	774	3.83	4.27	B.
The year	18,600	4	579	2.87	38.85	
1911–12.						
October	3,890	189	898	4.45	5.13	B.
November	862	132	400	1.98	2.21	A.
December	3,890	168	872	4.32	4.98	A.
January	2,780	.....	563	2.79	3.22	C.
February	4,940	62	698	3.46	3.73	C.
March	13,500	224	1,680	8.32	9.59	B.
April	1,430	290	586	2.90	3.24	B.
May	2,500	140	522	2.58	2.97	B.
June	3,890	36	251	1.24	1.38	B.
July	10,300	65	1,240	6.14	7.08	B.
August	1,310	58	299	1.48	1.71	B.
September	3,720	74	687	3.40	3.79	B.
The year	13,500	36	728	3.60	49.03	

Monthly discharge of Big Sandy Creek at Rockville, W. Va., for the years ending Sept. 30, 1909–1914—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1912–13.						
October	633	35	171	0.847	0.98	B.
November	1,010	79	227	1.12	1.25	A.
December	2,500	68	375	1.86	2.14	B.
January	8,390	429	1,790	8.86	10.22	B.
February	1,010	203	474	2.35	2.45	C.
March	5,130	228	781	3.87	4.46	B.
April	862	160	399	1.98	2.21	B.
May	4,760	111	1,100	5.45	6.28	A.
June	1,430	58	304	1.50	1.67	A.
July	1,100	53	248	1.23	1.42	B.
August	191	6.4	38.4	.190	.22	C.
September	41	6.0	13.4	.066	.07	B.
The year	8,390	6.0	496	2.46	33.37	
1913–14.						
October	1,430	10	207	1.02	1.18	B.
November	9,880	111	1,170	5.79	6.46	B.
December	1,430	126	402	1.99	2.29	B.
January	1,430	.....	437	2.16	2.49	C.
February	3,550	.....	522	2.58	2.69	C.
March	4,230	150	708	3.50	4.04	B.
April	4,400	330	1,080	5.35	5.97	B.
May	1,950	51	290	1.44	1.66	B.
June	543	14	72.1	.357	.40	B.
July	79	3.5	12.2	.060	.07	C.
August	180	1.7	30.4	.150	.17	B.
September	20	.9	5.49	.027	.03	D.
The year	9,880	.9	408	2.02	27.45	

BEAVER RIVER BASIN.

BEAVER RIVER AT WAMPUM, PA.

Location.—At highway bridge about 200 feet above the Pennsylvania Railroad bridge and about 500 feet below the Pittsburgh & Lake Erie Railroad station.

Drainage area.—2,220 square miles.

Records available.—June 29 to September 30, 1914.

Gage.—Vertical staff attached to upstream end of left pier; read morning and evening to quarter-tenths.

Discharge measurements.—Made from upstream side of bridge; at low stages by wading.

Channel and control.—Rocky; probably permanent.

Winter flow.—Discharge relation probably affected by ice.

Accuracy.—Results good.

Discharge measurements of Beaver River at Wampum, Pa., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 30	C. E. Ellsworth	0.76	312
Aug. 29	R. M. Adams	1.15	598
Sept. 17	C. E. Ellsworth	.27	147

Daily discharge, in second-feet, of Beaver River at Wampum, Pa., for the year ending Sept. 30, 1914.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	292	141	274	11	159	156	189	21	484	156	122
2	308	133	641	12	154	164	173	22	357	168	122
3	292	144	887	13	156	173	164	23	313	274	133
4	261	146	1,060	14	302	302	166	24	223	323	131
5	248	141	605	15	323	257	176	25	220	382	129
6	240	133	364	16	632	213	159	26	189	729	122
7	220	125	302	17	952	173	154	27	178	623	124
8	213	114	244	18	952	168	150	28	173	382	122
9	181	154	209	19	729	173	154	29	154	605	122
10	168	154	206	20	623	166	135	30	154	495	124
								31	146	385	.....

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Beaver River at Wampum, Pa., for the year ending Sept. 30, 1914.

[Drainage area, 2,220 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
July	952	146	322	0.145	0.17	A.
August	729	114	253	.114	.13	A.
September	1,060	122	255	.115	.13	A.

CONNOQUENESSING CREEK NEAR ELLWOOD CITY, PA.

Location.—About 150 feet above mouth of Duck Run, 1 mile below Slippery Rock Creek, and 1½ miles from Ellwood City.

Drainage area.—829 square miles.

Records available.—July 1 to September 30, 1914.

Gage.—In two sections. Lower section, a sloping gage reading from 0 to 7.7 feet; upper section, a vertical staff attached to large elm tree on right bank. Gage read morning and evening.

Discharge measurements.—Made from highway bridge between Ellwood City and Hazel Dell; at low stages, by wading.

Channel and control.—Channel rocky; control is at a rock riffle about 100 feet below gage; probably permanent.

Winter flow.—Probably affected by ice.

Accuracy.—Results good.

Discharge measurements of Connoquenessing Creek near Ellwood City, Pa., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 29	Ellsworth and Adams	2.58	320
Aug. 22	R. M. Adams	2.10	163
Sept. 17	C. E. Ellsworth	1.59	64.4

Daily discharge, in second-feet, of Connoquenessing Creek near Ellwood City, Pa., for the year ending Sept. 30, 1914.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	153		128	11	105		139	21	139		51
2	144		139	12	78		73	22	137		44
3	158		840	13	95		81	23	131	99	38
4	137		367	14	198		81	24	126	118	38
5	118		268	15	346		65	25	114	99	38
6	103		189	16	206		65	26		99	58
7	92		163	17	189		51	27		81	62
8	81		139	18	163		58	28		73	58
9	99		99	19	158		65	29		234	51
10	103		118	20	139		51	30		324	44
								31		204	

NOTE.—Daily discharge determined from rating curve well defined between 38 and 513 second-feet. Discharge estimated by comparison with the flow of Slippery Rock Creek at Wurtemburg, Pa., as follows: July 26–31, 65 second-feet, and Aug. 1–22, 75 second-feet.

Monthly discharge of Connoquenessing Creek near Ellwood City, Pa., for the year ending Sept. 30, 1914.

[Drainage area, 829 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
July	346		126	0.152	0.18	B.
August			96.2	.116	.13	D.
September	840	38	122	.147	.16	A.

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.

Drainage area.—325 square miles.

Records available.—August 12, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to trees on left bank; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 1.5, half-tenths from 1.5 to 2.5, and tenths above 2.5 feet.

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

Channel and control.—Practically permanent.

Extremes of stage.—Maximum stage recorded during year: 3.4 feet at 6 p. m. January 31. Minimum stage recorded: 0.93 foot at 7 a. m. and 6 p. m. September 7.

Winter flow.—Ice rarely forms in sufficient quantity to affect gage readings.

Accuracy.—Gage-height record very reliable.

Data insufficient for estimates of discharge.

The following discharge measurement was made by wading, by Peterson and Walters:

December 16, 1913: Gage height, 1.31 feet; discharge, 387 second-feet.

Daily gage height, in feet, of South Fork of New River near Crumpler, N. C., for the year ending Sept. 30, 1914.

[J. J. Garvey, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1....	1.55	1.46	1.75	1.5	2.6	1.65	1.95	1.7	1.33	1.05	1.04	1.07
2....	1.44	1.43	1.9	1.44	1.95	1.65	1.85	1.6	1.30	1.35	1.02	1.04
3....	1.38	1.42	1.65	1.47	1.75	1.42	1.8	1.55	1.28	1.45	1.01	1.06
4....	1.36	1.41	1.5	1.5	1.7	1.8	1.7	1.55	1.24	1.26	1.16	1.01
5....	1.33	1.39	1.46	1.55	1.65	1.8	1.65	1.8	1.30	1.29	1.06	1.02
6....	1.30	1.38	1.43	1.42	1.9	1.7	1.6	1.9	1.7	1.38	1.04	.99
7....	1.30	1.38	1.48	1.42	2.3	1.65	1.55	1.85	1.8	1.24	1.03	.93
8....	1.30	1.40	1.55	1.44	2.05	1.65	1.8	1.7	1.6	1.22	1.00	.96
9....	1.33	1.85	1.55	1.55	1.9	1.55	1.9	1.65	1.44	1.16	1.00	1.04
10....	1.38	1.7	1.5	1.85	1.75	1.5	1.7	1.65	1.55	1.5	1.10	1.03
11....	1.36	1.6	1.55	1.75	1.7	1.6	1.7	1.6	1.55	1.30	1.08	1.06
12....	1.35	1.46	1.5	1.75	1.65	1.8	1.6	1.55	1.36	1.18	1.16	1.18
13....	1.30	1.40	1.55	1.5	1.65	1.9	1.6	1.55	1.32	1.16	1.24	1.22
14....	1.28	1.42	1.48	1.5	1.9	1.75	1.7	1.5	1.30	1.16	1.20	1.10
15....	1.24	1.42	1.34	1.7	1.5	1.7	3.0	1.49	1.30	1.40	1.18	1.04
16....	1.24	1.44	1.32	1.5	1.65	1.7	2.45	1.46	1.27	1.8	1.09	1.00
17....	1.24	1.47	1.29	1.5	1.6	1.7	2.2	1.44	1.20	1.6	1.06	1.08
18....	1.26	1.42	1.30	1.42	1.75	1.8	2.0	1.44	1.20	1.5	1.02	1.32
19....	1.32	1.41	1.29	1.42	2.0	1.85	1.95	1.45	1.32	1.38	.99	1.40
20....	1.75	1.38	1.28	1.41	2.3	1.8	2.05	1.44	1.39	1.32	.96	1.25
21....	1.75	1.36	1.27	1.42	2.35	1.7	1.95	1.40	1.30	1.21	1.00	1.14
22....	1.5	1.34	1.27	1.40	2.05	1.65	1.9	1.40	1.20	1.11	1.08	1.08
23....	1.44	1.34	1.29	1.45	1.8	1.6	1.8	1.40	1.19	1.07	.98	1.07
24....	2.0	1.34	1.34	1.42	1.9	1.6	1.75	1.38	1.16	1.06	.90	1.04
25....	2.8	1.31	1.42	1.48	1.8	1.55	1.7	1.35	1.15	1.02	.92	1.07
26....	2.15	1.29	1.75	1.6	1.75	1.5	1.7	1.34	1.16	1.02	1.16	1.04
27....	1.75	1.28	1.65	1.5	1.7	1.6	1.6	1.32	1.16	1.20	1.18	1.04
28....	1.65	1.28	1.45	1.42	1.7	1.5	1.6	1.30	1.10	1.11	1.85	.98
29....	1.6	1.28	1.44	1.41	.....	1.65	1.6	1.31	1.05	1.09	1.8	.98
30....	1.55	1.30	1.47	1.40	.....	1.7	1.65	1.42	1.02	1.04	1.46	.98
31....	1.48	.....	1.48	3.0	.....	1.85	.....	1.38	.....	1.06	1.22	.....

NOTE.—Discharge relation probably affected by ice Jan. 13-16 and Feb. 14-17.

NEW RIVER AT RADFORD, VA.

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

Drainage area.—2,720 square miles.

Records available.—August 1, 1898, to July 15, 1906; May 6, 1907, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths.

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

Channel and control.—Practically permanent. 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 foot±0.3 foot.

Extremes of discharge.—The maximum stage recorded during the year, 7.0 feet at 8 a. m. February 21; discharge, 14,000 second-feet. Minimum stage recorded, 2.95 feet at 6.30 p. m. September 7; discharge, 580 second-feet. Maximum stage of which there is any record, 37.4 feet September 15, 1879, according to United States Weather Bureau.

Winter flow.—Discharge relation only occasionally affected by ice.

Regulation.—Power plants about 50 miles above station may slightly affect flow.

The following discharge measurement was made by Peterson and Walters: December 11, 1913: Gage height, 3.77 feet; discharge, 2,410 second-feet.

Daily discharge, in second-feet, of New River at Radford, Va., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,780	1,780	1,780	2,280	9,230	4,600	8,470	3,000	1,900	1,430	1,220	2,280
2	1,900	1,660	4,440	2,280	8,470	4,270	8,470	3,000	1,900	1,180	1,020	1,900
3	1,780	1,610	4,110	2,150	5,610	3,310	7,000	2,850	1,900	1,060	944	1,900
4	1,780	2,150	3,160	1,900	4,110	3,630	5,950	2,700	1,900	1,180	1,120	1,900
5	1,640	2,020	2,560	2,700	3,950	3,950	5,610	3,000	1,780	1,020	1,060	1,540
6	1,350	1,900	2,280	2,700	4,440	4,600	4,440	3,630	1,660	982	1,020	1,480
7	1,540	1,780	2,560	2,850	9,620	4,110	4,600	3,950	1,780	1,060	1,180	694
8	1,780	1,610	2,280	2,560	9,620	3,950	3,950	3,950	2,150	2,020	868	830
9	1,900	4,110	2,280	3,160	7,360	3,790	5,270	3,310	2,280	1,660	868	1,020
10	2,020	3,950	2,420	5,270	5,610	3,310	4,600	3,000	1,900	1,780	868	982
11	1,900	3,000	2,280	6,300	4,600	3,950	3,950	3,000	1,780	1,450	1,390	1,220
12	1,660	2,560	1,900	4,930	4,600	7,360	3,630	3,000	1,780	1,660	1,200	1,390
13	1,320	2,280	2,020	3,470	4,270	7,720	3,470	2,700	1,780	1,390	1,060	1,660
14	1,780	2,280	2,020	2,560	3,790	7,000	3,470	2,560	1,660	2,700	982	1,060
15	1,780	2,280	2,150	2,560	3,310	5,950	4,930	2,020	1,390	3,310	1,040	982
16	1,900	1,900	2,150	3,000	3,000	5,610	9,230	2,150	1,540	2,850	1,180	830
17	1,780	2,020	2,020	3,000	3,000	5,610	7,720	2,280	1,610	3,630	982	796
18	1,610	2,700	1,780	3,000	3,630	6,300	6,640	2,280	1,540	2,700	1,060	982
19	1,660	2,420	1,900	3,000	6,300	6,300	5,610	2,420	1,780	2,150	1,220	1,430
20	2,850	2,280	2,020	3,000	12,000	5,950	5,610	2,280	1,660	1,900	944	1,220
21	3,000	1,900	1,780	5,610	13,600	5,270	6,300	2,150	1,660	1,780	1,020	1,540
22	2,850	1,900	1,480	4,110	10,000	4,930	5,610	2,150	982	1,480	1,260	1,660
23	2,280	2,020	2,150	3,310	8,100	4,930	4,930	2,280	1,570	1,260	925	1,660
24	2,280	1,640	2,020	3,310	6,640	4,600	4,440	1,900	1,220	1,390	925	1,660
25	4,270	2,150	1,900	4,270	5,950	4,600	4,110	1,900	1,020	1,390	925	1,660
26	5,270	2,020	2,150	4,930	5,610	4,440	3,790	1,780	868	1,320	1,780	1,180
27	3,630	2,020	3,310	3,950	5,610	4,270	3,790	1,900	745	906	3,000	1,180
28	2,850	1,640	2,850	3,000	4,930	4,110	3,630	1,900	745	1,220	3,310	982
29	2,150	1,780	2,700	3,000	.....	4,270	3,310	1,900	982	1,020	5,610	1,020
30	2,280	2,020	2,420	2,700	.....	4,930	3,160	2,020	1,260	1,060	3,470	1,180
31	2,020	.....	2,700	4,930	.....	7,360	.....	1,900	.....	1,060	2,420	.....

NOTE.—Daily discharge determined from a rating curve well defined between 830 and 37,000 second-feet. Open-water rating curve used throughout the year.

Monthly discharge of New River at Radford, Va., for the year ending Sept. 30, 1914.

[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.		
October	5,270	1,320	2,210	0.812	0.94	A.
November	4,110	1,610	2,180	.801	.89	A.
December	4,440	1,480	2,370	.871	1.00	A.
January	6,300	1,900	3,410	1.25	1.44	B.
February	13,600	3,000	6,320	2.32	2.42	B.
March	7,720	3,310	5,000	1.84	2.12	A.
April	9,230	3,160	5,190	1.91	2.13	A.
May	3,950	1,780	2,540	.934	1.08	A.
June	2,280	745	1,560	.574	.64	A.
July	3,630	906	1,650	.607	.70	A.
August	5,610	868	1,480	.544	.63	A.
September	2,280	694	1,330	.489	.55	A.
The year	13,600	694	2,910	1.07	14.54	

NEW RIVER AT FAYETTE, W. VA.

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

Drainage area.—6,800 square miles.

Records available.—July 29, 1895, to May 22, 1901; August 11, 1902, to December 31, 1904; July 16, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Half-tenths below and tenths above 0. Elevation of the zero of gage, 838.44 feet above sea level.

Discharge measurements.—Made from upstream side of bridge.

Channel and control.—Bed composed of rock strewn with large bowlders, which cause boils and eddies at high stages.

Extremes of stage.—Maximum stage recorded during year: 8.6 feet at 5 p. m. January 12; minimum, 0.10 foot at 5 p. m. September 30.

The flood of 1878 reached a height of about 53 feet referred to the gage datum.

Winter flow.—Discharge relation little if at all affected by ice.

Accuracy.—Errors entered into many of the gage readings prior to 1908, particularly before installation of chain gage on 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 withheld for additional data.

The following discharge measurement was made by Peterson and Walters: November 15, 1913: Gage height, 6.05 feet; discharge, 10,400 second-feet.

Daily gage height, in feet, of New River at Fayette, W. Va., for the year ending Sept. 30, 1914.

[C. J. Henry, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.8	2.0	6.7	3.9	5.2	5.0	5.5	5.1	5.0	1.2	4.3	5.1
2	3.9	1.1	6.8	3.9	5.2	4.9	5.6	5.1	4.8	1.1	4.4	5.0
3	4.0	1.2	7.0	4.0	5.5	4.8	5.6	5.0	4.7	1.0	4.4	5.0
4	4.1	1.3	7.0	5.3	6.0	4.7	5.5	5.0	4.7	.9	4.5	4.9
5	4.2	1.4	6.5	6.8	6.1	3.8	5.4	4.9	4.5	.8	4.6	4.8
6	4.1	1.4	7.3	7.4	6.3	4.0	5.3	4.7	4.4	.8	4.9	4.8
7	4.2	1.5	7.4	7.9	6.3	5.1	5.2	4.7	4.3	.9	5.0	4.8
8	4.4	1.5	7.4	8.0	5.4	5.2	5.0	4.6	4.2	.8	5.1	4.8
9	4.8	1.6	7.3	8.1	4.1	5.8	4.8	4.4	4.2	1.1	5.2	4.7
10	5.2	1.7	7.1	8.2	4.1	6.0	4.8	4.3	4.1	1.2	5.2	4.6
11	5.4	1.7	6.9	8.3	4.0	7.0	4.8	4.1	4.1	1.2	5.4	4.5
12	5.9	1.8	6.3	8.5	4.0	7.1	4.7	4.1	4.1	1.4	5.5	4.5
13	6.1	2.2	6.0	8.4	4.1	7.2	4.7	4.3	4.0	1.9	5.6	4.4
14	5.2	4.5	5.5	8.4	4.2	7.1	4.6	4.5	3.8	2.1	5.6	4.4
15	4.8	7.3	5.8	8.3	4.8	7.0	4.6	4.4	3.7	2.3	5.7	4.3
16	4.3	7.4	7.7	8.1	5.8	6.9	4.5	4.2	3.6	2.6	5.7	4.2
17	3.6	7.4	8.3	7.9	7.1	6.8	4.5	4.2	3.5	2.7	5.7	4.1
18	2.5	7.3	8.0	7.8	7.1	6.7	4.5	4.2	3.4	3.2	5.8	4.0
19	2.1	7.1	7.8	7.1	6.9	6.6	4.4	4.2	3.4	3.5	5.8	3.8
20	1.8	6.9	7.0	7.3	6.3	6.4	4.4	4.5	3.3	3.7	5.9	3.7
21	1.4	6.3	5.1	7.9	5.9	5.9	4.3	4.6	3.2	3.7	5.9	3.3
22	1.2	6.0	3.1	8.0	5.7	5.8	4.2	4.6	3.2	3.8	5.9	3.0
23	1.1	5.5	3.1	8.0	5.6	5.6	4.1	4.6	3.1	3.9	6.0	2.8
24	1.1	5.4	3.1	8.0	5.4	5.4	4.1	4.8	3.1	4.0	6.0	2.3
25	1.0	5.1	3.0	7.0	5.2	5.3	4.2	4.9	3.0	4.1	6.6	1.9
26	1.6	5.1	3.0	5.2	5.2	4.9	4.2	5.0	3.0	4.1	6.5	1.7
27	1.8	5.1	2.9	5.1	5.1	4.8	4.4	5.1	2.8	4.1	5.9	1.5
28	2.0	5.0	2.8	5.1	5.1	4.9	4.6	5.1	2.7	4.2	5.8	1.2
29	2.4	5.0	2.7	4.9	.....	5.1	4.8	5.2	2.6	4.2	5.7	.6
30	2.2	6.6	2.6	4.9	.....	5.2	4.8	5.2	2.4	4.2	5.7	.2
31	2.0	.....	3.5	5.0	.....	5.2	.....	5.2	.....	4.3	.....	.....

NOTE.—Discharge relation probably not materially affected by ice.

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

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

Drainage area.—279 square miles.

Records available.—August 13, 1908, to September 30, 1914.

Gage.—Staff gage attached to posts on right bank; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 2, half-tenths from 2 to 3, and tenths above 3 feet.

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

Channel and control.—Practically permanent.

Extremes of stage.—Maximum stage recorded during year: 4.6 feet at 5.30 p. m. February 20. Minimum stage recorded: 1.10 feet at 5.30 p. m. July 2.

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

Winter flow.—Little if at all affected by ice.

Accuracy.—Gage-height record is very reliable.

Data insufficient for estimates of discharge.

The following discharge measurement was made by wading, by Peterson and Walters:

December 17, 1913: Gage height, 1.65 feet; discharge, 212 second-feet.

Daily gage height, in feet, of North Fork of New River near Crumpler, N. C., for the year ending Sept. 30, 1914.

[J. J. Garvey, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.74	1.69	2.0	1.94	3.0	2.4	3.8	2.1	1.64	1.18	1.22	1.38
2	1.64	1.64	2.3	1.89	2.6	2.4	3.7	2.05	1.60	1.20	1.20	1.34
3	1.62	1.63	1.93	2.00	2.4	2.4	3.3	2.05	1.59	1.92	1.17	1.30
4	1.59	1.62	1.83	1.90	2.3	2.45	3.0	2.05	1.56	1.52	1.48	1.29
5	1.56	1.60	1.80	1.92	2.25	2.3	2.95	2.3	1.60	1.58	1.34	1.26
6	1.54	1.60	1.74	1.89	3.1	2.25	2.6	3.1	2.25	1.46	1.26	1.22
7	1.52	1.58	1.87	1.83	3.6	2.25	2.5	2.7	1.88	1.38	1.20	1.20
8	1.52	1.62	2.0	1.83	3.1	2.2	2.5	2.5	1.81	1.38	1.18	1.20
9	1.61	2.25	1.72	2.3	2.7	2.15	2.4	2.5	1.67	1.33	1.20	1.40
10	1.68	1.88	1.74	3.2	2.55	2.15	2.2	2.4	1.82	1.85	1.31	1.32
11	1.60	1.78	2.05	2.6	2.45	2.5	2.2	2.25	1.64	1.50	1.36	1.30
12	1.56	1.74	1.78	2.2	2.3	4.2	2.15	2.2	1.52	1.46	1.30	1.78
13	1.56	1.86	1.86	1.92	2.3	3.3	2.1	2.1	1.60	1.30	1.24	1.46
14	1.50	1.85	1.85	2.0	2.1	2.9	2.25	2.15	1.56	2.15	1.40	1.32
15	1.48	1.83	1.75	2.3	2.2	2.75	3.9	2.05	1.61	2.35	1.40	1.26
16	1.48	1.80	1.69	2.05	2.2	2.75	3.5	2.0	1.51	2.0	1.34	1.18
17	1.48	2.4	1.68	2.15	1.81	2.9	3.4	1.98	1.43	1.71	1.22	1.26
18	1.50	2.15	1.68	1.84	2.6	3.2	3.1	1.97	1.42	2.0	1.18	1.74
19	1.56	2.0	1.66	1.98	3.0	3.8	2.8	1.92	1.57	1.64	1.13	1.52
20	2.05	1.92	1.62	1.93	4.4	2.8	3.2	1.88	1.52	1.48	1.12	1.55
21	1.86	1.84	1.60	2.25	3.8	2.55	2.9	1.85	1.50	1.40	1.24	1.42
22	1.70	1.80	1.60	2.05	3.1	2.55	2.7	1.82	1.48	1.37	1.33	1.32
23	1.74	1.76	1.62	1.96	2.9	2.4	2.6	1.80	1.41	1.34	1.26	1.26
24	2.2	1.73	1.68	2.1	3.1	2.4	2.5	1.79	1.40	1.29	1.15	1.22
25	2.75	1.66	1.72	2.85	2.8	2.35	2.45	1.77	1.38	1.24	1.14	1.28
26	2.15	1.64	2.4	2.4	2.7	2.4	2.5	1.72	1.42	1.22	1.48	1.32
27	1.98	1.64	1.80	2.25	2.55	2.5	2.4	1.70	1.36	1.42	2.05	1.24
28	1.89	1.63	1.98	2.15	2.45	2.9	2.25	1.69	1.32	1.38	3.5	1.20
29	1.82	1.63	1.86	2.1	.....	2.7	2.2	1.68	1.23	1.48	2.05	1.18
30	1.76	1.64	1.98	2.05	.....	3.9	2.2	1.82	1.18	1.38	1.66	1.18
31	1.70	.....	1.95	3.3	.....	4.0	.....	1.67	.....	1.27	1.48	.....

NOTE.—Discharge relation probably affected by ice Jan. 13–17 and Feb. 15–17.

REED CREEK AT GRAHAMS FORGE, VA.

Location.—At highway bridge at Grahams Forge, Va.

Drainage area.—247 square miles.

Records available.—July 29, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 3, half-tenths from 3 to 4.5, and tenths above 4.5 feet.

Discharge measurements.—Made from downstream side of bridge.

Channel and control.—Permanent; bottom solid rock. A determination be leveling, July 20, 1911, and December 13, 1913, 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.

Extremes of stage.—Maximum stage recorded during year: 4.6 feet at 5.25 p. m. February 20. Minimum stage recorded: 1.69 feet at 5.30 p. m. June 17.

Winter flow.—Discharge relation affected by ice for short periods.

Regulation.—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.—Gage-height record reliable.

Data insufficient for estimates of discharge.

The following discharge measurement was made by wading, by Peterson and Walters:

December 13, 1913: Gage height, 2.13 feet; discharge, 99 second-feet.

Daily gage height, in feet, of Reed Creek at Grahams Forge, Va., for the year ending Sept. 30, 1914.

[J. T. Black, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.14	2.10	2.33	2.46	2.94	2.92	3.6	2.44	2.18	2.06	2.05	2.16
2	2.16	2.10	2.56	2.40	2.74	2.75	3.6	2.43	2.18	2.12	2.12	2.13
3	2.14	2.11	2.46	2.38	2.66	2.78	3.35	2.40	2.18	2.14	2.04	2.12
4	2.10	2.14	2.34	2.44	2.57	2.77	3.1	2.42	2.19	2.10	2.12	2.14
5	2.12	2.13	2.29	2.44	2.56	2.74	2.94	2.48	2.18	2.07	1.92	2.08
6	2.10	2.12	2.24	2.39	2.88	2.73	2.85	2.64	2.18	2.08	2.04	2.12
7	2.13	2.11	2.29	2.40	3.9	2.73	2.78	2.64	2.20	2.12	2.08	2.02
8	2.14	2.06	2.32	2.43	3.45	2.73	2.76	2.62	2.19	2.09	2.10	2.14
9	2.14	2.26	2.32	2.63	3.05	2.70	2.72	2.58	2.30	2.14	2.10	2.15
10	2.12	2.42	2.27	3.45	2.86	2.66	2.64	2.54	2.08	2.18	2.08	2.24
11	2.12	2.22	2.28	3.1	2.76	3.1	2.60	2.48	2.08	2.34	2.12	2.10
12	2.12	2.19	2.24	2.82	2.66	4.2	2.59	2.46	2.16	2.16	2.13	1.91
13	2.10	2.16	2.21	2.64	2.63	3.45	2.56	2.43	2.13	2.09	2.13	2.17
14	2.10	2.16	2.20	2.64	2.54	3.2	2.56	2.40	2.16	2.36	2.12	2.05
15	2.10	2.17	2.11	2.54	2.60	3.1	2.80	2.36	2.14	2.50	2.09	2.13
16	2.15	2.18	2.08	2.48	2.56	3.1	2.94	2.34	2.14	2.21	2.12	2.12
17	2.12	2.20	2.14	2.50	2.56	3.1	2.96	2.30	1.94	2.46	1.97	2.14
18	2.10	2.32	2.10	2.47	2.60	3.1	2.87	2.34	2.06	2.34	2.12	2.14
19	2.14	2.24	2.08	2.42	3.35	2.95	2.82	2.29	2.10	2.16	2.00	2.16
20	2.28	2.22	2.12	2.52	4.4	2.87	2.97	2.28	2.15	2.16	2.08	2.14
21	2.24	2.18	2.10	2.72	3.85	2.80	2.98	2.26	2.16	2.15	2.08	2.10
22	2.18	2.17	2.10	2.63	3.45	2.78	2.86	2.24	2.14	2.12	2.16	2.16
23	2.14	2.16	2.06	2.50	3.35	2.79	2.75	2.26	2.16	2.12	2.08	2.04
24	2.17	2.14	2.12	2.50	3.25	2.82	2.70	2.24	2.10	2.14	1.99	2.14
25	2.28	2.06	2.15	2.76	3.1	2.83	2.65	2.22	2.11	2.12	2.09	2.12
26	2.21	2.12	2.32	2.73	3.05	2.82	2.61	2.22	2.12	2.12	2.64	2.10
27	2.20	2.10	2.31	2.61	2.98	2.80	2.60	2.20	2.08	2.04	2.56	2.14
28	2.16	2.12	2.24	2.54	2.95	2.75	2.54	2.18	2.10	2.16	3.0	2.02
29	2.14	2.02	2.31	2.46	.....	2.72	2.50	2.17	2.04	2.14	2.56	2.13
30	2.11	2.08	2.30	2.45	.....	3.15	2.50	2.20	2.12	2.04	2.33	2.10
31	2.14	.....	2.38	2.70	.....	3.85	.....	2.21	.....	2.08	2.22	.....

NOTE.—Discharge relation probably affected by ice Feb. 15–17.

BIG REED ISLAND CREEK NEAR ALLISONIA, VA.

Location.—About 1,200 feet above a suspension footbridge at J. P. Thomas's farm, 1½ miles from Allisonia, Va., and half a mile above the mouth of Little Reed Island Creek.

Drainage area.—291 square miles.

Records available.—July 31, 1908, to September 30, 1914.

Gage.—Vertical staff fastened to a tree on right bank; read once daily to hundredths; after periods of precipitation it is read twice daily. Limits of use: Hundredths below 1, half-tenths from 1 to 2, and tenths above 2 feet.

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

Channel and control.—Channel at measuring section subject to change caused by deposits of silt from ore washing. Control probably permanent. A determination by 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.

Extremes of stage.—Maximum stage recorded during year: 2.5 feet at 5 p. m. January 31. Minimum stage recorded: 0.28 foot at 6 p. m. August 20.

Winter flow.—Discharge relation sometimes affected by ice.

Accuracy.—Records of gage height reliable.

Data insufficient for estimates of discharge.

Discharge measurements of Big Reed Island Creek near Allisonia, Va., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 12	Peterson and Walters	0.60	[a] 252
12	do	.68	[b] 323

[a] Wading measurement about 1,300 feet above gage; small amount of ice at control.
[b] Wading measurement about 1,000 feet above gage; creek practically clear of ice.

Daily gage height, in feet, of Big Reed Island Creek near Allisonia, Va., for the year ending Sept. 30, 1914.

[K. M. Thomas, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.65	0.66	0.88	0.70	1.5	0.94	1.2	0.73	0.57	0.35	0.36	0.48
2	.59	.65	1.25	.68	1.15	1.1	1.25	.73	.55	.77	.34	.58
3	.58	.64	.91	.58	.96	1.25	.98	.72	.53	.45	.33	.51
4	.56	.64	.80	.88	.91	.93	.92	.71	.51	.45	.38	.44
5	.54	.62	.79	.83	.90	.89	.87	.98	.52	.45	.36	.37
6	.54	.62	.71	.79	1.65	.90	.84	1.0	.62	.51	.37	.36
7	.53	.63	.78	.75	1.65	.96	.82	.81	.60	.84	.35	.36
8	.66	.69	.76	.76	1.25	.95	1.3	.79	.63	.49	.33	.70
9	.68	2.0	.74	.88	1.05	.80	1.1	.76	.60	.47	.32	.67
10	.68	1.2	.72	1.0	.99	.81	.94	.75	.64	.59	.65	.47
11	.61	.86	.74	.98	.97	1.05	.88	.70	.67	.46	.82	.44
12	.86	.81	.77	.82	.92	1.3	.84	.69	.95	.38	.80	.54
13	.61	.78	.72	.73	.97	1.1	.83	.72	.56	.37	.52	.46
14	.56	.76	.68	.97	1.45	1.0	.87	.70	.54	1.35	.47	.42
15	.55	.73	.65	.99	1.5	1.0	1.05	.66	.50	.76	.40	.40
16	.53	.72	.65	.88	1.05	1.05	1.2	.66	.46	.87	.38	.36
17	.52	.92	.64	.91	1.1	1.05	1.0	.65	.45	.76	.35	.37
18	.55	.77	.64	.80	1.15	1.45	.93	.65	.44	.64	.34	.42
19	.63	.74	.61	.76	1.25	1.1	.88	.63	.48	.50	.31	.42
20	2.0	.70	.63	1.0	1.85	1.05	1.5	.62	.49	.44	.28	.40
21	1.15	.68	.63	1.25	1.4	.97	1.1	.60	.49	.40	.30	.42
22	.83	.67	.62	1.0	1.2	.98	.97	.60	.44	.37	.62	.37
23	.74	.67	.63	.90	1.2	.94	.91	.58	.41	.37	.35	.38
24	1.5	.64	.74	.92	1.05	.91	.87	.58	.37	.35	.31	.48
25	1.45	.63	.74	1.6	.98	.90	.85	.57	.34	.34	.39	.38
26	.92	.61	1.05	1.15	.96	.88	.82	.56	.37	.37	1.0	.36
27	.80	.56	.76	.94	.95	.87	.78	.55	.51	.60	.99	.33
28	.80	.62	.77	.87	.94	.92	.77	.54	.62	.44	1.2	.32
29	.73	.63	.74	.84	.....	.89	.77	.57	.44	.40	.86	.32
30	.69	.64	.73	.81	.....	1.0	.76	.78	.37	.33	.58	.31
31	.65	.....	.69	2.5	.....	.96	.....	.60	.....	.33	.51	.....

NOTE.—Discharge relation probably affected by ice Jan. 14–16, Feb. 14–18, and Mar. 2–3.

LITTLE RIVER NEAR COPPER VALLEY, VA.

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

Drainage area.—195 square miles.

Records available.—July 25, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 4, half-tenths from 4 to 5, and tenths above 5 feet.

Discharge measurements.—Made from downstream side of bridge.

Channel and control.—Probably permanent. 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.

Extremes of stage.—Maximum stage recorded during year: 6.4 feet at 5.40 p. m. January 31. Minimum stage recorded: 3.05 feet at 6.20 p. m. July 25.

Winter flow.—Discharge relation affected by ice for short periods.

Accuracy.—Gage-height records reliable.

Data insufficient for estimates of discharge.

The following discharge measurement was made by Peterson and Walters:

December 10, 1913: Gage height, 3.31 feet; discharge, 138 second-feet.

Daily gage height, in feet, of Little River near Copper Valley, Va., for the year ending Sept. 30, 1914.

[A. W. De Hart, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.38	3.41	3.70	3.48	4.6	3.78	4.1	3.65	3.39	3.15	3.18	3.25
2	3.30	3.38	4.25	3.46	4.05	3.60	4.1	3.61	3.36	3.56	3.11	3.20
3	3.30	3.38	3.76	3.38	3.90	3.75	3.98	3.59	3.32	3.32	3.40	3.20
4	3.30	3.36	3.62	3.49	3.84	4.15	3.85	3.59	3.30	3.25	3.38	3.20
5	3.28	3.38	3.56	3.72	3.82	3.85	3.81	3.71	3.31	3.28	3.22	3.15
6	3.25	3.36	3.50	3.70	4.35	3.76	3.80	3.76	3.36	3.28	3.20	3.15
7	3.26	3.34	3.62	3.78	4.85	3.74	3.75	3.71	3.39	3.22	3.15	3.15
8	3.29	3.46	3.68	3.82	4.25	3.70	3.85	3.71	3.36	3.41	3.18	3.12
9	3.50	5.0	3.48	3.94	3.98	3.66	3.84	3.64	3.34	3.31	3.11	3.18
10	3.82	4.1	3.45	4.45	3.88	3.59	3.79	3.61	3.58	3.31	3.14	3.24
11	3.58	3.75	3.58	4.1	3.91	3.98	3.75	3.60	3.32	3.40	3.18	3.20
12	3.62	3.58	3.50	3.80	3.84	4.6	3.71	3.58	3.38	3.22	3.28	3.25
13	3.50	3.68	3.54	3.80	3.62	4.2	3.70	3.55	3.40	3.15	3.20	3.29
14	3.38	3.60	3.54	3.81	3.41	4.05	3.71	3.52	3.30	4.35	3.45	3.25
15	3.32	3.62	3.41	3.84	4.35	4.1	4.3	3.50	3.25	3.95	3.25	3.24
16	3.29	3.55	3.40	3.85	4.1	4.1	4.3	3.45	3.24	3.78	3.20	3.21
17	3.30	3.72	3.38	3.81	4.0	4.0	3.96	3.45	3.20	3.60	3.19	3.20
18	3.30	3.62	3.40	3.84	4.05	4.4	3.88	3.48	3.20	3.48	3.14	3.38
19	3.38	3.55	3.34	3.76	4.65	4.2	3.81	3.46	3.21	3.32	3.10	3.42
20	4.25	3.50	3.34	3.88	5.4	4.15	4.05	3.46	3.26	3.21	3.12	3.32
21	4.15	3.46	3.35	4.4	4.7	3.95	4.0	3.45	3.25	3.18	3.19	3.24
22	3.63	3.44	3.35	3.92	4.35	3.98	3.86	3.42	3.24	3.15	3.16	3.20
23	3.52	3.45	3.38	3.68	4.2	3.95	3.79	3.42	3.20	3.12	3.18	3.19
24	3.50	3.41	3.60	3.72	4.05	3.92	3.75	3.41	3.20	3.10	3.16	3.14
25	4.2	3.40	3.50	4.45	4.0	3.86	3.74	3.40	3.16	3.06	3.30	3.15
26	3.75	3.38	4.15	4.0	3.98	3.80	3.71	3.39	3.15	3.10	3.76	3.14
27	3.58	3.42	3.64	3.82	3.90	3.80	3.70	3.38	3.14	3.28	3.80	3.18
28	3.46	3.40	3.58	3.74	3.89	3.81	3.69	3.35	3.30	3.30	5.0	3.11
29	3.40	3.41	3.45	3.68	.....	3.81	3.66	3.36	3.22	3.19	4.6	3.11
30	3.41	3.41	3.50	3.68	.....	3.88	3.65	3.35	3.15	3.15	3.52	3.10
31	3.40	.....	3.49	5.1	.....	3.98	.....	3.38	.....	3.11	3.32	.....

NOTE.—Discharge relation probably affected by ice about Jan. 13–19, and Feb. 11–18.

WALKER CREEK AT STAFFORDSVILLE, VA.

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

Drainage area.—277 miles.

Records available.—July 24, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 4, half-tenths from 4 to 5, and tenths above 5 feet.

Discharge measurements.—Made from downstream side of bridge.

Channel and control.—Practically permanent.

Extremes of stage.—Maximum stage recorded during year: 7.3 feet at 7.25 a. m. February 20. Minimum stage recorded: 2.64 feet at 7 p. m. August 5.

Winter flow.—Discharge relation probably not affected by ice.

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

Data insufficient for estimates of discharge.

The following discharge measurement was made by Peterson and Walters:

December 9, 1913: Gage height, 3.46 feet; discharge, 165 second-feet.

Daily gage height, in feet, of Walker Creek at Staffordsville, Va., for the year ending Sept. 30, 1914.

[J. F. Durham, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.96	3.06	3.30	3.72	5.7	4.55	6.4	3.67	3.00	2.77	2.70	3.02
2	2.93	3.02	4.1	3.66	4.9	4.3	6.2	3.62	3.04	2.85	2.68	2.91
3	2.97	3.00	3.95	3.58	4.55	4.3	5.6	3.59	2.98	2.23	2.66	2.88
4	2 94	2.99	3 68	3 50	4.35	4 25	5.1	3 60	2 94	2.79	2.68	2.82
5	2.87	2.96	3.58	3.86	4.3	4.25	4.8	3.66	2.95	2.84	2.67	2.80
6	2.85	2.91	3.55	3.77	4.65	4.3	4.55	3.70	3.00	2.80	2.66	2.79
7	2.86	2.91	3.50	3.76	6.6	4.25	4.4	3.66	3.00	2.80	2.67	2.78
8	2.86	3.02	3.58	3.78	5.9	4.2	4.4	3.60	3.02	2.76	2.75	2.82
9	2.90	4.1	3.47	4.25	5.1	4.1	4.3	3.60	3.00	2.88	2.75	2.73
10	2.88	3.86	3.42	6.0	4.75	3.90	4.15	3.54	3.00	2.82	2.81	2.78
11	2.91	3.65	3.42	5.2	4.6	5.4	4.1	3.48	2.91	2.75	2.75	2.80
12	2.82	3.43	3.36	4.75	4.35	6.5	4.05	3.44	2.94	2.85	2.82	2.84
13	2.80	3.38	3.30	4.0	4.15	5.6	3.96	3.40	2.95	2.86	2.83	2.91
14	2.82	3.34	3.24	3.99	4.0	5.2	3.90	3.38	3.02	3.15	2.85	2.88
15	2.82	3.40	3.22	4.1	4.1	5.2	4.3	3.33	2.94	3.32	2.83	2.82
16	2.76	3.44	3.20	4.0	3.96	5.4	5.3	3.32	2.88	3.15	2.76	2.82
17	2.85	3.47	3.21	4.1	3.72	5.7	5.0	3.30	2.86	3.00	2.72	2.78
18	2.88	3.70	3.18	4.1	4.05	5.7	4.65	3.24	2.84	2.94	2.75	2.78
19	2.91	3.62	3.14	3.98	5.4	5.2	4.45	3.22	2.85	2.93	2.71	2.82
20	3.45	3.49	3.16	4.15	7.2	4.9	4.85	3.22	2.84	2.85	2.72	2.80
21	3.45	3.40	3.11	5.8	6.1	4.45	5.0	3.20	2.91	2.80	2.72	2.76
22	3.22	3.30	3.10	5.2	5.5	4.45	4.75	3.18	2.96	2.76	2.72	2.78
23	3.08	3.28	3.11	4.6	5.45	4.5	4.5	3.17	2.94	2.73	2.75	2.78
24	3.15	3.20	3.14	4.4	5.2	4.5	4.35	3.16	2.85	2.74	2.72	2.80
25	3.62	3.14	3.23	5.4	4.75	4.5	4.25	3.11	2.93	2.73	2.95	2.82
26	3.60	3.12	3.74	4.95	4.65	4.55	4.15	3.10	2.90	2.72	3.05	2.80
27	3.46	3.12	3.72	4.65	4.55	4.6	3.99	3.10	2.75	2.71	3.38	2.82
28	3.34	3.14	3.64	4.3	4.55	4.5	3.93	3.10	2.80	2.70	3.88	2.80
29	3.25	3.10	3.62	4.15	.....	4.4	3.84	3.05	2.75	2.71	3.66	2.79
30	3.11	3.10	3.60	4.05	.....	4.7	3.75	3.04	2.74	2.75	3.36	2.80
31	3.08	.....	3.64	4.5	.....	5.8	.....	3.02	.....	2.72	3.13	.....

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.

Drainage area.—223 square miles.

Records available.—July 22, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 3.5, half-tenths from 3.5 to 4.5, and tenths above 4.5 feet.

Discharge measurements.—Made from downstream side of bridge.

Channel and control.—Practically permanent. 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.

Extremes of stage.—Maximum stage recorded during year: 6.7 feet at 6.50 a. m. February 20. Minimum stage recorded: 2.18 feet at 6 p. m. August 21 and 22.

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

Winter flow.—Discharge relation not affected by ice except for short periods during extremely cold weather.

Accuracy.—Gage-height records reliable.

Data insufficient for estimates of discharge.

The following discharge measurement was made by Peterson and Walters:

December 8, 1913: Gage height, 3.10 feet; discharge, 159 second-feet.

Daily gage height, in feet, of Wolf Creek, near Narrows, Va., for the year ending Sept. 30, 1914.

[J. A. Hale, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.51	2.68	2.78	3.24	4.25	3.9	6.0	3.26	2.57	2.36	2.34	2.62
2	2.50	2.62	3.8	3.22	3.9	3.9	5.9	3.19	2.54	2.40	2.33	2.56
3	2.50	2.58	3.48	3.95	3.8	3.7	5.2	3.15	2.48	2.40	2.34	2.47
4	2.47	2.56	3.34	3.7	3.7	3.7	4.6	3.12	2.47	2.40	2.32	2.40
5	2.45	2.58	3.20	3.20	3.65	3.7	4.3	3.17	2.50	2.39	2.34	2.38
6	2.46	2.59	3.12	3.19	3.7	3.8	4.05	3.20	2.53	2.39	2.34	2.37
7	2.46	2.58	3.08	3.16	5.0	3.7	3.85	3.18	2.58	2.38	2.34	2.34
8	2.44	2.60	3.10	3.16	4.8	3.65	3.85	3.12	2.57	2.34	2.33	2.32
9	2.48	3.23	3.02	3.7	4.35	3.6	3.8	3.14	2.50	2.34	2.42	2.32
10	2.46	3.41	2.92	5.2	4.1	3.46	3.7	3.13	2.52	2.36	2.42	2.31
11	2.46	3.13	3.02	4.5	3.95	4.7	3.6	3.08	2.47	2.46	2.46	2.34
12	2.44	3.00	2.90	4.05	3.7	5.6	3.55	3.04	2.46	2.46	2.48	2.45
13	2.41	3.00	2.92	3.6	3.6	5.0	3.5	3.02	2.60	2.42	2.42	2.48
14	2.41	3.26	2.88	3.5	3.40	4.6	3.41	3.00	2.74	3.12	2.30	2.42
15	2.40	3.36	2.86	3.48	3.49	4.5	3.6	2.98	2.56	3.12	2.32	2.35
16	2.40	3.31	2.86	3.40	3.42	4.8	4.4	2.94	2.49	2.68	2.30	2.31
17	2.38	3.9	2.80	3.37	3.31	5.3	4.45	2.88	2.48	2.62	2.29	2.29
18	2.40	3.85	2.78	3.31	3.6	5.4	4.2	2.85	2.44	2.64	2.26	2.27
19	2.44	3.5	2.76	3.25	4.9	5.1	4.0	2.84	2.44	2.60	2.24	2.26
20	2.76	3.32	2.73	3.29	6.5	4.35	4.3	2.83	2.45	2.58	2.21	2.24
21	2.90	3.18	2.71	4.25	5.4	4.0	4.4	2.81	2.70	2.48	2.18	2.26
22	2.76	3.07	2.70	4.05	4.8	3.95	4.2	2.79	2.67	2.41	2.19	2.24
23	2.68	3.02	2.71	3.75	4.3	3.75	4.05	2.75	2.54	2.38	2.23	2.24
24	2.68	2.97	2.70	3.6	4.7	3.8	3.9	2.71	2.48	2.34	2.22	2.28
25	3.26	2.92	2.72	5.1	4.4	3.9	3.75	2.68	2.48	2.32	2.31	2.35
26	3.22	2.84	3.09	4.6	4.15	4.05	3.7	2.65	2.47	2.38	2.65	2.38
27	3.04	2.78	3.16	4.2	4.05	4.3	3.6	2.64	2.44	2.42	2.86	2.40
28	2.97	2.74	3.05	3.9	3.95	4.15	3.48	2.60	2.41	2.46	3.8	2.32
29	2.90	2.70	3.12	3.8	.....	4.05	3.38	2.59	2.40	2.44	3.38	2.29
30	2.81	2.69	3.11	3.6	.....	4.9	3.33	2.60	2.38	2.39	2.92	2.28
31	2.75	.....	3.16	3.9	.....	5.8	.....	2.60	.....	2.35	2.73	.....

NOTE.—Discharge relation probably not materially affected by ice.

BLUESTONE RIVER AT LILLY, W. VA.

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

Drainage area.—454 square miles.

Records available.—August 22, 1908, to January 13, 1912; July 21 to November 7, 1912; January 15 to September 30, 1914.

Gage.—Vertical staff gage in two sections; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 2, half-tenths from 2 to 3.5, and tenths above 3.5 feet.

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

Channel and control.—Practically permanent. Levels taken August 24, 1910, and November 13, 1913, indicate that there would be no flow past the gage if the river stage were to fall to 0.0 ±0.2 foot.

Extremes of stage.—Maximum stage recorded during year: 7.0 feet at 8 a. m. February 20. Minimum stage recorded: 0.65 foot at 5 p. m. August 24.

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

Accuracy.—Gage-height record reliable.

Data insufficient for estimates of discharge.

The following discharge measurement was made by wading, by Peterson and Walters:

November 13, 1913: Gage height, 2.09 feet; discharge, 323 second-feet.

Daily gage height, in feet, of Bluestone River at Lilly, W. Va., for the year ending Sept. 30, 1914.

[W. H. Lilly, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.91	1.29	2.6	2.35	2.6	2.8	4.4	1.88	1.30	1.00	0.99	2.1
2	.86	1.23	2.95	2.2	2.6	2.6	4.0	1.82	1.31	.90	.90	2.2
3	.93	1.22	2.8	2.45	2.5	2.5	3.6	1.80	1.29	.94	.80	2.2
4	1.03	1.21	2.45	2.15	2.4	2.4	3.45	1.79	1.25	.92	.80	1.15
5	1.21	1.19	2.05	2.4	2.3	2.4	3.4	1.79	1.30	1.02	.90	1.12
6	1.21	1.11	1.90	2.4	2.65	2.4	3.4	1.88	1.44	1.02	1.20	1.10
7	1.15	1.10	1.92	2.4	3.7	2.6	2.85	1.88	1.39	.92	1.21	1.10
8	1.03	1.05	1.80	2.3	3.6	2.95	2.9	2.1	1.36	.90	1.24	1.08
9	1.01	1.93	1.75	3.45	3.3	2.9	3.6	2.0	1.32	.96	1.20	1.08
10	.91	2.45	1.70	5.5	2.9	2.9	3.1	1.94	1.26	1.00	1.19	1.12
11	.91	2.15	1.70	4.4	2.75	2.7	3.05	1.90	1.16	.92	1.12	1.11
12	.81	2.1	1.70	3.3	2.7	2.55	2.85	1.82	1.10	.85	1.09	1.10
13	.86	2.1	1.69	3.0	2.35	4.0	2.5	1.80	1.03	.80	1.10	1.08
14	.91	2.2	1.61	2.9	2.2	3.8	2.55	1.72	1.00	.80	1.09	1.10
15	.89	2.35	1.61	2.85	2.2	3.7	2.85	1.62	.99	.88	1.12	.95
16	.90	2.4	1.58	2.75	2.25	4.0	3.9	1.56	.96	1.24	1.09	.85
17	.93	2.3	1.52	2.4	2.65	4.7	4.1	1.50	.94	1.88	1.06	.90
18	.96	2.2	1.54	2.35	2.8	5.1	3.8	1.50	.89	1.71	1.01	.82
19	.96	2.15	1.48	2.1	5.0	5.2	3.2	1.48	.96	1.48	.96	.79
20	1.12	2.0	1.46	2.25	6.5	4.0	2.95	1.47	.92	1.10	.88	.74
21	1.13	1.96	1.45	3.6	5.4	3.3	2.8	1.42	.96	.97	.82	.76
22	1.19	1.90	1.44	3.15	4.1	3.8	2.65	1.39	.99	.88	.75	.80
23	1.13	1.80	1.49	2.55	3.9	3.6	2.85	1.36	.92	.82	.70	.85
24	1.11	1.79	1.40	2.8	4.1	3.2	2.8	1.35	.95	.88	.68	.90
25	1.12	1.79	1.36	4.8	3.8	3.3	2.6	1.30	1.06	.91	.70	.86
26	1.10	1.75	1.82	4.7	3.5	3.2	2.5	1.29	1.09	.88	.90	.84
27	1.19	1.78	1.98	3.5	3.2	3.25	2.3	1.28	1.02	1.02	1.34	.82
28	1.89	1.75	2.15	2.9	3.05	3.3	2.3	1.30	.96	1.21	2.05	.81
29	1.63	1.78	2.1	2.45	.....	3.2	2.2	1.28	.90	1.09	2.3	.81
30	1.49	1.88	2.1	2.55	.....	4.3	2.0	1.32	.96	1.02	2.3	.83
31	1.46	.....	2.1	2.5	.....	5.1	.....	1.34	.....	1.02	2.3	.....

NOTE.—Discharge relation probably affected by ice Feb. 17–18.

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.

Drainage area.—408 square miles.

Records available.—July 9, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 4.5, half-tenths from 4.5 to 5.5, and tenths above 5.5 feet.

Discharge measurements.—Made from downstream side of bridge.

Channel and control.—Probably not permanent. Bed at measuring section composed of coarse gravel. A determination by leveling, September 6, 1912, indicated that there would be no flow past the gage if the river stage were to fall to 2.7 feet ±0.1 foot. On November 11, 1913, this stage was found to be 2.2 feet ±0.2 foot.

Extremes of stage.—Maximum stage recorded during year: 8.8 feet at 5 p. m. November 16, 1913, and 6 p. m. April 26, 1914. Minimum stage recorded: 3.05 feet September 25 to 30.

Winter flow.—Discharge relation may be affected by ice for short periods during December, January, and February.

Data insufficient for estimates of discharge.

Discharge measurements of Greenbrier River near Marlinton, W. Va., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 11	Peterson and Walters	4.84	982
12	....do	4.60	816

Daily gage height, in feet, of Greenbrier River near Marlinton, W. Va., for the year ending Sept. 30, 1914.

[C. H. McCoy, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.40	4.13	4.9	4.43	7.6	4.44	5.5	4.38	3.28	3.42	3.26	3.41
2	3.53	4.00	5.0	4.38	6.4	4.40	6.4	4.20	3.38	3.39	3.27	3.36
3	3.51	3.92	4.45	4.34	5.2	4.36	6.3	4.10	3.30	3.27	3.26	3.36
4	3.43	3.80	4.40	4.41	4.85	4.8	5.6	3.93	3.30	3.27	3.26	3.26
5	3.40	3.77	4.33	4.36	4.7	4.8	5.05	4.33	3.30	3.27	3.26	3.26
6	3.33	3.73	4.28	4.29	4.65	4.75	4.7	5.05	3.74	3.47	3.26	3.25
7	3.32	3.71	4.75	4.16	4.8	4.75	4.55	5.05	3.69	3.42	3.26	3.25
8	3.28	3.70	4.8	4.10	4.95	4.6	6.0	4.75	3.61	3.37	3.26	3.25
9	3.56	4.7	4.75	4.15	5.1	3.85	6.2	4.55	3.48	3.37	3.26	3.25
10	3.70	4.46	4.7	5.2	5.1	3.80	5.6	4.44	3.38	3.27	3.36	3.25
11	4.03	4.8	4.6	5.15	4.8	3.78	5.1	4.24	3.28	3.27	3.36	3.25
12	3.96	4.6	4.5	4.7	4.7	3.78	4.75	4.18	3.38	3.27	3.36	3.25
13	3.87	4.7	4.46	4.6	4.85	4.05	4.45	4.10	3.34	3.27	3.41	3.25
14	3.80	7.0	4.39	4.8	5.1	4.18	4.25	3.94	3.28	3.29	3.51	3.25
15	3.76	7.7	4.34	4.8	5.1	4.55	4.38	3.84	3.27	3.53	3.57	3.25
16	3.72	8.4	4.29	4.75	5.0	5.1	5.15	3.74	3.27	3.73	3.37	3.25
17	3.67	7.6	4.27	4.7	4.9	5.35	5.6	3.70	3.27	3.68	3.26	3.15
18	3.73	6.1	4.24	4.5	4.85	6.1	5.2	3.60	3.17	3.52	3.26	3.15
19	3.96	5.35	4.18	4.24	5.6	5.4	4.48	3.56	3.17	3.47	3.26	3.15
20	4.75	4.6	4.09	4.20	7.2	4.95	5.1	3.50	3.17	3.37	3.26	3.15
21	5.05	4.42	3.99	7.1	5.8	4.6	5.4	3.46	3.17	3.28	3.16	3.15
22	5.0	4.36	3.96	6.9	5.4	4.55	5.15	3.40	3.17	3.27	3.16	3.15
23	4.6	4.30	3.97	6.2	5.15	4.45	4.85	3.34	3.27	3.27	3.16	3.10
24	4.95	4.26	4.04	5.9	5.05	4.42	4.65	3.28	3.27	3.27	3.16	3.10
25	5.8	4.18	4.18	5.9	4.95	4.85	4.28	3.28	3.52	3.26	3.16	3.05
26	6.2	4.04	6.4	5.8	4.9	6.0	8.4	3.28	4.27	3.26	3.51	3.05
27	5.7	3.94	5.4	5.8	4.7	7.2	7.0	3.28	3.97	3.51	3.96	3.05
28	5.05	4.15	4.65	5.7	4.55	7.2	5.6	3.28	3.82	3.61	3.86	3.05
29	4.7	4.34	4.7	5.6	.....	6.8	5.0	3.31	3.62	3.51	3.66	3.05
30	4.5	4.6	4.6	5.6	.....	6.7	4.7	3.20	3.47	3.41	3.46	3.05
31	4.34	.....	4.49	7.7	.....	6.1	.....	3.18	.....	3.26	3.46	.....

NOTE.—Observer reported ice gorging below gage, Mar. 4–8. Discharge relation probably affected by ice about Jan. 14–16, Feb. 13–18, and Mar. 4–8.

GREENBRIER RIVER AT ALDERSON, W. VA.

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

Drainage area.—1,340 square miles.

Records available.—August 1, 1895, to July 15, 1906; May 10, 1907, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths.

Discharge measurements.—Made from downstream side of bridge.

Channel and control.—Permanent, or nearly so; channel wide and shallow.

Extremes of discharge.—Maximum stage recorded during year: 7.6 feet at 6 p. m. February 20; discharge, 15,000 second-feet. Minimum stage recorded: 1.55 feet at 6 p. m. September 19; discharge, 86 second-feet.

No record of floods previous to establishment of station. Maximum stage since establishment of station, 19.4 feet at 6 p. m. March 27, 1913.

Winter flow.—Discharge relation little if at all affected by ice.

No discharge measurements were made at this station during the year ending September 30, 1914.

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1....	183	828	2,620	1,820	12,300	2,860	4,880	2,380	287	280	260	512
2....	164	696	6,520	1,620	6,800	2,500	5,690	2,040	294	246	200	405
3....	178	598	5,150	1,620	4,100	1,920	8,520	1,720	274	234	200	315
4....	169	533	3,480	1,440	3,220	1,720	6,240	1,500	246	223	188	287
5....	211	481	2,500	1,370	2,620	2,140	4,360	1,480	301	188	164	246
6....	194	434	2,040	1,300	2,620	2,140	3,350	2,040	287	183	140	223
7....	287	380	2,040	1,230	6,800	1,920	2,740	3,220	260	164	159	200
8....	246	415	3,850	1,230	8,520	1,720	2,380	2,860	246	188	260	211
9....	234	884	3,480	1,920	5,420	1,680	6,520	2,620	280	234	194	188
10....	217	3,980	2,620	4,100	3,850	1,480	5,690	2,140	287	246	260	169
11....	331	3,350	2,260	4,100	3,100	2,380	3,850	1,820	240	223	246	217
12....	671	2,380	1,820	3,480	2,380	1,920	3,100	1,560	217	178	331	356
13....	576	2,140	1,480	2,860	1,920	3,480	2,500	1,370	200	200	380	471
14....	490	3,480	1,230	2,380	1,240	2,860	1,920	1,210	183	1,000	347	452
15....	396	9,700	1,160	2,140	1,190	3,350	2,140	1,080	194	720	315	380
16....	364	11,900	1,030	1,820	1,230	6,240	6,800	971	169	544	331	260
17....	323	14,300	942	1,480	1,130	11,300	7,080	842	164	533	301	200
18....	308	8,230	842	1,300	1,190	13,300	5,150	774	188	610	240	150
19....	280	4,880	814	1,300	3,100	9,100	3,980	720	169	443	211	95
20....	364	3,350	747	1,240	14,000	5,960	4,880	622	169	347	194	101
21....	1,720	2,500	708	5,690	8,810	4,100	7,360	587	159	301	159	101
22....	2,140	1,820	696	9,700	5,420	3,480	5,420	544	164	301	150	101
23....	1,480	1,480	720	5,150	5,420	3,220	4,100	512	140	260	140	105
24....	1,240	1,190	708	3,850	4,880	3,220	3,220	490	140	211	124	101
25....	5,150	971	801	9,100	3,600	3,350	2,620	452	159	183	132	101
26....	7,080	855	2,880	8,230	3,100	5,690	2,740	424	183	183	164	120
27....	4,880	760	6,240	5,420	2,980	10,900	12,600	405	234	211	274	124
28....	2,860	828	3,720	3,980	2,860	9,400	6,240	364	659	178	396	109
29....	1,920	2,040	2,860	3,350	.....	9,100	4,360	364	415	169	1,130	113
30....	1,390	2,380	2,620	3,480	.....	6,800	3,100	323	315	211	659	109
31....	1,030	.....	1,920	4,100	.....	5,420	.....	308	.....	253	659	.....

NOTE.—Daily discharge determined from a rating curve well defined between 46 and 8,230 second-feet. Open-water rating curve used throughout year.

Monthly discharge of Greenbrier River at Alderson, W. Va., for the year ending Sept. 30, 1914.

[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.		
October	7,080	164	1,200	0.896	1.03	A.
November	14,300	380	2,930	2.19	2.44	A.
December	6,520	696	2,270	1.69	1.95	B.
January	9,700	1,230	3,280	2.45	2.82	B.
February	14,000	1,130	4,420	3.30	3.44	B.
March	13,300	1,480	4,670	3.49	4.02	B.
April	12,600	1,920	4,780	3.57	3.98	A.
May	3,220	308	1,220	.910	1.05	A.
June	659	140	241	.180	.20	A.
July	1,000	164	305	.228	.26	B.
August	1,130	124	287	.214	.25	B.
September	512	95	217	.162	.18	B.
The year	14,300	95	2,130	1.59	21.62	

Days of deficiency in discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895–1914.

Discharge in second-feet.	Days of deficient discharge.									
	[a] 1895	1895–96	1896–97	1897–98	1898–99	1899–1900	1900–1901	1901–2	1902–3	1903–4
46	.....	0	0	0	0	0	.....	0	0	0
70	0	10	3	2	1	4	.....	11	4	1
90	6	30	15	13	8	22	0	28	5	27
110	8	34	18	20	23	36	6	37	9	42
130	16	36	26	32	36	76	10	46	23	73
160	22	56	28	38	45	95	17	59	53	109
200	29	74	32	53	71	125	20	93	82	153
250	35	97	36	74	95	133	25	109	93	169
300	47	108	43	81	103	141	41	130	108	172
370	58	122	61	97	108	160	54	150	121	181
450	60	130	69	112	114	180	68	163	136	197
550	60	147	79	133	117	208	81	185	148	218
700	60	176	117	156	124	234	109	217	162	225
850	60	199	149	170	141	243	137	238	172	236
1,000	61	229	175	186	159	262	171	252	189	244
1,200	.....	248	205	212	178	273	197	258	203	257
1,500	.....	272	233	233	217	282	222	268	216	272
2,000	.....	293	264	256	246	301	253	288	238	288
2,500	.....	315	281	280	270	311	271	297	274	311
3,000	.....	318	294	297	284	318	295	305	298	327
4,000	.....	332	310	315	309	333	313	316	314	338
6,000	.....	348	334	339	331	350	330	327	335	352
9,000	.....	357	351	354	345	359	345	343	349	362
12,000	.....	362	358	358	357	361	352	351	354	364
16,000	.....	364	359	364	359	364	357	359	357	366
20,000	.....	365	361	364	361	365	362	360	360	.....
25,000	.....	366	363	364	362	.....	364	361	363	.....
30,000	.....	.....	363	364	363	.....	364	364	364	.....
40,000	.....	.....	364	364	364	.....	364	365	365	.....
50,000	.....	.....	364	365	365	.....	364	.....	.....	.....
62,500	.....	.....	365	.....	.....	.....	365	.....	.....	.....

[a] Aug. 1 to Sept. 30, 1895.

Days of deficiency in discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895–1914—Continued.

Discharge in second-feet.	Days of deficient discharge.									
	1904–5	[a] 1905–6	[b] 1906–7	1907–8	1908–9	1909–10	1910–11	[c] 1911–12	1912–13	1913–14
46	0	0	.....	.....	.....	.....	.....	0	.....	.....
70	23	1	.....	.....	.....	0	0	1	.....	.....
90	46	1	.....	0	0	2	2	6	.....	0
110	73	9	.....	4	3	6	13	13	0	9
130	79	9	.....	8	7	7	17	19	5	13
160	88	16	0	15	37	10	32	31	20	24
200	95	25	1	22	81	26	61	45	44	54
250	98	26	2	25	89	44	88	55	65	85
300	109	37	7	36	112	61	98	59	78	103
370	129	45	11	49	121	79	132	66	102	124
450	143	56	20	69	133	106	167	79	119	136
550	160	63	30	84	140	124	186	94	139	148
700	174	81	47	99	152	140	202	121	164	159
850	201	90	60	111	167	159	212	149	179	173
1,000	232	108	73	120	175	190	223	160	196	178
1,200	247	135	81	131	186	222	233	176	219	188
1,500	268	158	95	151	214	248	248	203	249	209
2,000	289	183	105	185	245	281	266	246	268	231
2,500	313	202	111	210	267	297	274	270	280	251
3,000	319	211	119	236	279	309	283	288	294	273
4,000	328	230	125	266	303	328	306	308	319	305
6,000	343	250	132	318	341	346	337	333	338	333
9,000	354	262	140	339	359	355	352	346	348	351
12,000	358	268	141	350	363	360	359	357	354	360
16,000	360	271	143	356	365	364	359	358	360	365
20,000	362	271	143	356	.....	364	362	365	363	.....
25,000	363	273	143	362	.....	364	364	365	363	.....
30,000	364	.....	143	364	.....	364	364	365	363	.....
40,000	365	.....	143	364	.....	365	365	366	364	.....
50,000	.....	.....	144	366	.....	.....	.....	.....	365	.....
62,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

[a] Oct. 1, 1905, to June 30, 1906.
[b] May 10 to Sept. 30, 1907.
[c] Below 1,200 second-feet, the table, for the year ending Sept. 30, 1912, is partly dependent upon estimates of daily flow for the period Jan. 8–18, 1912, when the discharge relation was affected by ice.

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 mouth of Rock Creek.

Drainage area.—248 square miles.

Records available.—July 3, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to bridge read once daily to hundredths. Limits of use: Hundredths below 5, half-tenths from 5 to 7, and tenths above 7 feet.

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. Measuring section at railroad bridge is poor and measurements are made at the wooden bridge near the railroad depot whenever possible.

Channel and control.—Probably permanent.

Extremes of stage.—Maximum stage recorded during year: 12.1 feet at 5.30 p. m. November 16, 1913. Minimum stage recorded: 3.93 feet at 7.20 a. m. June 21, 1914.

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

Data insufficient for estimates of discharge.

The following discharge measurement was made by Peterson and Walters:

December 1, 1913: Gage height, 5.97 feet; discharge, 701 second-feet.

Daily gage height, in feet, of Gauley River at Allingdale, W. Va., for the year ending Sept. 30, 1914.

[Harry Jones, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.87	5.45	5.9	5.6	7.5	5.5	7.3	5.8	4.33	4.46	4.15	4.98
2	4.67	5.35	7.6	5.5	6.6	5.1	10.1	.....	5.35	4.29	4.13	4.81
3	6.0	5.25	6.85	5.45	6.2	5.0	8.6	.....	5.35	4.31	4.07	4.78
4	5.2	5.25	6.4	5.35	5.95	5.4	7.3	.....	5.3	4.17	4.05	4.45
5	5.4	5.15	6.1	5.4	5.85	5.3	6.6	.....	5.3	4.23	4.03	4.55
6	5.0	5.1	5.75	5.3	5.85	5.3	6.25	.....	5.35	4.18	4.09	4.46
7	4.91	5.0	6.0	5.3	6.3	5.3	5.95	.....	4.33	4.31	4.18	4.43
8	4.76	5.0	6.9	5.3	6.5	5.25	6.95	.....	4.31	4.26	5.25	4.43
9	5.05	5.7	6.35	5.7	6.0	5.1	8.4	.....	4.28	4.30	5.4	4.38
10	5.7	6.1	6.05	5.65	6.05	5.55	6.9	.....	4.28	4.11	4.84	4.45
11	5.55	5.9	5.9	6.2	5.8	5.3	6.4	.....	4.21	4.07	4.83	4.43
12	5.3	5.8	5.7	5.9	6.05	5.55	6.15	.....	4.18	4.06	4.80	4.48
13	5.3	6.05	5.6	6.2	5.4	5.65	5.95	.....	4.04	4.03	5.45	4.47
14	5.05	8.7	5.5	6.05	5.3	5.7	5.7	.....	4.08	4.23	4.95	4.48
15	4.92	10.4	5.4	5.6	5.25	5.55	5.6	.....	4.18	4.31	4.81	4.48
16	4.89	11.5	5.35	5.45	5.1	6.55	7.5	.....	4.16	4.83	4.63	4.38
17	4.88	10.0	5.3	5.45	5.35	8.1	7.7	.....	4.08	4.71	4.53	4.31
18	4.86	8.7	5.3	5.4	5.2	7.2	5.95	.....	4.08	4.58	4.43	4.24
19	5.55	6.75	5.5	5.3	6.3	6.1	6.4	.....	4.02	4.48	4.33	4.16
20	5.5	6.25	5.25	5.45	9.4	6.3	7.7	.....	3.98	4.36	4.28	4.47
21	6.95	5.95	5.3	9.7	7.3	6.0	7.8	.....	3.93	4.25	4.23	4.30
22	6.2	5.7	5.25	8.5	6.55	6.25	6.9	.....	4.08	4.15	4.67	4.18
23	6.25	5.55	5.2	6.5	6.25	5.7	6.45	.....	4.29	4.11	4.63	4.13
24	6.25	5.45	5.35	6.3	5.95	5.65	6.1	4.71	5.1	4.11	4.49	4.17
25	7.9	5.25	5.35	9.3	5.9	6.1	5.9	4.67	5.0	4.23	4.38	4.28
26	10.4	5.25	6.95	7.3	5.75	7.4	7.2	4.58	5.65	4.26	4.68	4.44
27	7.9	5.2	6.3	6.65	5.75	9.0	8.2	4.43	5.1	4.23	5.7	4.33
28	7.6	5.35	6.0	6.35	5.5	9.2	7.0	4.33	4.76	4.59	5.15	4.33
29	6.6	6.4	5.85	5.75	.....	8.4	6.4	4.53	4.55	4.26	5.65	4.26
30	6.15	5.0	5.75	7.1	.....	7.8	6.0	4.83	4.53	4.24	5.5	4.23
31	5.85	.....	5.6	7.4	.....	8.2	.....	4.38	.....	4.15	5.15	.....

NOTE.—Discharge relation probably affected by ice about Jan. 13–18. No record May 2–23.

GAULEY RIVER NEAR SUMMERSVILLE, W. VA.

Location.—At highway bridge known as Brock's Bridge, 2½ miles southeast of Summersville, W. Va., and one-eighth mile below mouth of Muddlety Creek.

Drainage area.—686 square miles.

Records available.—July 6, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 4.5, half-tenths from 4.5 to 6, and tenths above 6 feet.

Discharge measurements.—Made from downstream side of bridge.

Channel and control.—Practically permanent.

Extremes of stage.—Maximum stage recorded during year: 16.2 feet at 5 p. m. November 16, 1913. Minimum stage recorded: 3.45 feet at 7 a. m. and 6 p. m. August 5, 1914.

Winter flow.—Discharge relation possibly affected by ice for short periods.

Accuracy.—Gage-height record reliable.

Data insufficient for estimates of discharge.

The following discharge measurement was made by Peterson and Walters:

November 19, 1913: Gage height, 8.83 feet; discharge, 3,500 second-feet.

Daily gage height, in feet, of Gauley River near Summersville, W. Va., for the year ending Sept. 30, 1914.

[J. W. Dermody, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.95	6.2	7.6	6.6	9.9	6.3	9.4	7.0	4.19	3.91	3.73	5.2
2	5.05	6.0	10.3	6.4	8.5	5.6	11.6	6.6	4.07	3.88	3.65	4.8
3	5.1	5.85	9.2	6.3	7.7	5.85	10.9	6.4	4.07	3.81	3.63	4.75
4	7.5	5.65	8.2	6.2	7.3	6.2	9.3	6.2	4.02	3.76	3.55	4.65
5	6.2	5.5	7.6	6.2	7.0	6.2	8.3	6.4	4.02	3.91	3.45	4.45
6	5.5	5.45	7.0	6.1	7.1	6.1	7.5	9.8	4.11	3.98	3.63	4.30
7	5.4	5.3	7.2	6.0	7.9	6.2	7.0	9.0	4.06	3.84	3 65	4 17
8	5.05	5.3	8.8	6.0	8.2	6.0	9.5	8.0	3.96	3.74	3.95	4.23
9	5.25	7.9	8.1	7.0	7.4	5.85	10.9	7.5	3.88	3.76	4.8	4.30
10	7.0	7.7	7.6	8.3	7.0	5.65	9.2	7.0	3.88	3.84	4.8	4.17
11	6.1	7.3	7.2	8.2	6.9	6.3	8.1	6.6	3.76	3.91	4.5	4.17
12	5.85	7.2	6.8	7.2	6.2	6.2	7.5	6.4	3.76	3.88	4.65	4.25
13	5.75	7.7	6.5	6.4	6.2	6.0	7.0	6.1	3.54	3.78	5.7	4.42
14	5.5	11.6	6.4	6.6	5.95	6.1	6.7	6.0	3.86	3.86	5.25	4.32
15	5.3	14.1	6.0	5.9	5.55	7.2	6.7	5.85	3.76	4.85	4.65	4.19
16	5.15	15.4	5.95	6.0	5.85	9.0	1.0	5.6	3.66	5.05	4.85	4.04
17	5.1	13.4	5.9	6.2	6.2	10.8	10.5	5.45	3.66	4.9	4.17	3.99
18	4.95	10.4	5.9	6.2	5.45	10.6	9.0	5.35	3.64	4.65	4.07	3.86
19	5.45	8.7	6.0	6.2	9.9	9.1	8.2	5.2	3.61	4.41	3.90	3.79
20	6.8	7.9	5.85	6.7	12.9	8.2	10.4	5.05	3.64	4.24	3.85	3.79
21	8.9	7.3	5.8	12.5	9.8	7.2	10.6	4.95	3.58	4.01	3.85	3.74
22	8.1	6.7	5.8	10.3	8.4	7.2	9.0	4.8	3.56	3.81	4.8	3 69
23	7.6	6.5	5.7	8.7	8.0	6.9	8.1	4.6	3.58	3.76	4.55	3.64
24	7.3	6.2	5.7	8.1	7.5	6.9	7.4	4.65	3.61	3.76	4.35	3.74
25	13.1	6.0	6.0	11.5	6.7	7.8	7.0	4.6	4.9	3.66	4.7	3.74
26	13.5	5.85	8.1	9.9	6.8	10.1	11.0	4.6	5.15	3.70	5.95	3.47
27	10.3	5.7	8.1	8.6	6.4	11.8	10.8	4.47	5.0	3.90	6.9	3.84
28	8.7	6.4	7.4	8.1	6.4	12.3	9.0	4.37	4.55	4.33	5.9	3.76
29	7.7	8.5	7.1	8.4	.....	11.0	8.0	4.22	4.26	4.10	5.85	3.74
30	7.1	7.7	7.0	8.6	.....	10.3	7.5	4.07	4.04	4.00	6.0	3.64
31	6.5	.....	6.6	10.2	.....	10.8	.....	4.25	.....	3.85	5.65	.....

NOTE.—Discharge relation probably affected by ice about Jan. 13–19, Feb. 13–19, and Mar. 4–6.

GAULEY RIVER AT 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.

Drainage area.—1,420 square miles.

Records available.—August 25, 1908, to September 30, 1914.

Gage.—Vertical staff fastened to tree on right bank; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 2, half-tenths from 2 to 4, and tenths above 4 feet. Sea-level elevation of the zero of the gage, 663.53 feet.

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

Channel and control.—Practically permanent.

Extremes of stage.—Maximum stage recorded during year: 14.1 feet at 6 p. m. November 16, 1913. Minimum stage not known because no gage readings are available from July 14 to August 1, 1914.

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

Winter flow.—Discharge relation may be affected by ice at intervals during December, January, and February.

Accuracy.—Records of gage height accurate and reliable.

Data insufficient for estimates of discharge.

The following discharge measurement was made at Gauley Bridge, about 5 miles below the gage, by Peterson and Walters:

November 21, 1913: Gage height, 4.69 feet; discharge, 3,540 second-feet.

Daily gage height, in feet, of Gauley River near Belva, W. Va., for the year ending Sept. 30, 1914.

[C. L. Davis, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.35	3.4	5.3	4.2	7.4	4.0	6.6	4.5	1.82	1.59	.....	2.7
2	2.75	3.2	7.6	4.0	6.0	3.75	8.0	4.1	1.82	1.49	1.37	2.55
3	2.8	3.05	7.2	3.95	5.3	3.4	8.2	3.8	1.78	1.39	1.28	2.45
4	4.1	2.95	5.9	3.85	4.8	3.5	6.8	3.6	1.73	1.33	1.20	2.4
5	4.0	2.8	5.2	3.8	4.5	3.8	5.7	3.8	1.82	1.25	1.14	2.25
6	3.4	2.65	4.6	3.75	4.5	3.85	5.1	6.1	1.81	1.15	1.04	1.95
7	3.0	2.6	4.6	3.7	5.2	4.2	4.6	6.7	1.77	1.05	1.00	1.88
8	2.7	2.6	6.0	3.8	5.8	4.0	5.0	5.9	1.77	1.17	.94	1.82
9	2.55	2.95	5.6	4.7	5.2	3.85	9.0	5.4	1.73	1.37	.91	1.81
10	2.75	4.8	5.1	6.4	4.8	3.6	7.0	4.9	1.67	1.14	1.14	1.81
11	3.1	4.6	4.7	6.2	4.4	3.9	5.9	4.6	1.61	.99	1.84	1.81
12	2.95	4.4	4.3	5.4	4.0	5.0	5.1	4.2	1.55	.93	2.1	1.81
13	2.8	4.9	4.0	4.5	3.65	4.8	4.6	3.95	1.45	.92	2.0	1.84
14	2.75	8.0	3.75	4.3	3.55	4.8	4.3	3.75	1.41	.....	2.45	1.91
15	2.6	11.3	3.6	4.2	3.5	5.1	4.2	3.55	1.36	.....	2.35	1.87
16	2.5	13.2	3.5	4.1	3.6	6.6	7.4	3.35	1.45	.....	2.1	1.83
17	2.4	12.5	3.4	4.2	3.75	8.6	9.0	3.15	1.39	.....	1.92	1.77
18	2.35	8.5	3.3	4.2	3.5	9.0	7.1	3.0	1.29	.....	1.78	1.63
19	2.4	6.5	3.3	4.0	7.1	7.3	5.9	2.85	1.22	.....	1.67	1.54
20	3.25	5.4	3.3	4.2	11.8	6.3	8.7	2.75	1.15	.....	1.58	1.50
21	5.4	4.7	3.2	9.1	8.0	5.3	6.5	2.65	1.03	.....	1.62	1.43
22	5.0	4.3	3.15	8.5	6.8	5.0	7.7	2.55	.96	.....	1.55	1.37
23	4.4	3.85	3.1	6.4	5.7	4.7	5.7	2.5	.91	.....	1.97	1.29
24	4.4	3.65	3.05	5.7	5.3	4.7	5.1	2.45	.89	.....	1.98	1.25
25	7.0	3.4	3.15	8.6	4.6	4.9	4.6	2.35	.89	.....	1.88	1.20
26	11.0	3.25	4.0	8.0	4.4	7.0	6.8	2.25	1.03	.....	1.92	1.14
27	7.7	3.1	5.6	6.6	4.2	9.2	8.6	2.15	2.25	.....	3.25	1.13
28	6.0	3.4	5.0	5.7	4.0	9.1	6.6	2.1	2.15	.....	3.4	1.13
29	5.0	5.7	4.6	5.5	.....	8.6	5.6	1.99	1.92	.....	3.0	1.13
30	4.4	5.5	4.4	5.8	.....	7.9	5.0	1.93	1.72	.....	3.2	1.21
31	3.85	.....	4.3	6.2	.....	7.3	.....	1.85	.....	.....	2.85	.....

NOTE.—Discharge relation probably affected by ice Feb. 13–18 and Mar. 2–5.

CHERRY RIVER AT RICHWOOD, W. VA.

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

Drainage area.—Not measured.

Records available.—July 3, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to half-tenths. Limits of use: Hundredths below 3, half-tenths from 3 to 4, and tenths above 4 feet.

Discharge measurements.—Made from downstream side of bridge.

Channel and control.—Practically permanent. The removal of stones and bowlders from the river bed in the vicinity of the point of control has at times affected the relation of gage height to discharge. The first stones were removed during August, 1909, and more were removed during May, June, July, and August, 1911. 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 $\pm$ 0.2 foot.

Extremes of stage.—Maximum stage recorded during year: 5.5 feet at 5 p. m. November 15, 1913. Minimum stage recorded: 1.66 feet at 7.30 a. m. and 6 p. m. July 1, 1914.

Winter flow.—Discharge relation affected by ice at times during December, January, and February.

Accuracy.—See "Control."

Data insufficient for estimates of discharge.

Discharge measurements of Cherry River at Richwood, W. Va., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 2	Peterson and Walters	3.89	916
2	....do	3.85	894

Daily gage height, in feet, of Cherry River at Richwood, W. Va., for the year ending Sept. 30, 1914.

[Floyd Artrip, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.23	2.61	3.35	2.65	3.6	2.65	3.65	2.77	2.01	1.66	1.75	2.12
2	2.23	2.53	3.9	2.58	3.2	3.7	4.1	2.67	2.01	1.76	1.75	2.04
3	2.98	2.45	3.35	2.62	3.0	3.45	3.7	2.57	1.96	1.94	1.75	2.04
4	2.83	2.43	3.15	2.60	2.88	3.35	3.25	2.57	1.96	1.84	1.73	1.96
5	2.58	2.38	2.95	2.50	2.88	2.68	3.05	2.77	2.01	1.86	1.75	1.94
6	2.45	2.33	2.75	2.48	2.85	2.48	2.88	3.4	2.04	1.81	1.75	1.89
7	2.41	2.33	3.05	2.45	3.1	2.46	2.80	3.1	1.96	1.76	1.73	1.89
8	2.33	2.35	3.1	2.45	3.0	2.43	3.85	2.97	1.96	1.74	1.87	1.89
9	2.28	2.93	2.98	2.75	2.82	2.38	3.55	2.87	1.91	2.26	1.90	1.84
10	2.43	2.73	2.80	2.95	2.80	2.43	3.2	2.77	1.88	1.96	2.15	1.84
11	2.41	2.68	2.75	2.80	2.70	2.48	3.0	2.69	1.86	1.86	2.00	1.86
12	2.53	2.68	2.68	2.72	2.70	2.40	2.90	2.62	1.86	1.81	2.37	2.06
13	2.43	2.93	2.60	2.80	2.60	2.43	2.76	2.59	1.91	1.75	2.27	2.02
14	2.35	4.3	2.55	2.70	2.60	2.40	2.68	2.55	1.86	2.35	2.07	1.94
15	2.33	5.1	2.52	2.70	2.62	2.73	3.0	2.47	1.84	2.27	1.95	1.86
16	2.31	5.0	2.50	2.60	2.58	3.35	4.5	2.42	1.78	2.13	1.90	1.84
17	2.25	3.55	2.50	2.52	2.58	3.8	3.65	2.37	1.76	2.05	1.85	1.82
18	2.38	3.3	2.55	2.48	2.60	3.65	3.25	2.35	1.74	2.07	1.80	1.79
19	2.43	3.2	2.52	2.50	3.9	3.25	3.05	2.32	1.71	1.95	1.75	1.74
20	3.3	2.98	2.50	3.0	3.9	3.0	3.7	2.27	1.78	1.87	1.75	1.74
21	3.15	2.85	2.50	4.4	3.25	2.90	3.5	2.27	1.81	1.85	2.25	1.74
22	2.93	2.71	2.50	3.5	3.0	2.76	3.2	2.22	1.81	1.80	2.10	1.74
23	3.1	2.63	2.50	3.15	3.0	2.68	3.0	2.22	1.81	1.75	1.95	1.74
24	4.1	2.53	2.60	3.1	2.90	2.70	2.87	2.17	1.88	1.75	1.97	1.74
25	4.3	2.51	2.60	4.0	2.75	3.2	2.77	2.15	1.88	1.75	2.27	1.79
26	4.6	2.43	3.3	3.4	2.70	4.4	4.2	2.12	1.91	1.85	2.96	1.84
27	3.65	2.43	3.0	3.2	2.70	4.4	3.55	2.07	1.84	2.23	2.54	1.79
28	3.2	3.1	2.85	3.1	2.62	4.7	3.2	2.05	1.78	2.00	2.29	1.74
29	2.98	3.2	2.78	3.45	.....	4.1	3.0	2.01	1.76	1.90	2.44	1.74
30	2.81	2.98	2.72	3.7	.....	4.1	2.87	2.11	1.71	1.85	2.29	1.74
31	2.71	.....	2.68	4.6	.....	4.0	.....	2.06	.....	1.83	2.22	.....

NOTE.—Discharge relation probably affected by ice Jan. 13–18, Feb. 14–18, and Mar. 1–13.

MEADOW RIVER NEAR RUSSELLVILLE, W. VA.

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

Drainage area.—297 square miles.

Records available.—July 17, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to trees on left bank just above the bridge, near former ferry crossing; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 4.5, half-tenths from 4.5 to 5.5, and tenths above 5.5 feet.

Discharge measurements.—Made from the concrete highway bridge built in 1913, or by wading.

Channel and control.—Practically permanent.

Extremes of stage.—Maximum stage recorded during year: 10.8 feet, November 17, 1913. Minimum stage recorded: 2.59 feet at 6 p. m. July 2, 1914.

Winter flow.—Discharge relation at times affected by ice gorges.

Accuracy.—Gage-height records reliable. In the fall backwater is sometimes caused at the gage by leaves lodging at the riffle below.

Data insufficient for estimates of discharge.

Discharge measurements of Meadow River near Russellville, W. Va., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 18	Peterson and Walters	9.04	2,830
20	.....do	6.50	1,050

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for the year ending Sept. 30, 1914.

[J. R. Bays, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.81	4.39	6.8	5.2	7.7	6.0	7.1	5.3	3.23	2.61	2.78	3.56
2	4.29	4.35	8.6	5.2	7.2	6.2	7.6	5.0	3.19	2.59	2.78	3.51
3	4.65	4.22	7.8	5.15	6.7	6.1	7.6	4.8	3.15	2.61	2.73	3.45
4	5.8	4.10	7.0	6.6	6.2	6.1	7.0	4.7	3.11	2.61	2.70	3.36
5	5.25	3.99	6.4	6.3	5.8	6.1	6.5	4.8	3.09	2.85	2.66	3.25
6	4.65	3.91	5.9	6.0	5.5	6.0	6.1	5.5	3.27	2.85	2.62	3.19
7	4.29	3.86	5.6	5.7	6.4	5.7	5.7	6.6	3.25	2.80	2.58	3.13
8	4.05	3.82	6.6	5.6	6.9	5.45	6.5	6.5	3.23	2.78	2.58	3.05
9	3.93	4.43	6.3	5.8	6.5	5.15	8.4	6.4	3.18	2.75	2.98	2.99
10	3.75	5.1	6.0	6.3	6.2	4.85	7.6	6.2	3.14	2.84	3.14	2.92
11	3.66	5.3	5.8	6.6	5.8	5.9	6.7	5.9	3.09	2.79	3.07	2.90
12	3.59	5.25	5.45	6.3	5.45	7.2	6.2	5.6	3.01	2.74	3.16	2.97
13	3.54	6.0	5.15	7.7	5.35	6.6	5.9	5.45	2.95	2.70	3.24	3.01
14	3.63	6.7	4.95	7.1	5.3	6.5	5.6	5.2	2.91	2.82	3.20	2.99
15	3.51	7.9	4.85	6.7	5.6	6.9	5.35	4.85	2.85	3.17	3.13	2.99
16	3.45	(a)	4.8	6.4	5.5	7.9	8.2	4.6	2.81	3.71	3.09	3.01
17	3.43	(a)	4.7	5.9	5.4	9.6	8.7	4.5	2.75	3.67	2.97	3.00
18	3.41	8.4	4.6	5.7	5.8	9.9	7.8	4.42	2.73	3.52	2.90	2.94
19	3.42	7.3	4.55	5.7	6.7	7.8	7.4	4.34	2.75	3.41	2.84	2.89
20	3.86	6.4	4.5	5.8	8.0	6.9	7.6	4.28	2.69	3.36	2.75	2.85
21	4.65	5.8	4.48	10.1	8.1	6.3	7.4	4.18	2.71	3.31	3.48	2.81
22	4.9	5.35	4.44	8.9	7.1	6.0	7.1	4.06	2.69	3.22	3.21	2.78
23	4.75	4.95	4.43	7.6	7.0	6.4	6.7	3.95	2.79	3.14	2.89	2.81
24	5.0	4.75	4.42	6.9	6.7	5.8	6.2	3.88	2.79	3.04	2.85	2.89
25	6.8	4.55	4.6	9.5	6.5	6.5	5.7	3.80	2.73	2.93	3.30	2.84
26	8.5	4.46	5.8	8.2	6.2	8.2	5.5	3.72	2.69	2.84	3.51	2.75
27	7.6	4.36	5.8	7.4	6.1	9.5	6.3	3.66	2.66	2.85	4.01	2.70
28	6.6	4.7	5.8	7.3	6.0	9.0	6.4	3.58	2.63	2.79	4.07	2.67
29	5.7	7.0	5.5	7.1	.....	8.6	6.0	3.47	2.63	2.76	3.85	2.64
30	4.85	6.5	5.4	7.0	.....	7.8	5.6	3.37	2.61	2.74	3.70	2.62
31	4.55	.....	5.3	7.7	.....	7.2	.....	3.29	.....	2.78	3.62	.....

a Observer unable to reach gage; water too high. Flood reached a stage of 10.8 feet on Nov. 17 as determined when the station was visited on Nov. 18, 1913.

NOTE.—Discharge relation probably affected by ice about Jan. 13–20, Feb. 15–18, and Mar. 1–6.

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 mouth of Back Fork Creek.

Drainage area.—168 square miles.

Records available.—July 1, 1908, to September 30, 1914.

Gage.—Vertical staff attached to right abutment of bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 3, half-tenths from 3 to 5, and tenths above 5 feet.

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

Channel and control.—Practically permanent. 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.

Extremes of stage.—Maximum stage recorded during year: 6.9 feet at 5 p. m. November 16, 1913. Minimum stage recorded: 1.40 feet at 8 a. m. September 24, 1914.

Winter flow.—Discharge relation sometimes affected by ice.

Data insufficient for estimates of discharge.

Discharge measurements of Elk River at Webster Springs, W. Va., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 3	Peterson and Walters	3.26	610
3	....do	3.24	604

Daily gage height, in feet, of Elk River at Webster Springs, W. Va., for the year ending Sept. 30, 1914.

[Cherry Woodzell, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.88	2.69	3.45	2.72	4.0	2.67	3.85	2.92	1.67	1.92	1.66	1.92
2	1.93	2.51	3.35	2.67	3.5	2.70	5.4	2.82	1.66	1.82	1.62	1.82
3	2.48	2.44	3.2	2.64	3.25	2.75	4.5	2.72	1.62	1.84	1.52	1.80
4	2.58	2.35	3.1	2.58	3.05	2.80	3.8	2.62	1.60	1.81	1.49	1.72
5	2.48	2.29	2.95	2.52	2.98	2.75	3.45	2.95	1.85	2.25	1.50	1.62
6	2.28	2.21	2.80	2.48	3.05	2.60	3.2	4.3	1.92	2.22	1.50	1.58
7	2.13	2.21	3.1	2.45	3.3	2.56	2.95	3.6	1.82	1.95	1.58	1.56
8	2.09	2.73	3.55	2.46	3.3	2.40	4.0	3.35	1.74	1.82	1.56	1.54
9	2.23	3.35	3.3	2.98	3.15	2.40	3.8	3.1	1.68	1.72	1.55	1.51
10	3.0	3.3	3.05	3.75	2.95	2.40	3.65	2.95	1.61	1.66	1.72	1.50
11	2.85	3.1	2.91	3.4	2.82	2.50	3.35	2.80	1.58	1.63	1.72	1.50
12	2.75	3.1	2.81	3.1	2.70	2.50	3.1	2.58	2.25	1.60	1.90	1.58
13	2.58	3.6	2.72	3.0	2.59	2.49	2.92	2.58	2.15	1.55	2.28	1.60
14	2.45	5.4	2.60	3.0	2.62	2.45	2.82	2.48	1.86	1.75	2.15	1.68
15	2.35	6.1	2.56	3.2	2.70	2.62	3.1	2.42	1.76	2.19	1.89	1.65
16	2.25	6.7	2.52	3 2	2.68	3.7	4.25	2.32	1.68	2.38	1.82	1.61
17	2.17	5.1	2.50	2.60	2.72	4.4	4.05	2.29	1.62	2.25	1.72	1.55
18	2.28	4.05	2.50	2.61	2.80	4.15	3.6	2. 4	1.58	2.12	1.64	1.52
19	2.68	3.5	2.50	2.59	4.85	3.6	3.25	2.19	1.54	2.09	1.57	1.50
20	3.25	3.25	2.50	3.2	4.9	3.3	3.95	2.13	1.55	1.95	1.52	1.52
21	3.75	3.0	2.48	5.2	3.3	2.99	4.0	2.07	1 68	1.82	1.52	1.52
22	3.35	2.81	2.53	4.05	3.4	2.93	3.5	2.02	1.80	1.80	1.55	1.46
23	2.15	2.67	2.56	3.5	3.25	2.82	3.25	2.00	2.48	1.72	1.54	1.42
24	3.3	2.63	2.56	3.4	3.05	2.89	3.0	1.98	2.82	1.64	1.50	1.44
25	4.25	2.53	2.83	4.6	2.88	3.5	2.88	1.94	4.3	1.69	1.56	1.50
26	4.85	2.43	4.05	3.8	2.78	4.35	3.35	1.88	3.05	1.80	1.75	1.50
27	3.9	2.48	3.5	3.5	2.68	4.95	4.55	1.82	2.62	2.15	2.10	1.49
28	3.4	2.75	3.15	3.3	2.65	5.2	3.6	1.80	2.35	2.04	2.12	1.48
29	3.1	3.2	2.95	3.5	.....	4.6	3.3	1.78	2.15	1.82	2.08	1.48
30	2.85	2.98	2.88	3.7	.....	4.2	3.05	1.74	2.02	1.82	2.11	1.46
31	2.75	.....	2.82	4.45	.....	4.1	.....	1.70	.....	1.72	2.04	.....

NOTE.—Discharge relation probably affected by ice, Jan. 13-19, Feb. 14-18, and Mar. 2-5.

ELK RIVER AT GASSAWAY, W. VA.

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

Drainage area.—578 square miles.

Records available.—July 1, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to bridge. From July 1, 1908, to May 5, 1913, the gage was located at the Coal & Coke Railroad bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 3, half-tenths from 3 to 3.5, and tenths above 3.5 feet. Sea-level elevation of zero of gage, 796.31 feet.

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

Channel and control.—Probably permanent. 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 ±0.2 foot.

Extremes of stage.—Maximum stage recorded during year: 21.2 feet at 4.15 p. m. November 16, 1913. Minimum stage recorded: 1.31 feet at 6.45 a. m. and 5.40 p. m. September 30, 1914.

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.

Winter flow.—Ice may affect the discharge relation for short periods.

Data insufficient for estimates of discharge.

Discharge measurements of Elk River at Gassaway, W. Va., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 29	Peterson and Walters	4.57	1,420
29	....do	4.66	1,480

Daily gage height, in feet, of Elk River at Gassaway, W. Va., for the year ending Sept. 30, 1914.

[H. A. Hays, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.01	3.45	4.7	3.05	4.7	3.9	5.9	6.5	1.64	2.67	1.74	2.23
2	2.16	4.4	5.2	3.0	4.6	3.5	7.5	6.3	1.62	2.04	1.68	2.13
3	2.28	4.9	5.3	3.05	4.5	3.3	10.6	6.2	1.59	1.84	1.59	2.08
4	2.17	4.9	5.2	3.15	4.5	3.1	7.4	5.8	1.58	1.82	1.57	2.03
5	2.12	4.4	5.2	3.25	4.5	3.2	6.2	6.1	1.65	1.86	1.53	1.94
6	2.06	3.8	5.1	3.4	4.5	3.7	5.5	8.9	1.68	1.88	1.49	1.86
7	2.17	3.6	5.0	3.45	4.5	4.8	4.5	7.5	1.79	1.84	1.45	1.74
8	2.29	3.35	5.0	3.6	4.4	4.9	5.8	5.9	1.76	1.79	1.43	1.70
9	2.23	3.35	4.9	3.7	4.8	4.6	9.5	5.0	1.72	1.66	1.43	1.64
10	2.19	3.5	5.2	3.8	4.4	4.4	6.8	4.4	1.62	1.63	1.45	1.62
11	2.16	3.8	5.1	4.0	4.5	3.9	5.7	3.8	1.57	1.63	1.71	1.64
12	2.14	4.6	5.0	4.5	4.6	3.7	5.3	3.45	1.52	1.74	2.17	1.60
13	2.12	6.3	4.9	4.5	4.6	3.7	4.8	3.25	1.52	1.71	2.12	1.58
14	2.08	13.4	4.0	4.3	4.4	3.6	4.6	3.05	1.68	1.67	2.18	1.55
15	2.26	16.0	3.3	4.0	4.4	3.8	4.8	2.88	1.85	2.69	2.08	1.56
16	2.35	18.8	3.15	3.9	4.2	4.3	6.4	2.71	1.71	4.0	1.88	1.55
17	2.29	16.1	3.1	3.8	4.0	8.6	8.5	2.66	1.62	3.00	1.81	1.54
18	2.32	8.7	3.05	3.6	3.7	7.5	6.9	2.62	1.58	2.69	1.70	1.54
19	2.60	6.3	3.1	3.5	13.4	5.6	7.5	2.55	1.54	2.42	1.63	1.51
20	3.1	5.1	3.05	3.8	18.3	5.0	11.7	2.39	1.61	2.32	1.58	1.47
21	5.2	4.4	3.0	12.8	14.3	4.0	10.2	2.26	1.60	2.24	1.55	1.44
22	5.8	4.2	3.1	10.1	9.4	4.0	7.5	2.13	1.60	2.15	1.51	1.42
23	4.8	4.0	3.15	8.9	6.0	4.2	7.1	2.07	2.24	1.98	1.48	1.40
24	4.8	3.9	3.2	7.8	5.0	4.4	6.9	2.03	3.7	1.84	1.50	1.39
25	7.5	3.9	3.25	6.3	4.1	5.0	9.3	1.98	4.0	1.99	1.92	1.36
26	13.4	3.9	3.35	5.4	3.9	7.1	15.8	1.96	5.8	2.37	2.14	1.34
27	7.7	4.0	3.35	4.9	3.8	9.2	10.6	1.84	5.9	2.44	2.50	1.33
28	6.3	4.4	3.25	4.9	4.0	8.0	7.4	1.82	5.4	2.27	2.22	1.33
29	4.7	4.7	3.2	4.8	.....	6.4	6.7	1.76	4.0	2.08	2.30	1.32
30	4.1	4.6	3.1	4.8	.....	5.1	6.6	1.73	3.05	1.99	2.34	1.31
31	3.4	.....	3.1	4.7	.....	5.5	.....	1.68	.....	1.83	2.36	.....

NOTE.—Discharge relation probably affected by ice about Jan. 12–18, and Feb. 12–17.

ELK RIVER AT CLENDENIN, W. VA.

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

Drainage area.—Not measured.

Records available.—June 27, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 3, half-tenths from 3 to 4, and tenths above 4 feet. Sea-level elevation of zero of gage, 588.69 feet.

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

Channel and control.—Probably permanent. 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 foot $\pm$ 0.2 foot.

Extremes of stage.—Maximum stage recorded during year: 21.8 feet at 4.25 p. m. November 16 and 7.10 a. m. November 17, 1913. Minimum stage recorded: 1.75 feet at 5 p. m. September 29, 1914.

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

Winter flow.—Discharge relation affected by ice at times during December, January, and February.

Accuracy.—Gage heights at times affected by backwater from Big Sandy Creek, which joins Elk River immediately below the gage. This backwater may be negligible at low stages in the Big Sandy, but at other times it may form a large percentage of the flow in Elk River above the junction of the two streams. On November 28, 1913, engineers of the Survey found the flow of the creek to be

29 per cent of the flow in Elk River above Big Sandy. The discharge and drainage area of Big Sandy Creek should therefore be included in estimating discharge at this station; that is, the Clendenin gage should be considered an index of the flow of Elk River just below the mouth of Big Sandy Creek. Discharge measurements at this station previously published do not include the flow of the Big Sandy.

Discharge measurements of Elk River at Clendenin, W Va., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 28	Peterson and Walters	4.02	1,240
28	.....do	4.16	1,330

Daily gage height, in feet, of Elk River at Clendenin, W. Va., for the year ending Sept. 30, 1914.

[J. W. Riley, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.72	3.85	5.8	4.8	6.7	4.9	6.5	5.3	2.28	2.72	2.33	2.70
2	2.58	3.6	7.6	4.6	6.5	4.8	7.4	4.8	2.25	2.53	2.21	2.58
3	2.50	3.4	6.8	4.7	5.8	4.6	10.3	4.4	2.18	2.41	2.17	2.81
4	2.58	3.3	6.0	5.1	5.2	4.4	9.1	4.2	2.15	2.41	2.11	2 66
5	2.58	3.15	5.4	5.2	5.0	4.6	7.0	5.0	2.17	2.35	2.09	2.58
6	3.65	3.1	4.9	5.0	5.4	5.2	6.0	8.8	2.23	2.20	2.05	2.52
7	3.35	3.0	5.4	5.0	6.0	6.6	5.4	7.7	2.21	2.11	2.05	2.40
8	3.1	2.93	7.5	5.2	6.2	6.4	5.9	7.3	2.19	2.14	1.99	2.32
9	2.92	3.25	7.3	7.6	5.9	5.7	7.7	6.4	2.21	2.14	1.99	2.26
10	2.75	5.2	6.5	11.0	5.4	5.2	8.4	5.4	2.34	2.29	2.03	2.20
11	2.66	6.0	5.7	9.2	5.0	5.0	6.6	4.8	2.20	2.28	2.00	2.20
12	3.35	5.6	5.2	7.3	4.6	5.0	5.8	4.6	2.17	2.11	2.73	2.20
13	3.4	6.4	4.6	5.7	4.3	5.1	5.2	4.3	2.14	2.06	3.65	2.25
14	3.35	10.4	4.4	5.1	4.2	5.5	4.8	4.1	2.02	2.19	3.2	2.19
15	3.25	15.1	4.2	4.9	4.2	6.0	4.7	3.85	1.98	3.15	2.86	2.15
16	3.1	19.3	4.0	4.9	4.1	6.9	7.9	3.7	1.96	3.7	2.78	2.11
17	2.96	20.4	3.9	5.1	3.9	7.9	9.1	3.5	2.26	4.3	2.64	2.09
18	2.89	11.1	3.8	5.3	4.9	8.7	8.0	3.35	2.30	3.75	2.52	2.07
19	2.82	7.3	3.8	5.0	13.8	8.0	6.5	3.2	2.22	3.3	2.38	2.05
20	4.1	6.0	3.75	5.0	18.9	6.5	9.9	3.1	2.08	3.0	2.28	2.01
21	4.9	5.2	3.7	7.7	11.2	6.0	12.7	2.95	2.04	2.83	2.22	2.02
22	6.1	4.7	3.7	10.5	7.4	5.5	8.9	2.89	1.98	2.76	2.18	2.01
23	5.4	4.4	3.65	7.3	6.1	5.6	6.8	2.81	1.94	2.53	2.14	1.96
24	4.9	3.95	3.65	6.2	5.1	5.7	5.8	2.73	2.02	2.47	2.15	1.89
25	5.6	3.8	3.8	8.2	4.9	5.7	5.2	2.65	2.80	2.43	2.16	1.88
26	8.3	3.65	7.2	9.5	4.8	6.0	10.2	2.63	3.75	2.35	2.32	1.85
27	9.3	3.6	8.2	7.3	4.9	7.1	14.0	2.57	4.5	2.86	2.28	1.87
28	6.5	4.4	6.7	6.2	4.8	8.0	9.1	2.50	3.7	2.87	2.82	1.79
29	5.4	4.9	5.8	5.5	.....	8.1	6.9	2.43	3.35	2.55	2.94	1.76
30	4.7	5.2	5.3	5.2	.....	7.2	5.9	2.37	2.87	2.51	2.82	1.81
31	4.2	.....	5.0	5.7	.....	6.4	.....	2.31	.....	2.50	2.76	.....

NOTE.—Discharge relation probably not materially affected by ice.

COAL RIVER AT BRUSHTON, W. VA.

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

Drainage area.—379 square miles.

Records available.—June 23, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 2.5, half-tenths from 2.5 to 4, and tenths above 4 feet. Sea-level elevation of the zero of the gage, 633.83 feet.

Discharge measurements.—Made from downstream side of bridge or by wading.
Channel and control.—Practically permanent.
Extremes of stage.—Maximum stage recorded during year: 8 feet at 8 a. m. February 20. Minimum stage recorded: 0.8 foot at 7 a. m. and 6 p. m. July 8.
Winter flow.—Discharge relation little if at all affected by ice.
Accuracy.—Gage-height records reliable.

Data insufficient for estimates of discharge.
The following discharge measurement was made by wading by Peterson and Walters: November 23, 1913: Gage height, 2.10 feet; discharge, 166 second-feet.

Daily gage height, in feet, of Coal River at Brushton, W. Va., for the year ending Sept. 30, 1914.

[G. W. Fitzpatrick, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.58	1.66	3.15	3.0	3.65	3.05	3.5	2.6	1.34	0.97	1.25	1.55
2	1.59	1.62	4.7	2.85	3.35	2.8	4.0	2.46	1.31	.97	1.21	1.42
3	1.50	1.56	3.8	2.95	3.15	2.7	4.2	2.38	1.28	.95	1.17	4.1
4	1.48	1.55	3.2	3.0	3.0	2.75	3.85	2.31	1.24	91	1.14	2.47
5	1.44	1.52	2.85	2.95	2.9	2.75	3.4	2.46	1.49	.89	1.04	2.04
6	1.41	1.48	2.6	2.9	2.95	3.05	3.1	2.75	1.83	.88	1.03	1.82
7	1.39	1.46	3.25	2.95	3.65	3.7	2.9	3.8	1.58	.83	1.01	1.72
8	1.36	1.46	3.45	3.0	3.9	3.8	3.35	3.6	1.41	.80	.99	1.66
9	1.33	1.82	3.55	4.6	3.5	3.5	5.1	3.5	1.35	1.13	1.00	1.58
10	1.31	2.28	3.15	6.2	3.2	3.3	4.6	3.35	1.32	1.07	1.01	1.46
11	1.30	2.30	2.95	4.8	3.0	4.6	3.8	3.15	1.24	1.08	1.13	1.66
12	1.34	2.27	2.7	3.9	2.75	6.0	3.45	3.1	1.22	1.07	1.28	1.92
13	1.34	2.5	2.5	3.3	2.65	5.1	3.2	2.9	1.15	1.01	1.27	1.84
14	1.32	3.65	2.40	3.05	2.6	4.4	3.05	2.65	1.10	1.61	1.32	1.68
15	1.32	3.4	2.29	2.85	2.48	4.0	3.15	2.5	1.08	2.03	1.37	1.60
16	1.32	5.2	2.19	2.7	2.46	4.3	5.9	2.39	.98	3.9	1.22	1.50
17	1.30	4.9	2.14	2.65	2.33	4.6	6.6	2.28	1.03	3.05	1.23	1.44
18	1.30	3.7	2.11	2.6	3.05	4.3	4.6	2.19	.98	2.65	1.15	1.40
19	1.38	2.9	2.04	2.6	6.6	4.0	3.95	2.10	1 08	2.95	1.11	1.34
20	1.90	2.6	2.00	2.6	7.5	3.75	6.3	2.00	1.08	2.27	1.07	1.28
21	2.04	2.38	1.99	3.2	5.1	3.3	5.6	1.92	1.04	1.89	1.13	1.25
22	2.04	2.23	1.98	3.55	4.1	3.25	4.5	1.86	1.03	1.74	1.08	1.23
23	1.89	2.11	1.89	3.1	3.75	3.4	3.8	1.80	1.10	1.58	1.01	1.20
24	1.82	2.01	1.88	2.85	4.7	3.8	3.4	1.75	1.16	1.47	1.00	1.18
25	2.95	1.92	1.86	3.6	4.1	4.1	3.15	1.72	1.16	1.41	1.21	1.22
26	3.3	1.84	3.65	4.3	3.6	4.1	3.75	1.66	1.13	1.44	1.87	1.20
27	2.55	1.88	4.0	4.0	3.25	3.9	3.4	1.60	1.27	1.67	2.11	1.17
28	2.20	2.14	3.5	3.3	3.1	3.6	3.1	1.55	1.11	1.59	2.09	1.14
29	2.04	2.48	3.2	3.0	.....	3.3	2.9	1.50	97	1.47	1 91	1.12
30	1.92	2.55	3.05	2.9	.....	3.25	2.75	1.44	.98	1.41	1.79	1.11
31	1.74	.....	3.0	3.3	.....	3.3	.....	1.40	.....	1.27	1.43	.....

NOTE.—Discharge relation probably not materially affected by ice.

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 mouth of Fuqua Creek.
Drainage area.—Not measured.
Records available.—October 12, 1911, to September 30, 1914.
Gage.—Staff gage in two sections on right bank; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 3.5, half-tenths from 3.5 to 4, and tenths above 4 feet.
Discharge measurements.—Made from boat 300 feet above gage or by wading.
Channel and control.—Probably permanent. 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 $\pm$ 0.2 foot referred to gage datum.
Extremes of stage.—Maximum stage recorded during year: 15.8 feet at 7.30 a. m, February 20. Minimum stage recorded: 0.5 foot at 7.30 a. m. July 10.

Winter flow.—Discharge relation probably affected by ice for short periods.
Accuracy.—Gage-height record reliable.

Data insufficient for estimates of discharge.

Discharge measurements of Coal River at Fuqua, W., Va. during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 22	B. J. Peterson	2.38	444
22	do	2.36	432

NOTE.—Measurements made by wading at Tornado.

Daily gage height, in feet, of Coal River at Fuqua, W. Va., for the year ending Sept. 30, 1914.

[W. C. Hoy, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.66	1.45	3.8	3.7	6.6	3.85	5.0	3.28	1.10	0.64	1.00	1.44
2	.88	1.32	7.6	3.5	5.2	3.65	6.5	3.02	1.06	.62	.90	1.30
3	.87	1.24	5.9	3.6	4.5	3.5	6.6	2.85	1.00	.60	.88	10.0
4	.81	1.17	4.4	3.95	4.0	3.55	5.6	2.71	.96	.60	.82	3.55
5	.78	1.12	4.0	3.95	3.75	3.44	4.8	3.8	1.02	.58	.78	2.42
6	.74	1.08	3.07	3.8	3.6	3.9	4.1	4.4	1.34	.56	.72	1.78
7	.72	1.04	3.65	3.8	4.3	5.2	3.7	6.5	1.40	.54	.72	1.64
8	.70	1.04	6.3	3.9	5.4	5.6	4.6	5.6	1.19	.52	.69	1.62
9	.66	1.33	5.2	6.1	4.8	5.1	8.4	5.3	1.08	.51	.67	1.59
10	.63	1.96	4.3	9.7	4.2	4.5	8.0	4.9	1.01	.51	.66	1.43
11	.62	2.40	3.8	8.5	3.9	5.0	6.0	4.6	.94	.55	.78	1.44
12	.60	2.33	3.30	5.9	3.46	11.5	5.0	4.1	.86	.58	.95	2.06
13	.58	2.72	2.94	4.4	3.19	9.0	4.3	3.9	.81	.54	1.04	2.06
14	.57	4.2	2.74	3.9	3.6	7.4	3.95	3.48	.82	.81	.94	1.80
15	.57	4.4	2.52	3.65	3.34	6.5	4.0	3.20	.76	1.86	1.06	1.59
16	.57	7.7	2.34	3.32	3.24	6.2	7.7	2.92	.72	3.18	1.17	1.44
17	.56	9.2	2.23	3.12	4.0	6.8	12.0	2.66	.70	6.1	1.14	1.32
18	.59	5.5	2.14	2.98	4.6	6.4	8.1	2.46	.67	3.36	1.00	1.23
19	.74	3.9	2.04	2.86	11.5	5.8	6.2	2.26	.66	3.55	.88	1.16
20	1.07	3.10	1.96	2.80	14.8	5.3	12.2	2.10	.68	2.52	.81	1.11
21	1.58	2.67	1.90	3.07	9.8	4.5	11.6	1.96	.81	1.95	.77	1.06
22	1.65	2.36	1.86	4.2	6.6	4.3	8.0	1.84	.84	1.64	.90	1.00
23	1.55	2.14	1.84	3.6	5.4	4.7	6.1	1.78	.81	1.42	.75	.94
24	1.40	2.07	1.78	3.25	5.6	5.7	5.0	1.68	.78	1.26	.72	.93
25	1.98	1.88	1.71	4.2	5.5	6.0	4.4	1.58	.81	1.16	1.19	.96
26	5.3	1.80	4.3	5.9	4.8	6.1	6.1	1.49	.80	1.41	1.81	.96
27	3.27	1.74	6.1	5.2	4.2	5.7	5.6	1.41	.80	1.37	2.46	.90
28	2.76	2.39	4.8	4.4	3.95	5.0	4.6	1.33	.90	1.70	2.32	.88
29	2.26	2.75	4.1	3.8	.....	4.5	4.1	1.26	.76	1.38	2.38	.81
30	1.74	2.85	3.8	3.5	.....	4.3	3.7	1.21	.69	1.18	1.89	.78
31	1.56	.....	3.7	5.1	.....	4.7	.....	1.14	.....	1.08	1.65	.....

NOTE.—On Feb. 17 observer reported ice along shores. Discharge relation probably not materially affected by ice.

POCOTALIGO RIVER AT SISSONVILLE, W. VA.

Location.—At highway bridge at the post office at Sissonville, W. Va., one-fourth mile below mouth of Grapevine Creek.
Drainage area.—Not measured.
Records available.—June 26, 1908, to September 30, 1914.
Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 2.5, half-tenths from 2.5 to 3.5, and tenths above 3.5 feet.

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

Channel and control.—Sand and gravel; may shift during floods. A determination by leveling, August 10, 1910, indicated that there would be no flow past the gage if the stage were to fall to 1.2 feet ± 0.2 foot. On November 25, 1913, this stage was found to be 0.7 foot ± 0.2 foot.

Extremes of stage.—Maximum stage recorded during year: 21.5 feet, February 19. Minimum stage recorded: 0.9 foot July 11, 12, and 13.

The flood of June 27, 1910, reached a height of 33 feet by the gage datum. Some of the flood water passed around the gage.

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

Regulation.—A dam and small power plant above the station modify the low-water flow.

Data insufficient for estimates of discharge.

Discharge measurements of Pocotaligo River at Sissonville, W. Va., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 25	Peterson and Walters	2.37	68
25	....do	2.42	70

NOTE.—Measurements made by wading at a section about 250 feet above gage.

Daily gage height, in feet, of Pocotaligo River at Sissonville, W. Va., for the year ending Sept. 30, 1914.

[B. N. Sisson, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.51	1.97	6.2	2.85	6.6	5.1	3.35	2.85	1.14	1.06	1.14	2.26
2	1.63	1.94	7.0	2.7	4.2	4.0	7.4	2.75	1.22	1.02	1.09	2.28
3	1.71	1.66	3.6	3.1	3.35	3.8	5.2	2.6	1.20	1.02	1.11	2.65
4	1.51	1.87	3.6	4.4	3.2	3.7	3.9	2.5	1.20	.99	1.10	2.6
5	1.42	1.59	3.1	4.6	3.25	4.3	3.4	7.9	1.14	1.05	1.11	2.22
6	1.31	1.25	2.95	4.4	3.5	5.7	3.0	10.9	1.24	1.08	1.09	2.22
7	1.25	1.43	6.8	4.4	3.4	6.5	3.4	5.8	1.17	1.02	1.08	2.12
8	1.25	1.20	6.2	4.7	3.05	4.8	6.0	4.5	1.10	1.08	1.11	2.33
9	1.21	2.47	4.7	7.9	2.65	4.3	7.5	4.2	1.13	.98	1.13	2.22
10	1.19	4.6	3.6	7.9	2.6	3.8	4.4	3.6	1.13	.96	1.06	2.25
11	1.21	4.4	3.3	4.8	2.6	3.9	3.6	3.15	1.14	.92	2.85	1.95
12	1.17	4.1	3.0	3.7	2.5	3.6	3.3	2.95	1.10	.91	4.3	2.05
13	1.14	6.4	2.7	3.15	2.45	3.8	3.05	2.95	.99	.91	4.5	1.92
14	1.13	7.9	2.7	3.1	2.7	4.6	2.85	2.8	1.06	1.20	2.8	2.07
15	1.08	7.7	2.6	2.85	2.9	5.3	3.05	2.5	1.03	3.2	2.55	2.07
16	1.10	18.4	2.29	2.8	2.85	4.8	9.6	2.41	1.10	2.35	2.6	2.02
17	1.09	10.2	2.35	2.8	2.9	3.9	5.8	2.25	1.09	2.05	2.5	2.02
18	1.14	4.6	2.35	2.85	4.6	3.7	4.1	2.19	1.08	1.70	2.40	1.87
19	1.24	3.6	2.26	2.6	17.7	3.5	3.8	1.94	1.09	1.59	2.40	1.79
20	4.3	3.1	2.18	2.6	13.1	3.35	12.1	1.96	1.10	1.42	2.20	1.87
21	3.6	2.85	2.19	2.9	5.2	3.2	6.8	1.77	1.06	1.55	2.04	1.77
22	3.2	2.65	2.12	3.15	4.1	3.35	5.0	1.84	1.11	1.25	2.20	2.12
23	2.5	2.55	2.18	2.75	3.8	3.8	3.6	1.62	1.07	1.13	2.5	2.01
24	2.8	2.37	2.65	2.65	3.4	4.2	3.2	1.70	1.07	1.15	5.1	1.97
25	6.3	2.98	3.2	5.7	3.3	3.6	3.05	1.77	1.06	1.21	3.7	1.82
26	7.0	2.10	10.8	4.3	3.2	3.35	12.5	1.52	1.04	1.27	2.95	1.77
27	3.7	2.08	5.8	3.4	4.0	3.15	7.1	1.14	1.23	1.19	2.7	1.82
28	2.95	3.4	4.0	3.05	4.3	3.6	4.3	1.54	1.11	1.17	2.47	1.78
29	2.75	4.8	3.45	2.85	.....	3.9	3.6	1.38	1.09	1.13	2.7	1.41
30	2.33	3.6	3.2	2.8	.....	3.9	3.2	1.32	1.07	1.11	2.5	1.68
31	2.43	.....	3.0	7.0	.....	3.4	.....	1.26	.....	1.14	2.42	.....

NOTE.—Discharge relation probably not affected by ice.

SCIOTO RIVER BASIN.

SCIOTO RIVER AT CHILLICOTHE, OHIO.

Location.—At the Scioto Valley Traction Co.'s bridge.
Drainage area.—3,760 square miles.
Records available.—December 1, 1913, to September 30, 1914.
Gage.—Vertical staff attached to south side of middle concrete pier of bridge; read daily, in the morning.
Discharge measurements.—Made from highway bridge about 100 feet west of gage; at low water, by wading.
Channel and control.—Rock, gravel, and mud; probably fairly permanent.
Extremes of stage.—Maximum stage recorded during year: 13.7 feet March 30. Minimum stage not known as no records are available during parts of February, March, June, and July.
Winter flow.—Discharge relation probably affected by ice during parts of January, February, and March.
Accuracy.—Gage-height record reliable.
Cooperation.—Gage heights furnished by United States Weather Bureau.

Data insufficient for estimates of discharge.

Discharge measurements of Scioto River at Chillicothe, Ohio, during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 12	Ellsworth and Adams	0.25	526
July 18	R. M. Adams	−.05	413

Daily gage height, in feet, of Scioto River at Chillicothe, Ohio, for the year ending Sept. 30, 1914.

[Marion MacKey, observer.]

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.0	1.6	7.0	.....	10.5	2.0	0.5	.....	−0.2	1.2
2	2.0	1.5	8.8	.....	10.1	1.9	.4	.....	−.3	.6
3	2.1	1.5	6.2	.....	12.2	1.9	.3	.....	−.3	.4
4	2.0	1.4	5.0	.....	13.0	1.8	.2	.....	−.3	.4
5	1.9	1.3	5.0	.....	13.1	1.7	.2	.....	−.4	.1
6	1.9	1.3	4.9	4.0	7.0	1.6	.2	.....	−.4	.1
7	1.7	1.2	4.1	6.3	3.1	1.6	.2	.....	−.4	.1
8	1.7	1.2	7.0	8.3	3.8	1.6	.1	.....	−.4	.1
9	1.7	1.6	9.0	8.3	11.0	4.1	.1	.....	−.4	.1
10	1.6	1.7	5.5	6.1	12.8	5.2	.1	.....	−.4	.1
11	1.6	1.7	5.4	5.8	10.8	4.8	.1	.....	−.4	.0
12	1.5	1.6	5.4	6.4	9.4	4.0	.1	.....	−.4	−.1
13	1.4	1.5	5.3	6.3	8.8	3.8	.1	.....	−.5	−.1
14	1.4	.....	4.9	5.7	8.0	4.9	.1	.....	−.5	−.1
15	1.4	3.0	4.8	8.1	7.1	5.8	.1	.....	−.5	−.2
16	1.0	2.9	4.8	11.0	4.8	5.7	.....	.....	−.5	−.2
17	1.3	1.8	4.7	11.9	4.4	5.2	.....	.....	−.5	−.2
18	.8	1.6	4.7	10.6	3.8	5.1	.....	−0.05	−.5	−.3
19	.7	1.5	4.7	9.7	3.1	4.4	.....	.....	−.4	−.3
20	.6	1.5	4.9	8.4	3.1	4.1	.....	.....	−.4	−.3
21	.5	1.9	4.9	5.0	2.9	3.1	.....	.....	−.4	−.3
22	.5	1.9	4.7	4.8	2.5	2.6	.....	.....	−.4	−.3
23	.5	1.8	4.7	4.0	2.4	2.1	.....	.....	−.4	−.3
24	1.8	1.8	.....	3.1	2.0	1.6	.....	.....	−.4	−.3
25	2.1	3.5	.....	3.0	1.8	1.4	.....	.....	−.3	−.3
26	2.2	6.6	.....	2.5	2.4	1.0	.....	.....	.0	−.4
27	2.0	4.7	.....	2.4	2.0	.8	.....	.....	.0	−.4
28	1.9	3.7	.....	8.8	2.6	.7	.3	.....	.0	−.4
29	1.7	3.1	.....	12.0	2.6	.7	.3	.....	.7	−.4
30	1.7	2.0	.....	13.7	2.5	.7	.2	.....	3.7	−.4
31	1.7	2.4	.....	12.2	.....	.6	.....	.....	2.1	.....

NOTE.—No record of stage Feb. 24 to Mar. 5; June 16 to Aug. 1 except July 18.

LITTLE MIAMI RIVER BASIN.

LITTLE MIAMI RIVER AT PLAINVILLE, OHIO.

Location.—At the steel highway bridge about half a mile above the Pennsylvania Railroad station.

Drainage area.—1,680 square miles.

Records available.—July 10 to September 30, 1914.

Gage.—Chain gage attached to downstream side of bridge; read morning and evening to quarter-tenths. Limits of use: Hundredths below 6.2, half-tenths from 6.2 to 7.6, and tenths above 7.6 feet.

Discharge measurements.—Made from downstream side of bridge; at low water, by wading.

Channel and control.—Channel consists of heavy gravel and rock, covered with layer of mud. Control is at a riffle about 600 feet below gage; practically permanent.

Accuracy.—Discharge relation affected by backwater during extremely high water in Ohio River.

Data insufficient for estimates of discharge.

Discharge measurements of Little Miami River at Plainville, Ohio, during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 4	Ellsworth and Adams	6.11	180
July 14	do	8.45	1,440
Aug. 19	do	5.57	73.4

Daily gage height, in feet, of Little Miami River at Plainville, Ohio, for the year ending Sept. 30, 1914.

[John Burns, observer.]

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	5.60	7.45	11	5.78	5.64	5.95	21	5.98	5.44	5.50
2	.....	5.54	7.05	12	5.68	5.52	5.91	22	5.88	5.48	5.51
3	.....	5.55	6.7	13	5.78	5.72	5.85	23	5.78	5.64	5.50
4	.....	5.44	6.4	14	8.5	6.17	5.52	24	5.80	5.65	5.66
5	.....	5.45	6.2	15	7.05	5.82	5.68	25	5.72	8.1	5.58
6	.....	5.49	6.00	16	6.6	5.66	5.66	26	5.60	8.0	5.62
7	.....	5.48	6.12	17	6.4	5.58	5.61	27	5.61	6.85	5.58
8	.....	5.48	5.98	18	6.14	5.54	5.50	28	5.65	8.2	5.59
9	.....	5.50	5.95	19	6.00	5.52	5.54	29	5.55	14.5	5.62
10	5.78	5.52	5.88	20	6.12	5.49	5.40	30	5.61	9.6	5.65
								31	5.62	8.2	.....

LICKING RIVER BASIN.

LICKING RIVER AT FALMOUTH, KY.

Location.—At the highway bridge on Ferry Street, about 500 feet above mouth of South Fork.

Drainage area.—2,290 square miles.

Records available.—January 1 to September 30, 1914.

Gage.—Chain gage attached to bridge; read daily, morning and evening.

Discharge measurements.—Made from bridge, from boat, or by wading, according to stage.

Channel and control.—Fairly permanent.

Winter flow.—Discharge relation probably not materially affected by ice.

Accuracy.—Discharge relation may be affected by backwater during high water in South Fork.

Data insufficient for estimates of discharge.

Discharge measurements of Licking River at Falmouth, Ky., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 30	Ellsworth and Adams	1.70	291
Aug. 15	Ellsworth and Streeter	1.47	146

Daily gage height, in feet, of Licking River at Falmouth, Ky., for the year ending Sept. 30, 1914.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.2	11.0	6.0	7.6	3.9	1.6	1.2	1.3	2.2
2	4.0	9.0	4.5	10.0	3.7	1.5	1.2	1.3	2.0
3	3.9	6.6	4.2	9.8	3.5	1.5	1.1	1.2	1.9
4	3.9	7.6	4.0	8.8	3.5	1.5	1.1	1.2	1.7
5	6.6	5.3	4.0	6.6	4.0	2.6	1.1	1.2	1.5
6	4.7	6.1	3.9	6.0	5.0	4.8	1.1	1.2	1.4
7	4.3	9.6	5.2	4.2	9.5	5.2	1.1	1.2	1.4
8	4.3	7.0	5.0	4.2	9.5	3.4	1.1	1.1	1.3
9	4.2	5.5	4.8	4.0	9.0	4.3	1.1	1.1	1.6
10	4.2	5.0	4.4	4.2	8.5	3.5	1.1	1.1	1.5
11	4.1	4.8	5.2	4.5	7.0	2.5	1.0	1.2	1.5
12	4.0	4.0	8.0	4.8	5.6	2.2	1.0	2.5	1.4
13	4.0	3.3	9.0	4.8	4.5	2.1	1.0	2.2	1.4
14	3.0	3.0	9.8	4.6	4.0	2.0	1.0	1.7	1.3
15	2.9	3.0	8.5	3.8	3.5	1.8	1.0	1.5	1.3
16	2.7	3.2	7.5	3.4	3.2	1.7	1.0	1.4	1.2
17	2.5	3.5	6.2	3.4	3.0	1.6	1.5	1.4	1.2
18	2.5	4.5	5.0	3.5	2.8	1.6	1.5	1.3	1.2
19	2.4	23.0	4.5	3.6	2.6	1.5	1.5	1.3	1.2
20	2.4	27.1	4.2	3.6	2.5	1.5	1.5	1.3	1.4
21	2.3	21.5	3.8	3.5	2.4	1.5	1.4	1.8	1.3
22	2.3	15.3	3.7	4.0	2.3	1.4	1.4	1.5	1.3
23	2.2	13.2	3.6	4.5	2.2	1.3	1.4	1.3	1.2
24	2.2	7.5	3.5	4.0	2.1	1.3	1.3	1.3	1.3
25	3.0	4.7	3.5	3.5	2.0	1.3	1.3	1.3	1.4
26	4.1	4.2	3.4	4.5	2.0	1.3	1.3	3.7	1.4
27	4.1	4.0	3.3	4.6	1.9	1.2	1.3	2.4	1.3
28	3.5	3.8	8.6	6.0	1.8	1.2	1.3	2.2	1.2
29	3.2	.....	7.0	5.0	1.7	1.2	1.3	5.8	1.1
30	3.0	.....	9.1	4.0	1.7	1.2	1.3	3.4	1.0
31	9.9	.....	8.2	.....	1.6	.....	1.3	2.6	.....

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.

Drainage area.—109 square miles.

Records available.—September 19, 1912, to September 30, 1914.

Gage.—Inclined staff fastened to posts on right bank; read daily, morning and evening, to half-tenths.

Discharge measurements.—Made from boat at section or at low water by wading both forks.

Channel and control.—Probably permanent.

Extremes of stage.—Maximum stage recorded during year: 6.2 feet at 5 p. m. March 27, 1914. Minimum stage recorded: 0.95 foot at 6 p. m. October 11, 1913.

Winter flow.—Affected by ice during severe winters.

Accuracy.—Gage-height record reliable.

Cooperation.—Station maintained in cooperation with the Division of Sewerage Investigation of the Department of Public Service of the City of Cincinnati, Ohio.

Data insufficient for estimates of discharge.

Discharge measurements of Mill Creek at Arlington Heights, Ohio, during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 2	Ellsworth and Adams	1.42	55.0
Aug. 11	C. E. Ellsworth	1.22	16.1
Sept. 29	Ellsworth and Streeter	1.16	22.6

Daily gage height, in feet, of Mill Creek at Arlington Heights, Ohio, for the year ending Sept. 30, 1914.

[H. C. Harris, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.20	1.12	1.60	1.30	3.42	1.20	5.30	1.30	1.35	1.12	1.15	1.22
2	1.20	1.05	1.40	1.35	1.35	1.30	2.05	1.20	1.40	1.12	1.15	1.20
3	1.20	1.08	1.35	1.30	1.30	1.80	1.40	1.20	1.40	1.15	1.15	1.18
4	1.10	1.10	1.30	1.35	1.78	1.62	1.40	1.25	1.40	1.20	1.15	1.22
5	1.05	1.15	1.30	1.30	1.60	2.00	1.38	1.75	1.55	1.15	1.18	1.28
6	1.10	1.15	1.25	1.30	1.45	1.90	1.30	1.30	1.40	1.10	1.15	1.28
7	1.10	1.18	1.28	1.35	2.20	1.85	1.38	1.20	1.40	1.10	1.15	1.45
8	1.10	1.35	1.30	1.45	1.60	1.60	1.85	1.25	1.40	1.10	1.15	1.35
9	1.05	1.20	1.20	1.52	1.50	1.58	1.40	1.20	1.38	1.10	1.35	1.25
10	1.00	1.15	1.25	1.62	1.50	1.58	1.30	1.25	2.68	1.10	1.20	1.28
11	.98	1.20	1.20	1.55	1.40	1.68	1.30	1.20	1.45	1.10	1.30	1.30
12	1.00	1.20	1.25	1.48	1.35	1.48	1.30	1.20	1.40	1.10	1.20	1.30
13	1.05	1.20	1.22	1.38	1.40	1.55	1.30	1.28	1.38	1.20	1.25	1.28
14	1.10	1.30	1.18	1.30	1.30	2.45	1.35	1.35	1.30	1.25	1.20	1.20
15	1.10	1.60	1.18	1.32	1.30	1.80	1.40	1.40	1.25	1.18	1.20	1.20
16	1.10	1.90	1.25	1.35	1.30	1.55	1.45	1.40	1.30	1.18	1.18	1.20
17	1.12	1.42	1.20	1.35	1.30	1.50	1.40	1.30	1.35	1.25	1.15	1.22
18	1.15	1.30	1.25	1.30	1.35	1.45	1.40	1.30	1.35	1.20	1.15	1.20
19	1.05	1.25	1.15	1.30	1.50	1.40	1.40	1.30	1.30	1.20	1.15	1.28
20	1.15	1.20	1.15	1.40	2.50	1.40	1.40	1.30	1.30	1.20	1.15	1.25
21	1.18	1.20	1.20	1.38	1.80	1.42	1.35	1.30	1.25	1.15	1.15	1.28
22	1.20	1.15	1.20	1.32	2.00	1.38	1.35	1.20	1.20	1.15	1.18	1.22
23	1.20	1.10	1.20	1.30	5.60	1.42	1.30	1.20	1.22	1.15	1.18	1.22
24	1.22	1.20	1.20	1.42	2.20	1.40	1.35	1.20	1.25	1.15	1.20	1.28
25	1.32	1.20	1.20	1.48	1.70	1.40	1.35	1.20	1.35	1.18	2.55	1.30
26	1.38	1.20	1.20	1.42	1.50	1.45	1.35	1.15	1.20	1.20	1.22	1.35
27	1.15	1.20	1.28	1.38	1.38	5.08	1.30	1.28	1.22	1.20	1.15	1.28
28	1.12	1.20	1.35	1.35	1.30	3.30	1.30	1.20	1.22	1.15	3.62	1.22
29	1.10	1.35	1.30	1.35	.....	2.80	1.30	1.30	1.20	1.15	2.08	1.22
30	1.10	1.35	1.35	1.30	.....	1.85	1.30	1.30	1.22	1.15	1.22	1.20
31	1.20	.....	1.25	4.90	.....	1.40	.....	1.30	.....	1.15	1.20	.....

NOTE.—Discharge relation probably affected by ice about Feb. 7–28.

MIAMI RIVER BASIN.

MIAMI RIVER AT PIQUA, OHIO.

Location.—At North Main Street Bridge at Piqua.

Drainage area.—842 square miles (determined by the Morgan Engineering Co.).

Records available.—October 1, 1913, to June 30, 1914. The United States Weather Bureau has obtained daily gage readings since January 1, 1911, and flood stages January 1, 1907, to December 31, 1910.

Gage.—Mott gage, read daily, in the morning, to tenths. Sea-level elevation of zero of gage, 848.7 feet.

Channel and control.—Channel shifts somewhat during floods.

Discharge measurements.—Made from upstream side of highway bridge, about 3,000 feet below gage, or by wading.

Floods.—The flood of March–April, 1913, which is the highest that is known to have occurred at this station, reached a stage of 23.3 feet on March 25, referred to the gage datum.

Winter flow.—Discharge relation affected by ice during part of winter.

Regulation.—Water is taken from the Miami & Erie Canal for power purposes, but there is no appreciable regulation.

Diversions.—The water in the Miami & Erie Canal—about 25 or 30 second-feet—flowing south from Sidney, is carried through a siphon under Loranne Creek, thence along the edge of the hills to Piqua, where it is used for power. It is discharged into the canal about a mile below the gage. In addition to this quantity about 40 or 50 second-feet are diverted into the lower canal level about 3 miles above the gage.

Accuracy.—Gage-height record not reliable.

Cooperation.—Gage-height record furnished by the United States Weather Bureau. Results of discharge measurements furnished by the Morgan Engineering Co., of Dayton, Ohio.

Estimates of discharge withheld.

Discharge measurements of Miami River at Piqua, Ohio, during the year ending Sept. 30, 1914.

[Made by H. R. Daubenspeck.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 23	2.0	210	June 25	1.0	69.5	Aug. 24	0.8	29.9
May 13	2.64	1,340	July 31	.85	41.1	Sept. 4	.88	38.8
13	2.64	1,390	31	.85	38.4	4	.88	35.5
June 11	.6	63.1	Aug. 12	1.8	223	25	1.05	57.9
11	.6	65.6						

NOTE.—Measurements subsequent to June 11, except that on Aug. 12, made by wading 1,500 feet below gage.

Daily gage height, in feet, of Miami River at Piqua, Ohio, for the period Oct. 1, 1913, to June 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	1.0	0.9	1.1	0.0	1.6	.....	3.0	1.7	1.0
2	.5	.0	1.6	.0	2.0	.....	5.0	1.7	1.0
3	.0	.0	1.6	.0	2.0	.....	4.0	1.6	1.0
4	.0	.0	1.6	.0	2.0	.....	4.0	1.7	1.0
5	.0	.0	1.6	.0	2.0	.....	3.0	1.7	1.0
6	.0	.0	1.6	.0	3.3	1.0	2.0	1.6	1.0
7	.0	.0	1.6	.0	2.1	4.0	2.7	1.8	1.0
8	.0	.0	.9	.0	1.3	3.0	2.3	1.9	1.0
9	.0	.5	.9	.0	1.0	2.6	1.9	2.0	1.0
10	.0	1.1	.0	.0	.....	1.6	1.3	2.6	1.0
11	.0	1.1	.0	.0	.....	2.0	3.1	2.7	1.0
12	.0	1.1	.0	.0	.....	2.0	3.6	2.7	1.0
13	.0	1.1	.0	.0	.....	2.6	3.4	2.6	1.0
14	.0	1.8	.0	.0	.....	3.9	3.5	2.3	1.0
15	.0	2.5	.0	.0	.....	4.2	3.2	2.4	1.0
16	.0	2.5	.0	.0	.....	3.6	2.7	2.0	1.0
17	.0	2.5	.0	.0	.....	3.0	2.5	1.7	1.0
18	.0	.7	.0	.0	.....	2.9	3.2	1.7	1.0
19	.0	.7	.0	.0	.....	2.0	2.7	1.4	1.0
20	.6	.0	.0	.0	.....	1.6	2.5	1.0	1.0
21	.6	.0	.0	.9	.....	1.6	2.4	1.0	1.0
22	1.2	.0	.0	1.1	.....	1.0	2.3	1.0	1.0
23	1.2	.0	.0	1.1	.....	1.0	2.0	1.0	1.0
24	1.8	.0	.0	1.8	.....	1.0	2.0	1.0	1.0
25	1.8	.0	.0	2.6	.....	1.0	2.7	1.0	1.0
26	1.8	.0	.0	2.0	.....	1.0	2.1	1.0	1.1
27	1.8	.0	.0	1.5	.....	2.0	2.0	1.0	1.1
28	1.8	.6	.0	1.0	.....	5.0	1.6	1.2	1.1
29	1.8	.6	.0	1.0	.....	4.0	1.0	1.2	1.0
30	1.8	1.1	.0	1.0	.....	5.6	1.0	1.2	1.0
31	1.8	.....	.0	1.0	.....	3.6	.....	1.0	.....

NOTE.—See "Accuracy" in station description.

MIAMI RIVER AT TADMOR, OHIO.

Location.—At the National Road Bridge at Tadmor, about 4¾ miles below the mouth of Honey Creek, which enters from the left.

Drainage area.—1,130 square miles (determined by the Morgan Engineering Co.).

Records available.—January 1 to September 30, 1914.

Gage.—Vertical staff in two sections; read daily, in the morning, to tenths. Sea-level elevation of zero of gage, 763.68 feet.

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

Channel and control.—May shift slightly during floods.

Extremes of discharge.—Maximum stage recorded during year: 11.9 feet at 12 midnight April 8; discharge, 11,400 second-feet. Minimum stage recorded: 1.5 feet August 5–9; discharge, 67 second-feet. Highest stage known: 25.4 feet, which occurred March 25, 1913.

Winter flow.—Discharge relation may be affected by ice for short periods during extremely cold weather.

Diversions.—None. All the water diverted into the Miami & Erie Canal is wasted into the river several miles above Tadmor.

Accuracy.—Records reliable.

Cooperation.—Gage-height record furnished by the United States Weather Bureau. Results of discharge measurements furnished by the Morgan Engineering Co., of Dayton, Ohio.

Discharge measurements of Miami River at Tadmor, Ohio, during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 20	H. R. Daubenspeck	2.0	139	July 16	H. R. Daubenspeck	1.85	126
Mar. 14	do	5.5	2,640	16	do	1.85	122
28	I. E. Houk	9.75	7,340	29	do	2.0	[a] 192
Apr. 17	H. R. Daubenspeck	4.0	1,360	29	do	2.05	[a] 196
25	do	2.9	559	Aug. 10	do	1.75	[a] 109
May 15	Daubenspeck and Houk	4.4	1,560	10	do	1.75	[a] 107
June 4	H. R. Daubenspeck	2.4	278	18	do	1.8	[a] 108
23	do	1.9	143	18	do	1.8	[a] 109
23	do	1.9	144	Sept. 3	do	2.1	[a] 205
July 2	do	2.1	179	3	do	2.1	[a] 201
2	do	2.1	187	24	do	2.4	297

[a] Measurement made by wading at a section about 50 feet below gage.

NOTE.—Measurements made by engineers of the Morgan Engineering Co., of Dayton, Ohio.

Daily discharge, in second-feet, of Miami River at Tadmor, Ohio, for the year ending Sept. 30, 1914.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	142	2,380	980	3,070	470	376	196	119	142
2	142	1,750	1,120	7,640	470	376	196	99	168
3	142	1,670	1,430	5,230	470	376	168	99	142
4	168	2,110	1,120	3,900	376	376	168	99	168
5	168	1,750	1,750	3,070	376	376	168	67	168
6	142	1,120	1,930	2,110	980	335	168	67	168
7	142	1,270	3,070	2,110	1,120	297	168	67	168
8	168	1,840	1,840	11,000	1,120	261	168	67	119
9	168	2,110	1,750	7,790	1,930	196	168	67	119
10	196	2,770	1,270	5,230	2,110	168	168	82	99
11	470	1,670	1,930	3,570	1,930	168	168	168	297
12	470	1,670	1,750	3,370	1,930	168	168	524	297
13	470	1,670	1,590	3,070	1,270	168	168	376	297
14	470	1,670	2,380	2,570	1,120	168	168	168	297
15	583	1,120	4,340	1,930	1,120	168	168	168	297
16	840	1,120	4,560	1,670	1,120	168	168	168	297
17	261	1,120	3,370	1,270	840	168	168	142	335
18	297	1,120	2,870	1,120	583	168	168	142	335
19	376	1,270	2,770	980	583	168	168	142	335
20	335	1,270	1,510	709	583	168	168	168	335
21	376	1,270	1,270	709	470	168	168	168	376
22	470	1,270	980	709	470	168	168	168	335
23	470	1,270	709	583	470	168	168	168	335
24	470	1,270	583	583	335	168	168	168	376
25	910	1,270	583	583	335	168	119	168	335
26	840	1,120	524	470	297	168	168	168	583
27	583	1,050	583	470	297	168	227	168	335
28	470	1,050	7,080	583	335	168	168	168	168
29	470	.....	5,830	583	376	168	168	196	168
30	421	.....	4,450	470	376	168	119	168	335
31	583	.....	3,570	.....	376	.....	119	168	.....

NOTE.—Daily discharge determined from a rating curve fairly well defined between 99 and 335 second feet, and well-defined between 335 and 11,000 second-feet. Open-water rating curve used throughout the period.

Monthly discharge of Miami River at Tadmor, Ohio, for the year ending Sept. 30, 1914.

[Drainage area, 1,130 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	910	142	394	0.349	0.40	C.
February	2,770	1,050	1,500	1.33	1.38	C.
March	7,080	524	2,240	1.98	2.28	B.
April	11,000	470	2,570	2.27	2.53	B.
May	2,110	297	795	.704	.81	A.
June	376	168	217	.192	.21	B.
July	227	119	167	.148	.17	B.
August	524	67	157	.139	.16	B.
September	583	99	264	.234	.26	B.

MIAMI RIVER AT DAYTON, OHIO.

Location.—At Main Street Bridge, Dayton, about half a mile below mouth of Mad River and 1 mile above mouth of Wolf Creek.

Drainage area.—2,450 square miles.

Records available.—March 18, 1905, to December 31, 1909, and April 1, 1913, to September 30, 1914.

Gage.—Vertical staff attached to downstream end of first pier from left bank; read once daily to tenths.

Discharge measurements.—Made from bridge.

Channel and control.—Practically permanent except during periods of extreme floods.

Extremes of discharge.—Maximum stage recorded during year ending September 30, 1914: 9 feet at 6 p. m. April 8; discharge, 22,800 second-feet. Minimum stage recorded: 0.4 foot on August 9; discharge, 215 second-feet. The flood of March-April, 1913, reached a stage of 28.1 feet on March 26.

Winter flow.—Ice may affect the discharge relation during extremely cold weather.

Diversions.—A power plant about a mile above the station may divert water around the section and a dam on Mad River about 2 miles above the station diverts water into the Miami & Erie Canal.

Accuracy.—Records good.

Cooperation.—Gage-height record furnished by the United States Weather Bureau. Results of discharge measurements furnished by the Morgan Engineering Co.

Discharge measurements of Miami River at Dayton, Ohio, during the years ending Sept. 30, 1913–14.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1912–13.		*Feet.*	*Sec.-ft.*	1913–14.		*Feet.*	*Sec.-ft.*
June 3	Smith and Bosard	2.4	1,630	May 11	H. R. Daubenspeck	3.1	2,430
5	Daubenspeck and Bosard	2.5	1,760	25	do	1.4	745
16	Bosard and Petty	1.6	920	June 6	do	1.2	550
1913–14.				15	do	.8	355
Feb. 2	Houk and Petty	3.65	3,360	26	do	.9	430
Mar. 7	Petty and Steinhilber	5.45	8,230	July 8	do	.65	252
28	do	7.65	16,300	Aug. 13	do	1.2	616
Apr. 8	Houk and Steinhilber	9.0	22,800	26	do	.6	306
				Sept. 8	do	.6	319
				28	do	.55	264

Daily discharge, in second-feet, of Miami River at Dayton, Ohio, for the years ending Sept. 30, 1913–14.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1913.							1913.						
1	12,100	2,310	3,090	743	363	363	16	9,670	1,850	1,080	904	280	412
2	9,340	2,310	3,090	1,080	363	280	17	7,430	1,850	990	904	280	467
3	8,050	2,190	2,740	904	363	280	18	5,930	1,740	990	1,080	280	467
4	25,500	2,070	2,740	904	363	280	19	4,590	1,640	904	904	319	412
5	29,400	2,070	2,580	822	363	246	20	3,690	1,440	904	904	319	467
6	14,100	1,850	2,310	743	363	246	21	3,090	1,260	904	822	319	528
7	9,670	1,850	2,070	743	319	280	22	2,910	1,260	904	822	363	467
8	7,430	1,850	2,070	743	319	319	23	2,580	1,440	822	743	412	467
9	5,930	1,740	1,740	667	319	319	24	2,440	1,350	990	467	412	467
10	8,370	1,740	1,540	595	319	319	25	2,310	1,260	904	467	412	467
11	21,200	1,640	1,260	467	319	319	26	2,310	1,170	904	412	363	467
12	17,900	1,540	1,080	467	363	319	27	2,310	5,100	822	412	363	467
13	20,700	1,350	904	467	319	319	28	2,310	7,430	822	412	363	467
14	26,600	1,640	1,080	467	319	319	29	2,440	5,100	822	412	363	412
15	17,000	2,190	1,080	990	319	319	30	2,440	3,690	743	412	363	412
							31	.....	3,480	.....	412	363	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	467	412	595	363	5,370	1,540	5,930	1,260	595	363	280	667
2	467	412	990	363	3,480	1,850	16,100	1,080	528	412	280	528
3	467	363	1,080	363	2,580	1,850	11,000	1,080	467	363	280	528
4	467	363	990	363	3,900	1,640	7,740	1,080	595	363	280	528
5	467	319	904	363	3,280	2,310	5,930	1,080	467	363	280	467
6	467	319	904	363	2,310	4,590	4,120	1,850	467	363	246	363
7	412	319	667	363	4,120	8,370	3,690	1,960	467	319	246	319
8	363	467	467	363	4,590	5,930	21,200	2,070	467	280	246	319
9	319	467	467	363	4,590	3,480	16,100	2,070	467	280	215	280
10	319	467	412	363	3,090	2,740	10,000	2,910	467	280	246	280
11	319	363	412	363	1,440	2,580	6,810	2,310	467	280	246	319
12	319	363	412	363	1,170	3,090	6,810	2,070	467	280	595	363
13	319	467	412	363	1,260	3,480	5,370	1,960	467	246	528	363
14	319	667	412	363	1,260	5,650	3,900	2,070	412	528	467	363
15	319	1,260	412	467	1,850	9,010	3,480	2,190	363	363	412	363
16	319	1,540	412	467	1,850	9,340	3,280	1,960	363	467	363	363
17	319	1,260	412	467	1,850	7,120	2,910	1,440	363	467	319	363
18	319	990	363	467	1,850	5,650	2,310	1,260	363	467	319	363
19	319	743	363	467	2,070	3,900	2,070	1,080	363	412	280	319
20	319	667	363	467	2,190	2,580	1,960	904	363	319	280	363
21	319	595	363	467	1,960	2,190	1,850	822	319	280	363	363
22	319	467	363	467	1,850	1,960	1,740	822	319	280	246	363
23	319	528	363	528	1,850	1,640	1,440	822	319	280	246	412
24	412	467	363	595	1,850	1,440	1,260	822	363	280	246	412
25	412	467	363	1,170	1,740	1,350	1,260	743	363	280	280	363
26	412	467	363	1,350	1,740	1,260	1,260	743	363	280	280	363
27	412	467	363	1,260	1,540	1,350	1,260	743	467	280	319	363
28	467	595	363	1,260	1,540	15,700	1,440	743	467	319	363	363
29	412	595	363	1,260	.....	12,500	1,440	667	412	319	528	319
30	467	595	363	904	.....	8,690	1,350	667	363	319	528	363
31	412	.....	363	1,640	.....	8,050	.....	667	.....	319	667	.....

NOTE.—Daily discharge determined from a rating curve fairly well defined between 246 and 467 second feet, and well defined between 467 and 22,800 second-feet. Open-water rating used during entire period Estimates of flow do not take into consideration the water diverted around the gage. (See "Diversions.")

Monthly discharge of Miami River at Dayton, Ohio, for the years ending Sept. 30, 1913–14.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
1913.				
April	29,400	2,310	9,660	C.
May	7,430	1,170	2,240	C.
June	3,090	743	1,430	C.
July	1,080	412	687	C.
August	412	280	344	C.
September	528	246	379	C.
1913–14.				
October	467	319	380	C.
November	1,540	319	582	C.
December	1,080	363	498	C.
January	1,640	363	606	C.
February	5,370	1,170	2,430	B.
March	15,700	1,260	4,610	A.
April	21,200	1,260	5,170	A.
May	2,910	667	1,350	A.
June	595	319	424	A.
July	528	246	337	B.
August	667	215	338	B.
September	667	280	384	B.
The year	21,200	215	1,420	

NOTE.—Estimates do not include flow of water diverted around gage.

MIAMI RIVER AT HAMILTON, OHIO.

Location.—A single-span highway bridge on High Street at Hamilton.

Drainage area.—3,580 square miles.

Records available.—February 28, 1910, to September 30, 1914. Flood stages only, November 16, 1904, to February 27, 1910, reported by the United States Weather Bureau.

Gage.—Vertical staff attached to the south side of the temporary bridge located about 100 feet below old gage site; read morning and evening to half-tenths. (See Water-Supply Paper 353 for description of old gage.)

Discharge measurements.—Made from upstream side of bridge.

Channel and control.—Apparently permanent under ordinary conditions. The section at the bridge shifts somewhat during floods on account of the high velocity.

Extremes of discharge.—Maximum stage recorded during year: 9.8 feet at 8 a. m. March 28; discharge, 25,800 second-feet. Minimum stage recorded: 2.10 feet during periods of July, August, and September; discharge, 392 second-feet. The maximum stage on record at this station occurred at 3 a. m. March 26, 1913, at gage height 34.6 feet.[1] The highest stage prior to 1913 was 21.2 feet March 24, 1898, according to the records of the United States Weather Bureau.

Winter flow.—Discharge relation affected by ice for short periods during severe weather only, as factory wastes probably keep the temperature of the water above the freezing point.

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 probably a considerable part of the low-water flow.

Regulation.—There are several power plants in Hamilton above the station, but all the water is returned to the river above the gage.

Accuracy.—The discharge relation was materially changed by the flood of March–April, 1913, and as no discharge measurements were made after this flood until June 6, 1914, estimates of discharge from April 22, 1913, to May, 1914, may not be as accurate as those subsequent to this period.

Data insufficient for estimating daily discharge during flood of March–April, 1913.

[1] For information relating to this flood, see U. S. Geol. Survey Water-Supply Paper 334.

Discharge measurements of Miami River at Hamilton, Ohio, during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 6	Ellsworth and Adams	2.55	965
July 17	C. E. Ellsworth	2.48	948
Sept. 30	Ellsworth and Streeter	2.10	392

Daily discharge, in second-feet, of Miami River at Hamilton, Ohio, for the period Apr. 22, 1913, to Sept. 30, 1914.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1913.							1913.						
1	.....	4,060	3,490	1,840	1,300	1,020	16	.....	3,220	2,200	2,200	1,300	765
2	.....	4,060	3,220	1,730	1,200	930	17	.....	3,220	1,960	2,200	1,200	930
3	.....	4,060	3,220	1,730	1,200	930	18	.....	2,960	1,960	2,200	1,200	930
4	.....	4,060	3,490	1,730	1,110	930	19	.....	2,960	1,840	2,200	1,510	930
5	.....	3,770	3,220	1,620	1,110	848	20	.....	2,700	1,730	2,200	1,510	930
6	.....	3,490	2,960	1,510	1,020	848	21	.....	2,700	1,730	1,960	1,510	930
7	.....	3,490	3,490	1,510	1,020	848	22	4,660	2,450	1,730	1,960	1,510	930
8	.....	3,490	3,490	1,510	930	1,110	23	4,660	2,450	1,730	1,840	1,510	930
9	.....	3,490	3,490	1,510	930	930	24	4,660	2,450	2,960	1,730	1,400	930
10	.....	3,220	3,220	1,510	930	848	25	4,360	2,450	2,700	1,730	1,300	848
11	.....	2,960	2,960	1,730	1,110	848	26	4,360	2,450	2,200	1,620	1,300	848
12	.....	2,700	2,450	1,960	1,960	848	27	4,360	4,060	1,960	1,620	1,200	848
13	.....	2,450	2,450	1,730	1,960	848	28	4,360	10,500	1,960	1,620	1,200	848
14	.....	3,220	2,450	1,730	1,620	848	29	4,360	5,880	1,960	1,510	1,110	848
15	.....	3,220	2,450	2,200	1,400	765	30	4,060	4,660	1,960	1,400	1,110	848
							31	.....	4,060	.....	1,300	1,020	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	1,510	1,620	4,060	1,510	9,480	4,360	15,100	3,770	1,400	620	392	930
2	1,510	1,510	3,490	1,730	8,460	4,060	22,000	3,770	1,300	620	392	848
3	1,400	1,510	3,490	1,730	7,470	4,060	17,600	3,770	1,300	620	392	848
4	1,400	1,510	3,220	1,730	7,800	4,660	13,600	3,770	1,200	620	392	848
5	1,300	1,510	2,960	1,730	7,140	7,470	10,500	3,490	1,200	620	392	848
6	1,300	1,510	2,450	1,840	6,500	10,500	9,140	3,490	1,110	558	392	765
7	1,200	1,510	2,450	1,840	11,200	14,400	8,460	3,490	1,110	558	392	765
8	1,200	1,510	2,450	1,840	7,800	11,600	23,200	3,490	1,020	558	1,110	692
9	1,110	1,510	2,200	1,840	7,140	8,460	22,400	3,770	930	558	392	620
10	1,110	1,510	1,960	1,840	5,570	7,800	16,200	3,770	848	558	392	620
11	1,110	1,510	1,960	1,840	4,660	9,140	12,600	3,770	848	558	1,020	495
12	1,110	1,510	1,960	1,840	4,060	8,130	11,200	3,770	848	495	1,960	444
13	1,110	1,510	1,730	1,840	3,220	7,800	10,200	3,770	765	495	1,020	444
14	1,110	3,490	1,730	1,840	2,450	10,200	8,800	3,770	765	2,450	848	444
15	1,020	5,260	1,620	1,840	2,450	14,700	8,460	3,770	692	1,020	692	392
16	1,020	5,880	1,620	1,840	2,450	15,400	7,800	3,770	620	930	392	392
17	1,020	4,060	1,510	1,840	2,960	13,300	7,140	3,490	620	930	392	392
18	1,020	2,960	1,510	1,730	3,770	9,820	6,500	3,490	620	1,110	392	392
19	1,020	2,700	1,510	1,730	10,800	8,460	5,880	3,220	620	765	392	392
20	1,110	2,450	1,510	1,730	6,820	7,140	5,260	2,960	620	765	392	392
21	1,300	2,200	1,510	1,960	6,190	6,500	4,660	2,700	620	620	392	392
22	1,300	1,960	1,510	1,960	6,190	5,880	4,060	2,450	620	620	392	392
23	1,400	1,730	1,510	1,960	6,190	4,960	4,060	2,450	620	495	392	495
24	1,510	1,510	1,510	1,960	5,260	4,060	3,770	2,200	558	392	392	495
25	1,510	1,510	1,510	4,960	4,660	4,060	4,060	2,200	558	392	4,060	495
26	1,510	1,510	1,510	4,660	4,360	4,060	4,060	1,960	558	392	765	495
27	1,510	1,510	1,510	4,060	4,360	11,600	4,060	1,960	558	392	620	495
28	1,730	1,510	1,510	3,220	4,660	24,100	3,770	1,730	558	392	2,450	444
29	1,730	1,510	1,510	2,960	.....	20,400	3,770	1,730	620	392	2,960	444
30	1,730	1,840	1,510	2,960	.....	15,400	3,770	1,510	620	392	1,300	392
31	1,730	.....	1,510	11,200	.....	13,600	.....	1,510	.....	392	930	.....

NOTE.—Daily discharge determined from a rating curve well defined between 392 and 7,800 second-feet. Above 7,800 second-feet the rating curve is an extension. Daily and monthly estimates of discharge, Oct. 1, 1912, to Mar. 25, 1913, were published in Water-Supply Paper 353, page 76. Open-water rating curve used during entire period.

Monthly discharge of Miami River at Hamilton, Ohio, for the year sending Sept. 30, 1913–14.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
1913.				
April				
May	10,500	2,450	3,580	
June	3,490	1,730	2,550	
July	2,200	1,300	1,770	
August	1,960	930	1,280	
September	1,110	765	890	
1913–14.				
October	1,730	1,020	1,310	D.
November	5,880	1,510	2,110	D.
December	4,060	1,510	2,000	D.
January	11,200	1,510	2,500	D.
February	11,200	2,450	5,860	C.
March	24,100	4,060	9,550	B.
April	23,200	3,770	9,400	B.
May	3,770	1,510	3,060	B.
June	1,400	558	811	B.
July	2,450	392	654	B.
August	4,060	392	864	B.
September	930	392	550	B.
The year	24,100	392	3,200	

NOTE.—Discharge in "Second-feet per square mile" and "Run-off (depth in inches on drainage area)" are not published; these estimates are misleading on account of the water diverted into the Miami & Erie Canal.

STILLWATER RIVER NEAR WEST MILTON, OHIO.

Location.—In the SE. ¼ sec. 4, T. 4 N., R. 5 E., 1 mile below the mouth of Ludlow Creek, entering from the right, at the bridge of the Cleveland, Cincinnati, Chicago & St. Louis Railroad (Peoria & Eastern division), about 2 miles north of West Milton.

Drainage area.—600 square miles.

Records available.—January 1 to September 30, 1914.

Gage.—Vertical staff in two sections; read daily, in the morning, to tenths. Sea-level elevation of zero of gage, 812.97 feet.

Discharge measurements.—Made from downstream side of railroad bridge at gage, from upstream side of highway bridge about 300 feet below the gage, or, during low water, by wading.

Channel and control.—Regular section shifts slightly during high water; weeds during the summer may affect the discharge relation.

Extremes of stage.—Maximum stage recorded during year: 8.0 feet April 8. Minimum stage recorded: 0.3 foot July 13 and 27.

The flood of March–April, 1913, reached a stage of 28 feet on March 25.

Winter flow.—Discharge relation affected by ice during severe weather.

Accuracy.—Gage-height record reliable.

Cooperation.—Gage-height record furnished by United States Weather Bureau. Results of discharge measurements furnished by the Morgan Engineering Co., of Dayton, Ohio.

Data insufficient for estimates of discharge.

Discharge measurements of Stillwater River near West Milton, Ohio, during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 28	Honk and Tobias	5.75	4,160	June 22	H. R. Daubenspeck	0.7	[a]31.9
Apr. 20	H. R. Daubenspeck	1.9	353	July 1	do	.9	[a]62.1
May 1	do	1.7	227	15	do	2.0	260
1	do	1.7	224	Aug. 4	do	.7	[a]40.2
4	do	1.5	179	4	do	.7	[a]42.2
4	do	1.5	181	19	do	.8	[a]47.6
20	do	1.4	[a]134	19	do	.8	[a]50.3
20	do	1.4	[a]136	Sept. 2	do	1.8	206
June 5	do	1.2	[a]96.0	23	do	.65	[a]40.2
5	do	1.2	[a]89.2	23	do	.65	[a]42.4
22	do	.7	[a]31.0				

[a] Measurement made by wading at a section about 500 feet below gage.

NOTE.—Measurements made by engineers of the Morgan Engineering Co., of Dayton, Ohio.

Daily gage height, in feet, of Stillwater River near West Milton, Ohio, for the year ending Sept. 30, 1914.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.7	3.4	1.7	4.1	1.6	1.0	0.8	0.8	2.0
2	.8	2.7	1.8	5.9	1.6	1.9	1.0	.6	1.8
3	.9	2.8	2.0	4.8	1.4	1.1	.9	.5	1.9
4	.9	3.4	2.6	3.8	1.4	1.0	.9	.7	1.6
5	1.0	2.7	3.0	2.9	1.5	1.2	.7	.5	1.5
6	1.0	2.2	4.0	2.8	2.0	1.1	.6	.4	1.5
7	.9	2.4	6.2	2.8	1.9	1.1	.7	.5	1.1
8	.9	2.0	5.0	8.0	1.9	1.3	.6	.8	1.0
9	1.2	2.0	3.5	5.8	1.7	1.2	.5	.9	.9
10	1.4	2.0	3.4	4.0	1.8	1.1	.5	1.4	1.0
11	1.6	1.8	3.3	3.8	1.8	1.0	.6	1.7	.9
12	1.8	1.8	3.2	3.2	1.7	1.1	.4	1.8	.9
13	1.7	1.8	3.3	3.0	1.6	1.0	.3	1.5	1.0
14	1.7	1.8	3.7	2.8	1.6	.9	1.4	1.2	.8
15	1.6	2.0	4.7	2.5	1.5	.7	1.5	1.1	.6
16	1.5	1.8	4.3	2.3	1.6	1.0	1.8	1.0	.7
17	1.1	1.2	3.8	2.1	1.5	.8	1.6	.8	.7
18	1.2	1.1	3.3	2.1	1.5	.7	1.4	.7	.5
19	1.5	1.5	3.0	2.0	1.4	.6	1.0	.6	.5
20	1.1	2.1	2.4	1.9	1.4	.6	.9	.6	.6
21	1.1	2.3	2.4	1.8	1.3	.5	.9	.5	.5
22	1.2	2.3	2.1	1.6	1.3	.5	.7	.4	.5
23	1.3	2.2	2.0	1.6	1.3	.8	.8	.7	.6
24	1.4	2.1	2.0	1.5	1.2	.9	.6	.5	.6
25	1.9	2.0	1.8	1.5	1.1	.9	.6	1.5	.7
26	1.9	1.9	1.8	1.7	1.2	1.0	.4	1.6	.5
27	1.7	1.8	1.9	1.6	1.1	1.1	.3	1.3	.4
28	1.7	1.6	6.0	2.1	1.0	1.1	.9	1.0	.4
29	1.6	.....	5.0	1.8	1.0	.9	1.0	1.7	.6
30	1.5	.....	4.2	1.8	1.1	1.0	1.0	2.4	.5
31	2.0	.....	4.1	.....	1.1	.....	.9	2.1	.....

MAD RIVER NEAR SPRINGFIELD, OHIO.

Location.—At the old mill about 800 feet south of the Cleveland, Cincinnati, Chicago & St. Louis Railroad bridge No. 121.

Drainage area.—488 square miles.

Records available.—February 1 to September 30, 1914.

Gage.—Vertical staff in two sections; lower section attached to north wall of rock-lined overflow channel from millrace; upper section attached to south side of old mill building; read daily, in the morning, to tenths. Sea-level elevation of zero of gage, 887.81 feet.

Discharge measurements.—Made from highway bridge about 1,000 feet below gage or by wading about 1,500 feet below gage.

Channel and control.—Channel shifts slightly during floods.

Extremes of stage.—Maximum stage recorded during year: 7.3 feet March 28. Minimum stage recorded: 0.9 foot August 20.

The flood of March–April, 1913, reached a stage on March 25 of 19.2 feet referred to the gage datum.

Winter flow.—The discharge relation is affected by ice during periods of extremely cold weather.

Accuracy.—Gage-height record reliable.

Cooperation.—Gage-height record furnished by the United States Weather Bureau. Results of discharge measurements furnished by the Morgan Engineering Co., of Dayton, Ohio.

Data insufficient for estimates of discharge.

Discharge measurements of Mad River near Springfield, Ohio, during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 8	I. E. Houk	2.85	438	June 30	H. R. Daubenspeck	1,35	199
Mar. 7	do	4.05	920	July 14	do	1.45	230
26	B. H. Petty	2.25	386	14	do	1.45	233
Apr. 21	H. R. Daubenspeck	2.55	428	28	do	1.2	203
29	do	2.4	349	28	do	1.2	213
29	do	2.4	384	Aug. 6	do	1.0	163
May 21	do	2.0	345	6	do	1.0	159
June 12	do	1.7	252	17	do	1.05	157
12	do	1.7	250	17	do	1.05	159
18	Daubenspeck and Houk	1.4	212	31	do	1.2	196
18	do	1.45	214	31	do	1.2	192
18	do	1.5	201	Sept. 22	do	1.1	184
30	H. R. Daubenspeck	1.40	205	22	do	1.0	176

NOTE.—Measurements subsequent to Apr. 29, except that on June 18, made by wading about 1,500 feet below gage.

Daily gage height, in feet, of Mad River near Springfield, Ohio, for the year ending Sept. 30, 1914.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.8	2.8	3.4	2.4	1.7	1.5	1.2	1.2
2	3.0	2.4	6.0	2.4	1.8	1.5	1.2	1.2
3	2.6	2.8	4.3	2.4	1.7	1.5	1.2	1.2
4	2.5	2.3	3.6	2.4	1.9	1.5	1.2	1.2
5	2.4	2.6	3.4	2.4	1.8	1.5	1.2	1.1
6	2.3	3.4	3.1	2.4	1.8	1.5	1.2	1.1
7	6.3	4.3	3.4	2.5	1.7	1.5	1.0	1.1
8	2.9	3.1	6.5	2.4	1.7	1.5	1.0	1.1
9	2.3	2.7	4.1	2.8	1.6	1.5	1.0	1.1
10	2.3	2.6	3.6	2.5	1.6	1.5	1.0	1.1
11	2.3	3.3	3.4	2.4	1.6	1.5	1.0	1.1
12	2.3	2.7	3.9	2.4	1.5	1.5	1.0	1.1
13	2.3	2.9	3.4	2.4	1.5	1.5	1.0	1.1
14	2.3	3.6	3.1	2.4	1.5	1.5	1.0	1.1
15	2.3	4.3	3.1	2.4	1.5	1.8	1.0	1.1
16	2.3	4.2	3.0	2.4	1.5	1.4	1.0	1.1
17	2.3	3.6	2.8	2.4	1.5	1.4	1.0	1.1
18	2.3	3.5	2.8	2.4	1.4	1.4	1.0	1.1
19	4.0	2.8	2.7	2.4	1.5	1.4	1.0	1.1
20	2.9	2.6	2.6	2.4	1.5	1.4	.9	1.1
21	2.3	2.6	2.6	2.0	1.5	1.3	1.4	1.1
22	2.3	2.4	2.5	2.0	1.5	1.3	1.0	1.1
23	2.3	2.5	2.4	2.0	1.5	1.3	1.4	1.3
24	2.3	2.5	2.4	1.9	1.7	1.2	1.4	1.2
25	2.3	2.4	2.7	1.8	1.6	1.2	1.2	1.2
26	2.3	2.4	2.6	1.8	1.5	1.2	1.1	1.1
27	2.3	2.3	2.5	1.8	1.5	1.2	1.1	1.1
28	2.3	7.3	2.4	1.8	1.5	1.2	1.0	1.1
29	.....	4.1	2.4	1.8	1.6	1.2	1.2	1.1
30	.....	4.2	2.4	1.8	1.5	1.2	1.3	1.1
31	.....	3.3	.....	1.8	.....	1.2	1.2	.....

BUCK CREEK AT SPRINGFIELD, OHIO.

Location.—At Plum Street Bridge in Springfield.

Drainage area.—163 square miles.

Records available.—July 15 to September 30, 1914.

Gage.—Vertical staff in two sections; read daily, in the morning, to tenths. Sea-level elevation of zero of gage, 908.2 feet.

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

Channel and control.—Channel may shift slightly during floods.

Extremes of stage.—The flood of March–April, 1913, which is the highest that is known to have occurred at this station, reached a stage on March 25, 1913, of 12.3 feet referred to the gage datum.

Winter flow.—Discharge relation affected by ice for short periods only, as the use of water for condensing purposes at points above the gage tends to keep the temperature above freezing.

Accuracy.—Gage-height record reliable.

Cooperation.—Station maintained and records furnished by the Morgan Engineering Co., of Dayton, Ohio.

Data insufficient for estimates of discharge.

Discharge measurements of Buck Creek at Springfield, Ohio, during the year ending Sept. 30, 1914.

[Made by H. R. Daubenspeck.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
July 14	0.9	60.9	Aug. 6	0.8	44.9	Aug. 31	1.0	51.8
14	.9	56.3	17	.65	29.9	Sept. 22	.9	57.0
28	.8	39.5	17	.75	40.2	22	1.0	64.5
28	.9	43.7	31	1.0	53.9			

NOTE.—Measurements made by wading.

Daily gage height, in feet, of Buck Creek at Springfield, Ohio, for the year ending Sept. 30, 1914.

[S. Van Bird, jr., observer.]

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	0.9	1.0	11	.....	0.7	0.6	21	1.0	1.2	0.7
2	.....	.8	1.0	12	.....	.9	.6	22	1.0	.7	.7
3	.....	.8	.9	13	.....	.9	1.0	23	.9	.7	1.0
4	.....	.8	.9	14	.....	.8	1.0	24	.8	1.2	.9
5	.....	.8	.8	15	1.3	.8	1.0	25	.9	1.0	.9
6	.....	.7	1.0	16	1.0	.7	.9	26	.8	1.2	.9
7	.....	.7	.8	17	.9	.7	.9	27	.8	1.0	.9
8	.....	.7	.7	18	1.0	.7	.8	28	.8	.8	.9
9	.....	.8	.6	19	1.0	.7	.8	29	.8	1.3	.9
10	.....	.8	.6	20	1.0	.7	.7	30	.8	1.2	.8
								31	.9	1.1	.....

TWIN CREEK NEAR GERMANTOWN, OHIO.

Location.—At covered highway bridge in the NE. ¼ sec. 14, T. 3 N., R. 4 E., about 1 mile west of Germantown, and about 2 miles above mouth of Little Twin Creek entering from the left.

Drainage area.—272 square miles.

Records available.—April 12 to September 30, 1914.

Gage.—Vertical staff in two sections; read daily, in the morning, to tenths. Sea-level elevation of zero of gage, 712.73.

Discharge measurements.—Made from downstream side of the bridge or by wading about 200 feet above gage. The bridge makes an angle of about 45 degrees with the direction of the current. Flood measurements will be made at the highway bridge about half a mile below the gage.

Channel and control.—Channel shifts slightly during floods.

Extremes of discharge.—Maximum stage recorded during year: 4.8 feet August 10; discharge, 1,170 second-feet. Minimum stage recorded: 0.9 foot July 8–13 and August 2–8; discharge, 12 second-feet.

The flood of March–April, 1913, which is the highest that is known to have occurred at this station, reached a stage of 18.3 feet on March 25, referred to the gage datum.

Winter flow.—Discharge relation affected by ice and occasionally by ice jams.

Accuracy.—Records good.

Cooperation.—Station maintained and records furnished by the Morgan Engineering Co., of Dayton, Ohio.

Discharge measurements of Twin Creek near Germantown, Ohio, during the year ending Sept. 30, 1914.

[Made by H. R. Daubenspeck.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 14	2.7	367	June 3	1.2	26.8	Aug. 5	0.9	11.7
14	2.7	366	17	1.1	20.2	5	.9	11.3
16	2.72	392	17	1.1	21.1	20	1.1	25.3
28	2.0	141	29	1.1	19.7	20	1.1	23.3
May 5	1.9	121	29	1.1	19.5	21	1.15	24.6
5	1.9	116	July 10	.92	11.8	29	3.4	614
19	1.5	52.3	10	.92	10.4	Sept. 21	1.0	17.9
19	1.5	51.3	27	1.0	15.7	21	1.0	20.8
June 3	1.2	26.6	27	1.0	16.2			

NOTE.—Measurements subsequent to May 5, except that of Aug. 29, made by wading about 200 feet above gage.

Daily discharge, in second-feet, of Twin Creek near Germantown, Ohio, for the year ending Sept. 30, 1914.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	120	35	17	17	67	16	410	67	22	100	44	22
2	.....	100	35	22	12	67	17	340	67	22	67	35	22
3	.....	100	35	22	12	270	18	270	67	22	55	35	22
4	.....	100	28	17	12	100	19	235	55	82	44	22	17
5	.....	100	35	17	12	44	20	235	55	44	28	28	17
6	.....	100	35	17	12	44	21	175	55	28	22	22	17
7	.....	100	28	17	12	44	22	175	55	28	22	44	17
8	.....	100	28	12	12	35	23	145	55	35	22	28	17
9	.....	120	28	12	12	35	24	145	44	22	17	22	17
10	.....	120	28	12	1,170	28	25	145	44	22	17	28	17
11	.....	100	28	12	270	28	26	205	44	22	17	55	17
12	585	82	35	12	235	28	27	145	44	22	17	28	17
13	550	82	28	12	235	22	28	145	35	22	35	22	17
14	445	82	28	67	67	28	29	145	35	17	28	730	17
15	410	82	22	205	375	22	30	120	35	17	22	145	17
							31	.....	35	.....	17	100	.....

NOTE.—Daily discharge determined from a rating curve fairly well defined between 12 and 28 second-feet and well defined between 28 and 850 second-feet.

Monthly discharge of Twin Creek near Germantown, Ohio, for the year ending Sept. 30, 1914.

[Drainage area, 272 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
April 12-30	585	120	264	0.971	0.69	B.
May	120	35	73.5	.270	.31	A.
June	82	17	29.4	.108	.12	B.
July	205	12	32.4	.119	.14	C.
August	1,170	12	124	.456	.53	C.
September	270	17	37.7	.139	.16	B.

KENTUCKY RIVER BASIN.

DIX RIVER NEAR BURGIN, KY.

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

Drainage area.—416 square miles.

Records available.—July 2, 1910, to July 16, 1911; October 1, 1911, to September 30, 1914.

Gage.—Staff gage attached to abutment of bridge; read once daily to tenths. Soundings taken at the gage indicate that zero of staff gage set by observer February 15, 1913, is approximately 0.2 foot below zero of gage installed when station was established. Therefore all gage heights subsequent to February 15, 1913, refer to a datum which is about 0.2 foot below datum of original gage.

Discharge measurements.—Made from upstream side of bridge.

Channel and control.—Probably permanent.

Extremes of stage.—Maximum stage recorded during year: 16.2 feet May 5. Minimum stage recorded: 2.8 feet October 1–18 and July 1–14.

Winter flow.—Discharge relation ordinarily not affected by ice.

Accuracy.—Discharge estimates from February 15 to September 30, 1913, as published in Water-Supply Paper 353, are in error due to the change in gage datum as noted under "Gage."

Cooperation.—Station maintained in cooperation with the Kentucky Geological Survey.

Data insufficient for estimates of discharge.

No discharge measurements were made during the year ending September 30, 1914.

Daily gage height, in feet, of Dix River near Burgin, Ky., for the year ending Sept. 30, 1914.

[C. P. Kennedy, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.8	3.3	5.3	.....	6.7	5.7	6.8	5.0	3.4	2.8	3.3	3.8
2	2.8	3.3	5.6	.....	6.6	5.4	8.6	4.8	3.6	2.8	3.8	3.8
3	2.8	3.3	5.8	.....	6.5	5.2	7.5	4.5	3.6	2.8	3.9	3.8
4	2.8	3.3	5.5	.....	6.5	5.6	6.9	4.4	3.9	2.8	3.9	3.6
5	2.8	3.3	5.4	.....	6.4	5.5	6.5	16.2	4.4	2.8	3.9	3.8
6	2.8	3.3	5.1	.....	6.3	5.4	6.3	13.8	4.8	2.8	3.9	3.8
7	2.8	3.7	6.3	.....	7.0	5.3	5.9	9.5	6.2	2.8	3.9	6.0
8	2.8	3.7	6.0	.....	8.1	5.3	6.2	7.8	4.6	2.8	3.9	10.6
9	2.8	3.9	5.6	.....	7.5	5.2	6.4	6.2	4.4	2.8	3.9	6.8
10	2.8	3.7	5.3	.....	6.2	5.0	6.1	5.9	3.8	2.8	4.0	6.8
11	2.8	3.5	5.2	.....	5.9	5.8	5.8	5.8	3.5	2.8	4.0	9.4
12	2.8	3.5	4.9	.....	5.6	13.0	5.5	5.5	3.3	2.8	4.9	6.3
13	2.8	3.4	4.9	.....	6.2	9.9	5.3	5.3	3.0	2.8	5.0	6.3
14	2.8	3.4	4.7	.....	10.3	8.1	5.0	5.0	3.0	2.8	6.4	5.6
15	2.8	3.4	4.5	.....	8.2	7.5	4.9	4.8	3.0	4.6	4.8	5.4
16	2.8	3.8	4.9	.....	7.9	7.2	6.3	4.5	3.0	5.0	4.0	5.0
17	2.8	4.0	4.7	.....	6.8	6.9	6.0	4.2	3.0	4.3	3.9	5.0
18	2.8	4.6	4.6	.....	9.8	6.5	5.9	4.2	3.0	4.0	3.7	4.8
19	3.8	5.6	4.5	.....	14.9	6.3	5.7	4.1	3.0	3.8	3.6	4.6
20	3.8	4.6	4.5	.....	11.8	6.0	5.6	4.0	3.0	3.3	3.4	4.2
21	4.0	4.6	4.4	.....	8.9	5.8	7.3	4.0	3.0	3.0	3.4	4.0
22	4.3	4.8	4.8	.....	7.6	5.5	6.9	3.9	3.0	3.0	3.4	4.1
23	3.9	5.9	4.9	.....	6.8	5.3	6.5	3.6	3.0	3.0	3.4	3.8
24	3.7	5.4	8.0	.....	6.6	5.4	6.1	3.3	3.0	3.0	6.0	3.7
25	3.6	5.5	8.1	.....	6.3	5.6	5.8	3.9	3.0	3.0	5.8	3.7
26	3.6	5.5	7.9	.....	6.0	4.9	5.8	3.9	3.0	3.0	5.4	3.7
27	3.5	5.4	7.7	.....	5.9	5.3	5.6	3.9	3.0	3.0	5.1	3.3
28	3.3	5.4	7.4	.....	5.9	5.3	5.5	3.9	3.0	3.0	4.8	3.3
29	3.3	5.3	7.2	.....	.....	5.2	5.3	3.8	3.0	3.3	4.5	.....
30	3.3	5.3	6.9	.....	.....	5.6	5.1	4.4	3.0	3.3	4.0	3.2
31	3.3	.....	6.6	.....	.....	7.7	.....	4.3	.....	3.3	4.0	.....

WABASH RIVER BASIN.

EMBARRASS RIVER NEAR OAKLAND, ILL.

Location.—In the northeastern part of T. 14 N., R. 10 E., on the county line road to Hindsboro and Arcola; at highway bridge about 2 miles northwest of Oakland, Coles County, and about 5 miles below the mouth of Brush Creek.

Drainage area.—535 square miles.

Records available.—October 23, 1909, to December 31, 1912; August 25 to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, in the morning, to quarter-tenths.

Discharge measurements.—Made from downstream side of bridge.

Channel and contol.—Measuring section is at a pool and is practically permanent; control, about half a mile downstream, consists of coarse gravel and is probably permanent. A determination by leveling, August 25, 1914, indicates that there would be no flow past the gage if the river stage were to fall to 1.55 feet ±0.05 foot.

Extremes of stage.—The flood of 1897 reached a height of about 24 feet referred to the gage datum.

Winter flow.—Discharge relation may be affected by ice during parts of December, January, and February.

Data insufficient for estimates of discharge.

The following discharge measurement was made by Peterson and Kessler:

August 25, 1914: Gage height, 1.56 feet; discharge, 0.

Daily gage height, in feet, of Embarrass River near Oakland, Ill., for the year ending Sept. 30, 1914.

[S. C. Chapman, observer.]

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1		1.70	11		1.58	21		1.45
2		1.70	12		1.55	22		1.45
3		1.68	13		1.55	23		1.45
4		1.65	14		1.52	24		1.42
5		1.60	15		1.52	25	1.56	1.40
6		1.82	16		1.50	26	1.55	1.40
7		1.85	17		1.50	27	1.48	1.40
8		1.72	18		1.50	28	1.48	1.35
9		1.65	19		1.48	29	1.55	1.38
10		1.62	20		1.48	30	1.60	1.45
						31	1.70	

NOTE.—Water standing in pools, August 25–29 and September 12–30.

EMBARRASS RIVER AT STE. MARIE, ILL.

Location.—In sec. 30, T. 6 N., R. 14 W., at highway bridge at north end of Main Street, at Ste. Marie, Jasper County, about 450 feet downstream from the Cincinnati, Hamilton & Dayton Railway bridge, and 2½ miles upstream from the mouth of Hickory (or North Fork) Creek.

Drainage area.—1,540 square miles.

Records available.—October 20, 1909, to December 31, 1912; August 24 to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning or afternoon, to tenths.

Discharge measurements.—Measuring section is in a pool; measurements made from downstream side of highway bridge at ordinary stages; during high water made also from the downstream side of five wooden trestles on the Cincinnati, Hamilton & Dayton Railway, northwest of the highway bridge.

Channel and control.—Channel shifting; control is about 1,800 feet below gage. A determination by leveling on August 24, 1914, indicates that there would be no flow past the gage if the river were to fall to 1 foot ±0.1 foot.

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

Winter flow.—Discharge relation may be affected by ice during parts of December, January, and February.

Accuracy.—Gage readings reliable.

Data insufficient for estimates of discharge.

The following discharge measurement was made by Peterson and Kessler by wading at a section about 1,300 feet below the gage:

August 24, 1914: Gage height, 1.72 feet; discharge, 18.8 second-feet.

Daily gage height, in feet, of Embarrass River at Ste. Marie, Ill., for the year ending Sept. 30, 1914.

[Val. C. Wuerth, observer.]

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1		2.5	11		1.7	21		1.2
2		2.1	12		1.5	22		1.2
3		1.9	13		1.5	23		1.2
4		1.8	14		1.4	24	1.2	1.2
5		1.6	15		1.4	25	1.5	1.2
6		1.5	16		1.4	26	1.7	1.2
7		1.8	17		1.3	27	1.4	1.2
8		1.9	18		1.3	28	2.8	1.2
9		1.5	19		1.3	29	2.4	1.2
10		1.8	20		1.3	30	1.8	1.2
						31	3.2	

EAST BRANCH OF WHITE RIVER AT SHOALS, IND.

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

Drainage area.—4,900 square miles.

Records available.—June 25, 1903, to July 21, 1906; October 12, 1908, to September 30, 1914.

Gage.—Standard chain gage attached to bridge. From January 1 to June 30, 1914, the gage was read each morning to tenths. During the remainder of the year it was read morning and evening to tenths. Limits of use: Half-tenths below and tenths above 4.5 feet.

Discharge measurements.—Made from downstream side of bridge.

Channel and control.—Solid rock; permanent.

Extremes of stage.—Maximum stage recorded during year: 16.4 feet at 6 p. m. April 2. Minimum stage recorded: 1.65 feet at 7 a. m. July 13 and 6 p. m. July 17. The flood of March–April, 1913, reached a stage of 42.2 feet at 7 a. m. March 28. Maximum gage height as published by the United States Weather Bureau prior to 1913, 34.1 feet, March 30, 1904; flood of March, 1897, said to have been 1 to 1½ feet higher.

Winter flow.—In severe winters discharge relation affected by ice during parts of January and February; in ordinary winters there is little if any ice at the station.

Accuracy.—Station was not visited by engineers of the Geological Survey during 1912 and 1913. On December 5, 1914, the bench marks and elevation of the zero of the gage were checked with wye level and a discharge measurement was made. An error in the gage discovered by this checking affects the daily gage height and estimates of daily and monthly discharge from July 1 to December 31, 1912, as published in Water-Supply Paper 323. Corrections were published in Water-Supply Paper 353.

Cooperation.—Gage-height records furnished by the United States Weather Bureau during part of year.

Discharge measurement (gage height, 2.23 feet) made December 5, 1914, checks the low-water part of the rating curve, but as no measurements were made at the higher stages the effect of the extreme flood of March–April, 1913, on the discharge relation is unknown. Consequently estimates of discharge subsequent to March 25, 1913, have not been prepared for publication.

No discharge measurements were made at this station during the year ending September 30, 1914.

Daily gage height, in feet, of East Branch of White River at Shoals, Ind., for the year ending Sept. 30, 1914.

[G. H. Rowe, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.15	2.40	4.0	3.15	4.3	6.0	15.4	4.5	2.95	2.7	2.2	3.55
2	2.2	2.25	4.6	3.2	5.0	6.2	16.4	4.15	3.0	2.65	2.2	3.55
3	2.1	2.45	5.0	3.15	6.7	6.0	15.8	4.1	3.05	2.75	1.9	3.05
4	2.15	2.4	5.4	3.1	6.3	6.4	15.0	3.85	3.0	2.7	1.8	3.0
5	2.6	2.4	5.3	3.15	5.8	6.7	13.9	3.9	2.85	2.65	2.25	2.9
6	2.5	2.2	5.0	3.3	5.6	7.0	12.0	4.05	3.0	2.2	2.15	2.5
7	2.2	2.35	4.5	3.25	5.4	7.8	9.8	4.6	3.05	2.3	2.35	2.5
8	2.2	2.15	4.3	3.5	5.6	8.6	8.8	5.4	2.85	2.0	2.1	2.85
9	2.4	2.4	4.0	3.6	5.6	9.0	8.4	5.4	3.35	2.45	2.0	2.8
10	2.2	2.45	3.8	3.65	5.2	8.7	9.4	5.0	3.1	2.25	1.95	2.65
11	2.05	2.35	3.75	3.8	4.8	8.2	10.0	5.0	2.95	2.4	2.2	3.0
12	2.0	2.45	3.6	4.1	4.25	7.9	9.9	4.8	3.1	1.9	2.8	2.6
13	1.9	2.5	3.45	3.95	3.8	7.8	9.0	4.6	2.75	1.7	3.25	2.65
14	2.15	2.2	3.5	3.8	3.75	7.8	9.2	4.15	3.0	2.25	3.3	2.5
15	2.1	2.5	3.25	3.6	3.9	7.6	8.3	3.9	2.55	2.8	3.3	2.3
16	2.1	3.3	3.2	3.45	3.25	7.8	8.2	3.65	2.8	2.4	3.3	2.0
17	2.2	3.9	3.25	3.3	3.9	7.8	9.6	3.6	2.95	1.7	2.8	2.0
18	2.1	4.3	3.0	3.3	3.4	7.8	9.4	3.65	2.65	2.85	2.45	2.0
19	2.2	4.6	3.1	3.25	4.8	6.8	8.2	3.45	2.75	2.05	2.15	2.5
20	2.35	4.4	3.0	3.2	9.8	6.0	6.6	3.35	3.0	2.45	2.35	2.7
21	2.4	3.95	3.05	3.05	9.3	5.6	5.7	3.3	2.75	3.0	2.3	2.6
22	2.3	3.7	2.9	3.1	9.4	5.1	5.4	3.25	1.75	3.05	2.6	1.85
23	2.55	3.5	3.05	3.05	9.6	4.8	5.0	3.3	2.65	3.05	2.55	1.75
24	2.2	3.65	3.1	3.0	8.1	4.6	4.8	3.25	2.65	2.3	2.0	2.5
25	2.3	3.45	3.3	3.05	7.2	4.25	4.6	3.1	2.6	2.2	2.2	2.65
26	2.4	3.25	3.6	3.0	7.0	4.2	4.6	3.45	2.55	2.3	2.35	2.65
27	2.35	2.9	3.55	2.95	6.5	4.15	4.8	3.3	2.55	2.45	2.3	2.45
28	2.35	3.05	3.5	3.0	6.0	8.1	4.8	3.15	2.55	2.4	2.25	2.2
29	2.2	3.15	3.6	2.9	.....	10.8	4.8	3.05	1.75	2.35	2.5	2.1
30	2.3	3.0	3.4	2.95	.....	13.4	4.6	3.05	1.7	2.3	3.0	2.1
31	2.4	.....	3.3	3.1	.....	14.6	.....	2.7	.....	2.5	3.4	.....

NOTE.—Observer took no notes relative to ice, but discharge relation was probably affected by ice about Feb. 8–18.

LITTLE WABASH RIVER AT WILCOX, ILL.

Location.—At highway bridge at Wilcox, Clay County, in sec. 3, T. 2 N., R 8 E., third principal meridian, about 6 miles southeast of Clay City, Ill., and about a quarter of a mile below mouth of Big Muddy Creek.

Drainage area.—Not measured.

Records available.—August 22 to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, in the morning, to half-tenths.

Discharge measurements.—At ordinary stages made from downstream side of bridge, which is at a pool; during high water made also from a bridge across the drainage ditch about half a mile east of the highway bridge, as at extremely high stages low ground between highway bridge and drainage ditch overflows.

Channel and control.—Probably permanent; control section is about 100 feet below the bridge. A determination by soundings August 22, 1914, indicates that there would be no flow past the gage if the stage were to fall to about 1.2 feet±0.1 foot.

Extremes of stage.—Maximum stage recorded: 7.35 feet September 10. Minimum stage recorded: 1.70 feet August 23.

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

Accuracy.—Gage readings reliable.

Data insufficient for estimates of discharge.

Discharge measurements of Little Wabash River at Wilcox., Ill, during the year ending Sept. 30 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 22	Peterson and Kessler	1.73	4.1
Sept. 30	William Kessler	1.91	10.7

NOTE.—Measurements made by wading at a section about 100 feet below gage.

Daily gage height, in feet, of Little Wabash River at Wilcox, Ill., for the year ending Sept. 30, 1914.

[Hugh Holman, observer.]

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1		3.45	11		5.75	21		2.20
2		4.05	12		4.70	22	1.75	2.15
3		3.50	13		3.75	23	1.70	2.10
4		2.85	14		3.15	24	2.00	2.05
5		2.55	15		2.80	25	1.75	2.00
6		2.50	16		3.40	26	2.90	1.95
7		5.80	17		3.00	27	2.35	1.93
8		5.85	18		2.70	28	2.30	1.90
9		5.00	19		2.60	29	5.90	1.90
10		7.35	20		2.30	30	4.80	1.87
						31	3.85	

SKILLET FORK NEAR WAYNE CITY, ILL.

Location.—In sec. 18, T. 2 S., R. 6 E., at Southern Railway bridge 1 mile east of Wayne City, in Wayne County, and about 4 miles below mouth of Horse Creek.

Drainage area.—481 square miles.

Records available.—August 16, 1908, to December 31, 1912; June 22 to September 30, 1914.

Gage.—Standard chain gage attached to bridge, read daily, morning or afternoon, to half-tenths.

Discharge measurements.—Made from downstream side of bridge; in high water also from the downstream side of wooden trestle about 1 mile east of main channel. Low-water measurements made about three-fourths mile below regular section by wading or from a boat.

Channel and control.—Channel practically permanent; rough. Control, remains of rock dam at section. A determination by leveling on August 20, 1914, indicates that there would be no flow past the gage if the river stage were to fall to 1.6 feet± 0.1 foot.

Extremes of stage.—Maximum stage recorded during year: 14.10 feet September 9. Minimum stage recorded: 1.9 feet, July 4, 7, 9, 12, 14, 17, 19, 22, 24, 27, 29, and August 2, 4, 7, 9.

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

Winter flow.—Discharge relation may be affected by ice during parts of December, January, and February.

Diversions.—About 30,000 gallons of water per day are pumped from the river above the gage into the service tank of the Southern Railway.

Accuracy.—Gage readings reliable.

Data insufficient for estimates of discharge.

Discharge measurements of Skillet Fork near Wayne City, Ill., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 20	B. J. Peterson	2.15	[a] 1.6
Sept. 29	William Kessler	2.19	[b] 3.1

[a] Measurements made by wading at a section about a mile below gage.
[b] Measurement made by wading at a section about three-fourths mile below gage.

Daily gage height, in feet, of Skillet Fork near Wayne City, Ill., for the year ending Sept. 30, 1914.

[J. C. Taylor, observer.]

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	.....	2.2	2.0	2.95	16	.....	2.0	2.4	2.40
2	.....	2.1	1.9	2.70	17	.....	1.9	2.3	2.30
3	.....	2.0	2.0	2.50	18	.....	2.0	2.3	4.50
4	.....	1.9	1.9	2.40	19	.....	1.9	2.1	4.00
5	.....	2.0	2.0	2.35	20	.....	2.0	2.18	2.90
6	.....	2.0	2.0	2.25	21	.....	2.0	2.15	2.60
7	.....	1.9	1.9	2.60	22	2.9	1.9	2.15	2.60
8	.....	2.0	2.0	9.15	23	3.0	2.0	2.15	2.40
9	.....	1.9	1.9	14.10	24	2.8	1.9	2.15	2.40
10	.....	2.0	2.0	12.15	25	2.6	2.0	2.15	2.40
11	.....	2.0	3.3	8.45	26	2.5	2.0	2.15	2.40
12	.....	1.9	3.3	4.25	27	2.4	1.9	2.10	2.30
13	.....	2.0	3.0	2.95	28	2.3	2.0	2.30	2.20
14	.....	1.9	2.9	2.65	29	2.1	1.9	2.40	2.10
15	.....	2.0	2.6	2.45	30	2.2	2.0	4.25	2.18
					31	.....	2.0	4.10	.....

TENNESSEE RIVER BASIN.

FRENCH BROAD RIVER AT ASHEVILLE, N. C.

Location.—At highway bridge known as Smith's bridge, which is one-fourth mile above the Southern Railway bridge and about one-fourth mile below a concrete highway bridge; about 1 mile below the Southern Railway station at Asheville and 2 miles below mouth of Swannanoa River.

Drainage area.—987 square miles.

Records available.—March 19, 1903, to September 30, 1914.

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; read once daily to tenths. The staff gage ends at zero and the chain gage is used for readings below zero. Both gages are adjusted to the same datum.

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

Channel and control.—Channel at measuring section broken by three piers of the highway bridge. Bed of river is mostly rock but is not excessively rough. Current good at all points. Control practically permanent.

Extremes of discharge.—Maximum stage recorded during year: 3.4 feet April 15; discharge, 7,690 second-feet. Minimum stage recorded: —0.9 foot July 26–27, August 10, September 5–9, 15, 17–19, and 30; discharge, 590 second-feet.

The flood of August 31, 1910, reached a height of about 8.8 feet by the gage datum. Stage of 10.6 feet reported by the United States Weather Bureau (date unknown).

Winter flow.—Not affected by ice.

Accuracy.—Data reliable, although no discharge measurements have been made subsequent to September 16, 1912.

Cooperation.—Gage-height records since 1903 furnished by United States Weather Bureau.

Daily discharge, in second-feet, of French Broad River at Asheville, N. C., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,490	1,390	1,290	2,320	2,600	1,710	1,820	1,600	1,100	920	750	670
2	1,190	1,390	3,070	1,940	1,820	1,710	1,940	1,600	1,100	920	750	670
3	1,190	1,390	1,940	1,940	1,600	1,600	1,710	1,490	1,100	1,010	750	1,010
4	1,100	1,290	1,600	1,710	1,600	1,600	1,600	1,490	1,100	1,010	1,010	750
5	1,010	1,190	1,390	1,710	1,390	1,600	1,490	1,490	1,190	1,290	830	670
6	920	1,190	1,290	1,710	1,820	1,600	1,490	1,820	1,190	1,190	750	590
7	920	1,190	1,390	1,820	3,240	1,710	1,490	1,940	1,190	1,010	750	590
8	920	1,190	1,820	1,710	3,070	1,600	1,600	1,710	1,190	920	670	590
9	920	1,600	1,710	1,710	2,320	1,600	5,430	1,600	1,190	830	670	590
10	1,010	1,390	1,490	1,710	1,940	1,490	3,070	1,490	1,010	1,190	590	670
11	920	1,290	1,490	1,600	1,940	1,490	2,320	1,390	1,010	1,290	830	670
12	920	1,190	1,290	1,600	1,820	1,940	2,190	1,390	1,010	920	1,100	750
13	920	1,190	1,290	1,390	1,710	1,820	1,940	1,290	1,100	920	830	670
14	920	1,190	1,290	1,390	1,710	1,710	1,940	1,290	1,100	1,010	1,190	670
15	830	1,100	1,290	1,390	1,600	1,820	7,690	1,190	1,100	1,600	1,710	590
16	830	1,100	1,290	1,390	1,600	1,820	6,900	1,190	1,100	1,190	1,010	670
17	830	1,100	1,290	1,390	1,490	1,710	3,960	1,190	1,010	1,190	920	590
18	920	1,010	1,190	1,290	1,490	1,600	2,600	1,190	1,100	1,100	750	590
19	920	1,010	1,190	1,290	1,940	1,600	2,600	1,190	1,490	920	750	590
20	1,390	1,100	1,100	1,290	2,460	1,600	2,910	1,190	1,190	830	750	920
21	1,490	1,100	1,100	1,190	3,070	1,600	2,600	1,190	1,010	830	670	1,010
22	1,100	1,010	1,100	1,190	2,460	1,490	2,320	1,190	1,010	750	920	1,010
23	1,010	1,010	1,190	1,190	2,190	1,490	2,060	1,190	1,010	750	830	920
24	1,390	1,010	1,820	1,190	1,940	1,490	1,940	1,100	1,100	670	750	920
25	5,660	1,010	2,060	1,390	1,940	1,390	1,940	1,100	1,010	670	750	920
26	3,410	1,010	2,910	1,390	1,820	1,390	1,940	1,100	1,010	590	1,010	830
27	2,060	1,010	2,320	1,390	1,820	1,390	1,820	1,100	1,010	590	1,600	750
28	1,940	920	1,820	1,290	1,820	1,290	1,710	1,100	920	670	1,190	750
29	2,060	920	1,710	1,190	.....	1,600	1,710	1,100	920	1,390	830	670
30	1,710	1,010	2,600	1,190	.....	1,600	1,600	1,100	920	920	750	590
31	1,490	.....	2,750	1,600	.....	1,710	.....	1,100	.....	750	750	.....

NOTE.—Daily discharge computed from a rating curve well defined between 920 and 10,800 second-feet. See "Accuracy" in station description.

Monthly discharge of French Broad River at Asheville, N. C., for the year ending Sept. 30, 1914.

[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.		
October	5,660	830	1,400	1.42	1.64	B.
November	1,600	920	1,150	1.17	1.30	B.
December	3,070	1,100	1,650	1.67	1.92	B.
January	2,320	1,190	1,500	1.52	1.75	B.
February	3,240	1,390	2,010	2.04	2.12	B.
March	1,940	1,290	1,610	1.63	1.88	B.
April	7,690	1,490	2,540	2.57	2.87	B.
May	1,940	1,100	1,330	1.35	1.56	B.
June	1,490	920	1,080	1.09	1.22	B.
July	1,600	590	963	.976	1.13	B.
August	1,710	590	884	.896	1.03	B.
September	1,010	590	729	.739	.82	C.
The year	7,690	590	1,400	1.42	19.24	

TENNESSEE RIVER AT FLORENCE, ALA.

Location.—At Southern Railway bridge about 1 mile south of Florence, just below the foot of Little Muscle Shoals and the lower end of Pattons Island, about 3 miles above the upper end of Sevenmile Island, 8 miles below the mouth of Shoal Creek, 208 miles below Chattanooga, Tenn., and 256 miles above the mouth of the Tennessee.

Drainage area.—30,800 square miles.

Records available.—November 7, 1871, to September 30, 1914. Data relating to the shoals in Tennessee River near Florence are given in U. S. Geol. Survey Twenty-second Ann. Rept., pt. 4, pp. 229–230, 1902.

Gage.—Rod gage consisting of four sections of steel, $\frac{3}{8}$ inch by $7\frac{1}{4}$ inches, attached to right face of stone draw pier, which has batter of 1 inch to the foot. Sections form one continuous gage graduated from −1.92 to 33.5 feet. Zero of gage, 400.85 feet above sea level. For description of gages used prior to September 30, 1913, see Water-Supply Paper 353, p. 151.

Discharge measurements.—Made from downstream side of 17-span combined railway and highway bridge.

Bench marks.—See Water-Supply Paper 353, p. 153.

Channel and control.—Channel rocky and probably permanent, though rough and uneven. Current obstructed by 16 stone piers, which make careful measurements necessary. Control probably permanent.

Extremes of discharge.—Maximum stage recorded during year: 12.2 feet at 8 a. m. and 4 p. m. April 4; discharge, 124,000 second-feet. Minimum stage recorded: −0.6 foot October 18–21; discharge, 8,150 second-feet. Highest flood on record occurred March 16–20, 1897; maximum stage, 32.5 feet.

Winter flow.—Discharge relation not materially affected by ice.

Regulation.—The Hales Bar dam, 175 miles upstream, may cause some diurnal fluctuation, but this has not been noticeable to date.

Accuracy.—Records good.

Cooperation.—Gage heights furnished by Mississippi River Commission.

No discharge measurements were made at this station during the year ending September 30, 1914.

Daily discharge, in second-feet, of Tennessee River at Florence, Ala., for the year ending Sept. 30, 1914.

[R. E. Coburn, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	25,400	11,800	12,300	27,700	30,100	51,600	101,000	48,000	14,500	11,800	12,300	13,900
2	18,800	13,400	12,300	29,300	53,400	49,800	114,000	49,800	13,900	11,300	12,800	29,300
3	14,500	13,900	12,800	29,300	63,300	47,100	124,000	40,300	13,400	10,800	13,400	34,400
4	13,400	13,900	14,500	27,700	54,300	44,600	127,000	38,600	13,400	9,850	13,400	32,600
5	12,300	13,900	15,700	26,100	48,000	41,200	125,000	41,200	12,800	9,850	13,900	24,600
6	12,300	13,900	16,300	25,400	48,000	37,800	117,000	46,200	12,800	9,850	15,100	20,200
7	11,800	12,800	15,700	24,600	61,500	36,000	90,200	39,400	12,800	9,850	14,500	18,200
8	11,300	11,300	15,700	23,100	68,300	34,400	78,800	36,900	12,800	9,850	13,900	16,300
9	10,800	10,800	15,700	20,900	76,600	32,600	81,000	37,800	12,800	9,850	13,400	13,900
10	10,800	9,850	17,500	20,900	75,500	31,000	82,100	41,200	12,800	9,850	13,900	13,400
11	10,300	9,850	19,500	20,200	68,300	31,000	74,400	41,200	12,800	10,300	13,900	12,800
12	9,850	10,800	21,600	19,500	61,500	32,600	75,500	40,300	12,800	10,300	13,400	12,800
13	9,400	10,800	22,400	19,500	60,600	39,400	78,800	37,800	13,900	10,300	13,400	11,300
14	9,400	10,800	22,400	18,800	57,000	43,700	78,800	35,200	13,900	9,850	15,700	10,800
15	9,400	10,800	20,200	18,200	55,200	48,900	93,800	32,600	13,900	9,850	16,900	9,850
16	9,400	10,800	19,500	18,800	53,400	55,200	109,000	30,100	13,900	16,300	17,500	9,850
17	8,950	11,800	19,500	20,200	53,400	67,300	114,000	29,300	13,900	18,800	16,300	9,850
18	8,150	11,800	18,800	21,600	53,400	66,300	114,000	27,700	13,900	12,300	15,700	10,300
19	8,150	11,800	15,100	20,900	51,600	58,800	108,000	26,100	13,900	26,900	16,300	10,800
20	8,150	11,800	15,100	19,500	48,000	51,600	95,000	23,800	12,300	47,100	18,800	10,300
21	8,150	11,300	13,900	17,500	44,600	44,600	91,400	23,100	12,800	25,400	18,800	10,300
22	8,550	11,300	13,400	16,300	42,800	42,800	90,200	22,400	12,800	37,800	16,300	10,300
23	8,950	11,800	13,400	15,100	41,200	42,800	99,800	20,900	13,900	27,700	15,100	10,300
24	9,400	12,800	13,400	15,100	46,200	44,600	106,000	19,500	19,500	23,100	14,500	9,850
25	8,950	12,800	15,100	15,100	53,400	44,600	107,000	18,800	21,600	18,800	13,900	9,400
26	9,850	13,400	15,100	15,100	60,600	42,800	89,000	18,800	18,800	15,700	13,900	9,400
27	9,850	13,400	14,500	15,700	60,600	42,800	81,000	17,500	17,500	15,100	13,900	10,800
28	10,800	12,800	15,100	16,300	55,200	42,000	62,400	16,300	15,100	13,900	13,900	10,800
29	10,800	12,300	15,100	16,900	.....	42,800	56,100	16,300	13,400	13,900	12,800	10,800
30	10,800	12,300	16,300	17,500	.....	50,700	52,500	15,100	12,300	13,900	12,800	9,850
31	10,800	.....	18,800	20,200	.....	83,200	.....	15,100	.....	12,800	12,800	.....

NOTE.—Daily discharge computed from a rating curve well defined above 10,800 second feet.

Monthly discharge of Tennessee River at Florence, Ala., for the year ending Sept. 30, 1914.

[Drainage area, 30,800 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	25,400	8,150	11,000	0.357	0.41	B.
November	13,900	9,850	12,000	.390	.44	B.
December	22,400	12,300	16,300	.529	.61	A.
January	29,300	15,100	20,400	.662	.76	A.
February	76,600	30,100	55,200	1.79	1.86	A.
March	83,200	31,000	46,000	1.49	1.72	A.
April	127,000	52,500	93,900	3.05	3.40	B.
May	49,800	15,100	30,600	.994	1.15	A.
June	21,600	12,300	14,200	.461	.51	A.
July	47,100	9,850	16,500	.536	.62	A.
August	18,800	12,300	14,600	.474	.55	A.
September	34,400	9,400	14,200	.461	.51	B.
The year	127,000	8,150	28,500	.925	12.54	

Days of deficiency in discharge of Tennessee River at Florence, Ala., for the year ending Sept. 30, 1914.

Discharge in second-feet.	Days of deficient discharge.	Discharge in second-feet.	Days of deficient discharge.	Discharge in second-feet.	Days of deficient discharge.
8,000	.....	16,000	180	45,000	295
8,500	4	18,000	199	50,000	307
9,000	8	20,000	221	60,000	324
9,500	15	24,000	240	70,000	335
10,000	34	28,000	251	80,000	342
11,000	61	32,000	259	100,000	353
12,000	75	36,000	266	120,000	362
14,000	150	40,000	275	140,000	365

NOTE.—A table of duration of discharge at Florence for the years ending Sept. 30, 1895–1913, was published in Water-Supply Paper 353, pp. 194–195. In using that table below 16,000 second-feet for the years ending Sept. 30, 1904 and 1905, it should be noted that in constructing the table the mean daily discharges for September, October, and November, 1904, were assumed to be constant and equal to the estimated mean monthly discharges.

TENNESSEE RIVER AT JOHNSONVILLE, TENN.[1]

Location.—At the Nashville, Chattanooga & St. Louis Railway freight elevator about 1,000 feet below the railway bridge at Johnsonville, Tenn., 96 miles from the mouth of the Tennessee, and 160 miles below Florence, Ala.

Drainage area.—38,500 square miles.

Records available.—October 1, 1875, to September 30, 1914. Records from October 1, 1875, to September 30, 1913, published in Water-Supply Paper 353.

Gage.—Staff at freight elevator on right bank about 1,000 feet below the Nashville, Chattanooga & St. Louis Railway bridge.

Discharge measurements.—Made from downstream side of through-type railway bridge of six spans and draw span.

Channel and control.—No information relative to control. Channel at measuring section at bridge composed of bowlders and coarse gravel; apparently permanent.

Extremes of discharge.—Maximum stage recorded during year: 19.8 feet April 5–6; discharge, 156,000 second-feet. Minimum stage recorded: 0.4 foot September 19; discharge, 10,500 second-feet.

A stage of 48 feet on March 24, 1897, is the highest unquestioned record.

Winter flow.—Discharge relation not materially affected by ice.

Regulation.—Flow probably not affected by other than natural causes.

Accuracy.—Records good.

Cooperation.—Gage-height record furnished by United States Weather Bureau.

The following discharge measurement was made by Ellsworth and Adams:

August 5, 1914: Gage height, 1.90 feet; discharge, 15,200 second-feet.

[1] For detailed history of this station, see Water-Supply Paper 353, pp. 195–201.

Daily discharge, in second-feet, of Tennessee River at Johnsonville, Tenn., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	19,700	13,000	14,800	20,700	20,700	63,600	112,000	64,400	17,800	14,800	14,800	14,500
2	24,100	12,600	14,800	22,400	22,900	59,600	137,000	58,100	16,900	13,700	14,500	14,100
3	25,300	13,700	14,800	27,100	32,200	55,800	148,000	52,800	16,500	13,000	13,400	14,500
4	21,800	14,800	14,500	31,000	52,800	52,800	154,000	47,600	16,500	12,300	13,700	22,900
5	18,700	15,600	15,200	29,000	61,200	49,800	156,000	87,200	15,600	12,000	14,800	31,000
6	16,500	16,100	16,500	29,000	58,100	46,800	156,000	91,500	15,200	11,400	15,600	30,300
7	15,200	16,100	17,400	29,000	58,800	43,200	142,000	86,300	14,800	11,400	15,600	28,400
8	14,500	16,100	17,800	27,100	70,200	40,400	139,000	75,200	16,100	11,100	16,100	24,100
9	14,100	15,200	17,800	25,900	83,800	38,300	126,000	62,000	16,500	11,100	16,100	20,700
10	13,700	14,500	17,400	24,700	84,600	37,000	120,000	51,300	16,100	11,100	16,100	18,300
11	13,400	12,600	17,800	24,700	82,000	35,600	111,000	48,300	16,100	10,800	15,200	16,100
12	13,000	11,600	19,200	23,500	78,600	37,000	102,000	47,600	15,600	11,400	15,600	14,800
13	12,600	12,300	20,200	22,400	76,000	39,700	98,400	46,800	15,600	11,600	15,600	13,700
14	12,300	12,600	21,300	22,400	76,000	44,700	100,000	43,900	15,600	11,600	16,100	13,000
15	12,000	12,600	22,900	21,300	72,700	49,800	105,000	41,800	15,600	11,400	16,100	12,300
16	11,600	12,600	22,900	20,700	69,400	51,300	113,000	38,300	16,500	11,400	16,900	11,600
17	11,400	12,600	22,400	20,700	64,400	52,800	132,000	34,900	17,400	11,400	18,300	11,400
18	11,400	13,400	21,300	20,700	61,200	67,700	139,000	32,900	16,900	19,200	18,700	10,800
19	11,400	13,700	20,200	21,800	59,600	72,700	139,000	30,300	16,500	27,100	18,300	10,500
20	11,400	14,100	19,200	22,900	59,600	70,200	137,000	27,700	16,100	22,400	16,900	10,800
21	11,100	14,100	18,300	22,400	57,300	62,800	130,000	26,500	16,100	26,500	16,900	11,400
22	11,100	14,100	16,900	21,300	53,500	55,800	120,000	26,500	14,800	42,500	18,300	11,400
23	10,800	13,700	16,500	19,200	50,500	50,500	110,000	25,300	14,500	43,200	18,300	11,600
24	10,800	13,700	16,900	18,300	47,600	47,600	105,000	23,500	14,500	37,600	17,400	12,000
25	11,100	14,100	17,400	17,800	48,300	46,800	110,000	22,900	15,600	31,600	16,100	12,000
26	12,000	14,800	17,800	17,800	52,800	48,300	116,000	21,800	19,200	29,600	15,200	12,000
27	12,300	14,800	19,200	17,800	60,400	49,800	114,000	20,700	20,700	21,300	15,200	11,400
28	12,300	15,200	20,200	17,800	65,200	28,300	103,000	20,200	19,200	18,700	16,500	11,100
29	12,300	15,200	20,700	18,300	.....	48,300	88,900	19,200	17,400	16,500	16,100	11,400
30	12,600	14,800	21,300	19,200	.....	58,100	75,200	18,700	16,100	15,600	16,100	12,000
31	12,600	.....	20,700	20,200	.....	81,200	.....	18,300	.....	15,200	14,800	.....

NOTE.—Daily discharge determined from a well-defined rating curve. During April there may have been some backwater from Ohio River, which reached a stage at Paducah, Ky., of more than 30 feet April 3–21, the maximum stage being 36.4 feet.

Monthly discharge of Tennessee River at Johnsonville, Tenn., for the year ending Sept. 30, 1914.

[Drainage area, 38,500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	25,300	10,800	14,000	0.364	0.42	B.
November	16,100	11,600	14,000	.364	.41	B.
December	22,900	14,500	18,500	.481	.55	B.
January	31,000	17,800	22,500	.584	.67	B.
February	84,600	20,700	60,000	1.56	1.62	B.
March	81,200	35,600	51,800	1.35	1.56	B.
April	156,000	75,200	121,000	3.14	3.50	B.
May	91,500	18,300	42,300	1.10	1.27	B.
June	20,700	14,500	16,400	.426	.48	B.
July	43,200	10,800	18,300	.475	.55	B.
August	18,700	13,400	16,100	.418	.48	B.
September	31,000	10,500	15,300	.397	.44	B.
The year	156,000	10,500	33,900	.881	11.95	

NOTE.—See footnote to table of daily discharge.

SOUTH FORK OF HOLSTON RIVER AT BLUFF CITY, TENN.

Location.—At highway bridge at Bluff City, 300 feet below Virginia & Southwestern Railway bridge, 1 mile below the mouth of Indian Creek, and about 10 miles above mouth of Watauga River.

Drainage area.—828 square miles.

Records available.—July 17, 1900, to September 30, 1914.

Gage.—Vertical staff attached to downstream side of bridge pier nearest the right bank; read once daily to tenths.

Discharge measurements.—Made from downstream side of bridge; also from railroad bridge 300 feet above, where the section is much better except at low stages, when the current becomes sluggish.

Channel and control.—Channel probably permanent. Control, a shallow ledge.

Extremes of discharge.—Maximum stage recorded during year: 6.4 feet at 12 midnight March 31; discharge, 8,720 second-feet. Minimum stage recorded: 0 foot August 4, 8–10, 19–22, and September 28–29; discharge, 185 second-feet.

Accuracy.—Records only fair on account of unfavorable section for making discharge measurements.

Cooperation.—Since January 1, 1905, gage heights have been furnished by the United States Weather Bureau.

Daily discharge, in second-feet, of South Fork of Holston River at Bluff City, Tenn., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	475	285	420	715	1,190	1,680	5,080	940	420	212	212	530
2	420	285	650	715	1,280	1,480	4,560	940	475	245	212	420
3	370	285	650	715	1,100	1,190	3,760	940	420	325	212	370
4	325	245	530	715	1,020	1,280	3,040	860	420	325	185	325
5	285	245	420	650	940	1,100	2,500	940	370	285	245	285
6	285	285	370	650	1,020	1,190	2,010	2,760	420	285	212	285
7	325	285	475	650	2,370	1,280	1,790	2,250	475	245	212	245
8	285	370	650	590	3,320	1,480	1,680	1,790	420	245	185	245
9	285	785	715	650	2,130	1,480	1,790	1,480	420	245	185	285
10	285	1,020	590	1,100	1,580	1,280	1,580	1,280	370	245	185	285
11	325	715	530	1,900	1,480	1,280	1,280	1,190	420	245	212	325
12	285	650	530	1,380	1,280	6,780	1,280	1,100	370	325	212	370
13	245	650	475	1,020	1,190	4,560	1,280	1,020	420	285	212	325
14	245	590	475	650	1,680	3,040	1,190	940	420	245	245	285
15	245	590	420	860	1,280	2,250	2,010	860	420	590	245	245
16	245	590	420	715	1,020	2,010	2,250	785	370	475	212	245
17	245	1,100	420	715	940	1,790	2,370	785	325	325	212	212
18	245	1,190	370	650	1,020	2,250	2,250	715	325	475	212	212
19	285	1,020	370	590	1,480	2,370	1,900	715	325	420	185	212
20	370	860	370	590	4,220	2,010	3,180	650	325	325	185	212
21	590	715	370	650	5,620	1,790	3,180	590	285	285	185	212
22	475	650	370	715	3,610	1,680	2,500	590	285	245	185	212
23	420	590	370	715	2,630	1,680	2,010	590	285	245	212	212
24	370	530	370	715	3,040	1,680	1,680	530	285	212	212	212
25	370	475	370	1,020	3,040	1,580	1,480	530	285	212	212	245
26	370	420	650	1,580	2,370	1,580	1,380	530	285	245	590	245
27	370	420	860	1,280	2,010	1,580	1,380	530	245	245	1,900	212
28	325	420	650	1,020	1,790	1,580	1,190	475	245	285	4,220	185
29	325	420	590	940	.....	1,580	1,100	475	245	245	2,130	185
30	325	370	590	785	.....	3,040	1,100	475	212	245	1,190	245
31	285	.....	650	785	.....	8,490	.....	475	.....	212	715	.....

NOTE.—Daily discharge determined from a poorly defined rating curve. No discharge measurements made during year ending Sept. 30, 1914, but two measurements made in October, 1914, indicate that the rating curve used prior to Oct. 1, 1913, is applicable for the year ending Sept. 30, 1914.

Monthly discharge of South Fork of Holston River at Bluff City, Tenn., for the year ending Sept. 30, 1914.

[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.		
October	590	245	332	0.401	0.46	D.
November	1,190	245	568	.686	.77	C.
December	860	370	506	.611	.70	C.
January	1,900	590	852	1.03	1.19	C.
February	5,620	940	1,990	2.40	2.50	C.
March	8,490	1,100	2,190	2.64	3.04	C.
April	5,080	1,100	2,130	2.57	2.87	C.
May	2,760	475	927	1.12	1.29	C.
June	475	212	353	.426	.48	D.
July	590	212	292	.353	.41	D.
August	4,220	185	514	.621	.72	C.
September	530	185	269	.325	.36	D.
The year	8,490	185	902	1.09	14.79	

HOLSTON RIVER NEAR ROGERSVILLE, TENN.

Location.—At Virginia & Southwestern Railway bridge near Austins Mill, a small railway station 3 miles south of Rogersville, 150 feet below mouth of Honeycut Creek, and about 2 miles below Dodson Creek, both small streams from the south.

Drainage area.—3,060 miles.

Records available.—Gage-height records March 10, 1902, to September 30, 1914, United States Weather Bureau. Discharge measurements were begun in 1904 by the United States Geological Survey.

Gage.—Vertical staff attached to downstream side of bridge pier nearest the right bank; read once daily to tenths.

Discharge measurements.—Made from top of the high-decked steel railroad bridge.

Channel and control.—Practically permanent. Section good for measurements.

Extremes of stage.—Maximum stage recorded during year: 9.5 feet March 31. Minimum stage recorded: 1.4 feet during periods in June, July, August, and September.

The flood of March 28, 1913, reached a maximum height of 19.1 feet by the gage datum.

Winter flow.—Discharge relation not greatly affected by ice.

Cooperation.—Gage maintained and gage-height records furnished by the United States Weather Bureau.

Station was last visited by engineers of the Geological Survey on June 21, 1912. Nothing is known as to the effect of the flood of March 28, 1913, on the discharge relation or of the permanency of the gage since last inspected. Therefore no estimates of discharge subsequent to that date have been prepared for publication.

Daily gage height, in feet, of Holston River near Rogersville, Tenn., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.8	1.8	1.7	1.9	2.4	3.2	7.8	2.7	1.7	1.4	1.5	2.2
2	1.9	1.7	1.8	2.0	3.0	3.1	6.1	2.7	1.7	1.4	1.5	2.0
3	1.8	1.7	1.8	2.1	3.0	2.9	5.6	2.5	1.7	1.4	1.4	1.9
4	1.7	1.7	1.8	2.1	2.8	2.8	4.8	2.4	1.7	1.4	1.4	1.9
5	1.7	1.6	1.9	2.1	2.5	2.8	4.2	2.6	1.8	1.5	1.4	1.8
6	1.7	1.6	1.8	2.1	2.4	2.8	3.9	2.9	1.8	1.5	1.4	1.7
7	1.7	1.6	2.0	2.0	3.7	2.9	3.6	4.0	1.8	1.5	1.4	1.5
8	1.7	1.6	2.1	2.0	4.6	3.3	3.5	3.6	1.8	1.4	1.4	1.5
9	1.7	1.6	2.0	2.0	4.3	3.3	3.7	3.3	1.8	1.4	1.4	1.5
10	1.6	1.9	2.0	2.1	3.5	3.1	3.6	3.0	1.7	1.4	1.4	1.6
11	1.6	2.1	1.9	2.7	3.2	3.0	3.2	2.9	1.6	1.4	1.5	1.6
12	1.6	2.0	1.9	3.2	3.0	4.0	3.1	2.7	1.6	1.5	1.4	1.8
13	1.7	1.9	1.8	2.8	2.8	6.9	3.0	2.6	1.6	1.5	1.5	1.8
14	1.7	1.9	1.8	2.4	3.3	5.1	2.8	2.6	1.6	1.5	1.5	1.8
15	1.7	1.9	1.8	2.1	3.2	4.3	3.5	2.5	1.7	1.9	1.6	1.6
16	1.7	1.9	1.8	2.0	2.9	3.8	4.6	2.4	1.6	2.9	2.3	1.4
17	1.7	1.9	1.8	2.0	2.6	3.6	4.3	2.3	1.6	2.2	1.9	1.4
18	1.6	2.2	1.7	1.9	2.4	3.8	4.0	2.2	1.6	1.9	1.5	1.4
19	1.6	2.6	1.7	1.9	2.6	4.2	4.0	2.2	1.7	1.9	1.5	1.4
20	1.7	2.3	1.7	1.9	3.9	4.0	4.7	2.2	1.9	1.9	1.4	1.4
21	1.9	1.9	1.6	1.9	5.6	3.9	5.2	2.1	1.9	1.8	1.4	1.4
22	2.0	1.9	1.6	1.9	5.2	3.6	4.7	2.0	1.6	1.5	1.4	1.4
23	1.9	1.9	1.6	2.0	4.3	3.6	4.0	2.0	1.5	1.5	1.4	1.4
24	1.9	1.9	1.6	2.0	4.1	3.4	3.7	1.9	1.5	1.5	1.4	1.4
25	1.9	1.9	1.6	2.1	4.6	3.4	3.4	1.8	1.5	1.4	1.5	1.5
26	2.5	1.8	2.5	2.8	4.1	3.2	3.2	1.8	1.5	1.4	2.2	1.4
27	2.2	1.8	2.5	3.3	3.8	3.1	3.2	1.8	1.5	1.4	3.0	1.4
28	2.0	1.7	2.4	2.8	3.5	3.1	3.1	1.8	1.4	1.4	6.0	1.4
29	1.9	1.7	2.1	2.6	.....	3.3	2.9	1.7	1.4	2.3	5.5	1.4
30	1.9	1.7	2.0	2.4	.....	3.9	2.8	1.7	1.4	2.0	3.3	1.4
31	1.8	.....	1.9	2.2	.....	9.5	.....	1.7	.....	1.8	2.8	.....

NOTE.—No gage heights or estimates of flow have been published by the United States Geological Survey prior to Jan. 1, 1904, but the rating curve for 1904 is probably applicable to all gage heights taken by the United States Weather Bureau prior to that date.

DOE RIVER AT BLEVINS, TENN.

Location.—At Eastern Tennessee & Western North Carolina Railroad bridge, one-fourth mile west of Blevins, Tenn., and 4½ miles above the mouth of Little Doe River.

Drainage area.—62.2 square miles.

Records available.—December 16, 1911, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 3.5, half-tenths from 3.5 to 5, and tenths above 5 feet.

Discharge measurements.—Made from upstream side of bridge or by wading at section about one-fourth mile above bridge.

Channel and control.—Practically permanent. 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.

Extremes of stage.—Maximum stage recorded during year: 3.08 feet at 8.45 a. m. January 31. Minimum stage recorded: 1.65 feet at 8.45 a. m. July 1 and September 27.

Winter flow.—Discharge relation may be occasionally affected by ice during unusually severe winters; probably not materially affected during year ending September 30, 1914.

Data insufficient for estimates of discharge.

No discharge measurements were made at this station during the year ending September 30, 1914.

Daily gage height, in feet, of Doe River at Blevins, Tenn., for the year ending Sept. 30, 1914.

[O. L. Wright, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.78	1.85	2.04	1.95	2.40	2.06	2.36	2.06	1.84	1.65	1.80	1.89
2	1.79	1.85	1.97	1.93	2.24	1.96	2.36	2.01	1.83	1.92	1.78	1.85
3	1.78	1.84	1.89	1.92	2.16	2.07	2.27	2.00	1.81	1.85	1.75	1.80
4	1.77	1.84	1.88	2.07	2.11	2.16	2.20	2.00	1.81	1.76	1.78	1.80
5	1.75	1.84	1.88	1.95	2.07	2.06	2.16	2.16	1.82	1.73	1.76	1.79
6	1.75	1.83	1.87	1.92	2.34	2.11	2.14	2.16	1.98	1.71	1.75	1.79
7	1.75	1.82	2.19	1.90	2.61	2.09	2.09	2.15	1.91	1.70	1.75	1.80
8	1.76	1.84	2.14	2.04	2.43	2.04	2.11	2.14	1.81	1.70	1.77	1.82
9	1.76	2.07	2.10	2.01	2.16	1.96	2.08	2.15	1.81	1.70	1.82	1.85
10	1.75	2.04	1.97	2.19	2.08	2.12	2.06	2.12	1.79	1.85	1.80	1.86
11	1.75	1.97	1.94	2.04	2.06	2.18	2.03	2.10	1.76	1.83	1.79	1.91
12	1.77	1.97	1.92	1.92	2.05	2.91	2.03	2.10	1.75	1.80	1.79	1.95
13	1.75	1.96	1.89	1.97	2.05	2.46	2.04	2.06	1.80	1.74	1.83	1.86
14	1.74	1.97	1.87	2.07	2.06	2.34	2.06	2.01	1.85	1.73	1.85	1.82
15	1.72	1.97	1.87	2.00	2.08	2.26	2.81	1.99	1.80	1.90	1.94	1.75
16	1.73	2.10	1.87	2.09	2.09	2.26	2.65	1.96	1.75	1.87	1.85	1.75
17	1.75	2.22	1.86	1.95	2.06	2.25	2.46	1.96	1.74	1.93	1.80	1.66
18	1.75	2.10	1.84	1.92	2.11	2.21	2.36	1.96	2.04	1.90	1.77	1.85
19	1.77	1.99	1.84	1.90	2.16	2.16	2.34	1.93	1.93	1.84	1.73	1.77
20	2.07	1.96	1.83	1.92	2.39	2.18	2.74	1.86	1.94	1.71	1.75	1.75
21	1.93	1.92	1.83	2.00	2.29	2.01	2.49	1.88	1.80	1.68	1.78	1.76
22	1.87	1.91	1.85	1.94	2.18	2.01	2.36	1.91	1.75	1.68	1.76	1.75
23	1.87	1.90	1.85	1.96	2.20	2.03	2.28	1.90	1.75	1.69	1.68	1.68
24	1.93	1.88	1.90	2.00	2.22	2.08	2.24	1.91	1.73	1.70	1.70	1.67
25	2.04	1.87	1.95	2.20	2.18	2.07	2.16	1.91	1.75	1.70	1.70	1.75
26	1.99	1.87	1.97	2.15	2.17	2.13	2.20	1.89	1.72	1.73	1.98	1.75
27	1.95	1.87	1.92	2.06	2.08	2.21	2.24	1.87	1.70	1.75	2.37	1.65
28	1.93	1.86	1.90	2.04	2.08	2.30	2.17	1.86	1.70	1.90	2.50	1.68
29	1.92	1.84	1.90	2.00	.....	2.37	2.13	1.87	1.69	2.00	2.02	1.70
30	1.90	1.87	1.95	2.00	.....	2.55	2.10	1.86	1.66	1.90	1.93	1.74
31	1.87	.....	1.94	3.08	.....	2.35	.....	1.84	.....	1.85	1.90	.....

NOTE.—Because of an error in the gage found by checking with wye levels on Oct. 16, 1914, gage heights for 1913 as published in Water-Supply Paper 353 should be corrected as follows: May 24 to Sept. 28, subtract 0.02 foot; Sept. 29–30, subtract 0.03 foot.

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.

Drainage area.—132 square miles.

Records available.—December 11, 1911, to September 30, 1914.

Gage.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 3.5, half-tenths from 3.5 to 5, and tenths above 5 feet.

Discharge measurements.—Made from upstream side of bridge or by wading at a section about 40 feet above the bridge. The current makes a decided angle with the bridge.

Channel and control.—Practically permanent. A determination by leveling 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.

Extremes of stage.—Maximum stage recorded during year: 3.23 feet at 6 a. m. March 12. Minimum stage recorded: 0.92 foot June 27 to July 1.

Winter flow.—Ice may affect the discharge relation for short periods during unusually severe winters; probably not materially affected during year ending September 30, 1914.

Data insufficient for estimates of discharge.

No discharge measurements were made at this station during the year ending September 30, 1914.

Daily gage height, in feet, of Doe River at Valley Forge, Tenn., for the year ending Sept. 30, 1914.

[W. C. Garrison, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.25	1.13	1.33	1.36	2.04	1.68	2.13	1.55	1.17	0.92	1.11	1.31
2	1.20	1.13	1.40	1.26	1.76	1.28	2.18	1.53	1.17	1.72	1.09	1.26
3	1.15	1.15	1.30	1.24	1.66	1.48	2.03	1.51	1.14	1.32	1.16	1.21
4	1.15	1.15	1.30	1.06	1.64	1.58	1.91	1.48	1.14	1.12	1.26	1.16
5	1.10	1.15	1.25	1.16	1.59	1.63	1.78	1.63	1.17	1.07	1.11	1.11
6	1.05	1.15	1.25	1.24	2.09	1.71	1.71	1.63	1.17	1.02	1.09	1.11
7	1.05	1.15	1.25	1.24	2.39	1.75	1.68	1.63	1.22	1.02	1.03	1.11
8	1.05	1.15	1.45	.99	1.92	1.63	1.65	1.68	1.14	1.02	1.01	1.06
9	1.05	1.65	1.25	1.39	1.79	1.48	1.63	1.61	1.12	1.02	1.11	1.21
10	1.13	1.25	1.10	1.74	1.74	1.48	1.61	1.58	1.17	1.32	1.09	1.11
11	1.05	1.35	1.25	1.54	1.74	1.75	1.58	1.53	1.12	1.62	1.09	1.06
12	1.20	1.35	1.15	1.24	1.62	3.23	1.58	1.51	1.10	1.22	1.11	1.51
13	1.10	1.33	1.25	1.09	1.54	2.33	1.53	1.48	1.12	1.07	1.21	1.26
14	1.05	1.43	1.19	1.09	1.64	2.13	1.51	1.45	1.12	1.07	1.46	1.19
15	1.05	1.40	1.24	1.34	1.39	2.03	2.78	1.45	1.12	1.22	1.61	1.11
16	1.05	1.37	1.24	1.39	1.49	1.98	2.58	1.42	1.12	1.37	1.41	1.09
17	1.05	1.93	1.24	1.36	1.09	1.98	2.13	1.40	1.07	1.32	1.21	1.16
18	1.07	1.65	1.24	1.19	1.39	2.18	2.03	1.37	1.12	1.30	1.11	1.06
19	1.13	1.50	1.14	1.29	1.69	1.88	1.93	1.32	1.52	1.22	1.01	1.06
20	1.65	1.40	1.19	1.32	2.14	1.91	2.73	1.32	1.22	1.12	1.06	1.06
21	1.35	1.35	1.19	1.34	2.09	1.88	2.18	1.32	1.22	1.02	1.21	1.06
22	1.33	1.35	1.19	1.29	1.94	1.83	2.08	1.30	1.10	1.02	1.16	1.06
23	1.30	1.30	1.19	1.26	1.84	1.73	1.93	1.27	1.04	1.02	1.03	1.09
24	1.25	1.27	1.19	1.32	1.94	1.81	1.83	1.22	1.02	1.02	1.01	1.06
25	1.45	1.25	1.19	2.14	1.79	1.71	1.73	1.24	1.02	.97	1.03	1.21
26	1.35	1.20	1.49	1.74	1.82	1.71	1.78	1.22	.97	1.02	2.01	1.09
27	1.33	1.20	1.19	1.64	1.76	1.78	1.68	1.22	.92	1.07	1.81	1.03
28	1.33	1.20	1.26	1.54	1.73	1.93	1.63	1.22	.92	1.07	2.81	1.01
29	1.23	1.20	1.24	1.49	.....	1.83	1.58	1.20	.92	1.87	1.83	1.01
30	1.23	1.20	1.39	1.46	.....	2.13	1.68	1.27	.92	1.32	1.66	1.01
31	1.20	.....	1.34	2.02	.....	2.33	.....	1.22	.....	1.19	1.41	.....

NOTE.—Because of an error in the gage, found by checking with wye levels on Oct. 15, 1914, gage heights for 1913 as published in Water-Supply Paper 353 should be corrected as follows: Feb. 10 to Apr. 27, subtract 0.02 foot; Apr. 28 to July 12, subtract 0.03 foot; July 13 to Sept. 27, subtract 0.04 foot; Sept. 28–30, subtract 0.05 foot.

LITTLE TENNESSEE RIVER AT JUDSON, N. C.

[Old U. S. Geological Survey station.]

Location.—At Southern Railway bridge about half a mile north of Southern Railway station at Judson, 2½ miles below mouth of Nantahala River, 1 mile below Alarka Creek, one-fourth mile below Sawyer Branch, and 3 miles above the mouth of Tuckasegee River.

Drainage area.—675 square miles.

Records available.—June 25, 1896, to September 30, 1913.

Gage.—Vertical staff in two sections on right bank 100 feet above the bridge. Lower section bolted to rock; upper section on tree. For history of gages previously used see Water-Supply Paper 323.

Discharge measurements.—Made from downstream side of railroad bridge. Some recent measurements have been made at a swinging footbridge one-half mile upstream, at Judson railroad station.

Channel and control.—The control has changed materially, although the channel at the bridge is rough; rocky bottom; section divided by two piers; current swift and irregular.

Extremes of stage.—The flood of February 28, 1902, reached a stage of 16.2 feet.

Winter flow.—Discharge relation not affected by ice.

Accuracy.—A study of hydrometric data collected by the Knoxville Power Co. on the Little Tennessee and its tributaries indicates that the old Survey station at Judson, because of a combination of natural causes and inherent difficulties, does not yield results as accurate as those obtained at the new station established by the power company on April 16, 1912, about half a mile above the Southern Railway bridge. Therefore only gage heights are published for the old Survey station. (See also Water-Supply Paper 323.)

No discharge measurements were made at this station during the year ending September 30, 1913.

Daily gage height, in feet, of Little Tennessee River at Judson, N. C., for the year ending Sept. 30, 1913.

[Miss E. G. Enloe, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.5	3.2	3.2	4.2	5.0	5.9	6.2	4.2	4.3	3.4	4.2	2.8
2	3.5	3.6	3.3	4.0	4.8	5.4	6.0	4.1	4.2	3.4	3.8	2.8
3	3.4	3.3	3.6	4.1	5.2	5.0	5.8	4.0	4.2	3.6	3.9	2.8
4	3.4	3.3	3.5	3.9	5.2	4.9	5.7	4.0	4.2	3.9	3.4	2.8
5	3.4	3.3	4.4	4.0	5.1	4.8	5.6	4.0	4.2	3.8	3.35	3.1
6	3.35	3.2	5.1	4.0	4.8	4.6	5.3	4.0	4.2	3.5	3.4	3.45
7	3.3	4.2	4.6	3.9	4.7	4.5	5.2	4.0	4.4	3.3	3.3	3.05
8	3.3	4.0	4.3	4.0	4.6	4.4	5.2	4.0	4.8	3.2	3.8	2.9
9	3.3	3.6	3.9	4.0	4.4	4.4	5.0	4.2	4.5	3.2	4.4	2.85
10	3.2	3.5	3.8	4.0	4.4	5.3	5.0	4.1	4.9	3.2	3.9	3.25
11	3.2	3.4	3.7	4.0	5.6	5.4	5.4	4.0	4.2	3.3	3.7	2.9
12	3.2	3.4	3.6	4.7	6.2	5.0	5.7	3.9	4.2	3.8	3.45	2.8
13	3.2	3.35	3.5	4.9	5.3	5.0	5.4	3.9	4.0	3.8	3.3	2.8
14	3.45	3.6	3.5	4.5	5.0	.....	5.3	3.8	4.0	3.4	3.2	2.8
15	3.6	3.45	3.4	4.2	4.8	.....	5.3	3.9	3.9	3.3	3.35	2.8
16	3.35	3.35	3.4	4.1	4.6	8.8	5.2	3.9	3.8	3.3	3.4	3.1
17	3.3	3.3	3.4	4.0	4.6	7.3	5.0	4.0	3.7	3.2	3.2	3.45
18	3.2	3.3	3.6	4.3	4.4	6.4	4.8	4.0	3.7	3.15	3.1	3.35
19	3.8	3.2	3.6	4.2	4.4	6.2	4.8	4.0	4.3	3.05	3.0	3.15
20	4.2	3.2	3.45	4.1	4.6	6.1	4.8	3.9	3.8	3.05	3.25	3.0
21	3.6	3.2	3.4	4.2	5.0	6.1	4.8	3.8	3.8	3.1	3.5	3.8
22	3.4	3.2	3.4	4.2	4.6	6.0	4.7	4.0	3.8	3.1	3.2	3.3
23	3.4	3.2	3.4	4.0	4.5	5.9	4.6	7.8	3.7	3.1	3.15	3.05
24	3.3	3.2	4.0	5.0	4.4	5.8	4.5	6.1	3.6	3.1	3.05	2.9
25	3.3	3.15	3.6	6.0	4.3	5.8	4.4	5.2	3.6	3.3	3.0	2.9
26	3.25	3.1	3.6	5.1	4.2	6.6	4.4	4.8	3.6	3.6	3.0	2.85
27	3.2	3.1	3.8	6.6	7.4	.....	4.4	5.2	3.6	3.6	2.9	2.8
28	3.2	3.1	3.7	6.4	7.2	8.8	4.4	4.8	3.6	3.9	2.9	2.8
29	3.15	3.2	3.5	5.5	.....	7.4	4.2	4.6	3.5	3.5	2.9	2.8
30	3.15	3.1	4.8	5.2	.....	7.1	4.2	4.4	3.5	3.5	3.35	3.8
31	3.15	.....	4.4	4.8	.....	6.7	.....	4.4	.....	3.6	2.95	.....

LITTLE TENNESSEE RIVER AT JUDSON, N. C.

Location.—At footbridge near Southern Railway station at Judson.

Drainage area.—675 square miles.

Records available.—April 16, 1912, to September 30, 1914; January 25, 1896, to September 30, 1913, at old Geological Survey station located at Southern Railway bridge.

Gage.—Two staff gages attached to pier of footbridge. A Friez recording gage established on October 8, 1913, about 500 feet below the footbridge, did not work satisfactorily during certain periods and readings were then obtained from the staff gages.

Discharge measurements.—Made from footbridge.

Channel and control.—Practically permanent.

Winter flow.—Discharge relation not affected by ice.

Accuracy.—Records good.

Cooperation.—Results of discharge measurements and estimates of daily discharge furnished by the Knoxville Power Co., Alcoa, Tenn.

Discharge measurements of Little Tennessee River at Judson, N. C., during the years ending Sept. 30, 1912–1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1911–12.		*Feet.*	*Sec.-ft.*	1912–13.		*Feet.*	*Sec.-ft.*
June 20	H. S. Spencer	19.78	1,130	Apr. 12	C. M. Scudder	20.97	2,970
21	do	19.73	1,050	14	do	20.58	2,290
25	do	21.02	3,200	19	do	20.34	2,000
25	do	21.36	3,820	23	do	20.17	1,690
26	do	20.63	2,450	24	do	20.08	1,630
29	do	20.29	1,950	May 2	do	19.92	1,350
				6	do	19.83	1,210
1912–13.				Sept. 9	H. S. Spencer	19.29	532
Dec. 28	do	19.60	908				
Feb. 28	C. M. Scudder	21.59	4,240	1913–14.			
Mar. 15	do	25.50	14,700	Sept. 30		18.98	396

Daily discharge, in second-feet, of Little Tennessee River at Judson, N. C., for the years ending Sept. 30, 1912–1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.												
1	925	1,080	1,700	7,070	5,360	5,360	5,930	3,060	1,540	1,500	2,720	782
2	925	1,080	1,590	5,360	3,950	5,360	5,410	2,740	1,420	1,530	1,390	667
3	925	1,080	1,590	4,850	3,550	5,360	4,580	2,520	1,420	1,680	1,180	667
4	850	1,040	1,480	4,380	3,550	5,360	3,940	2,610	1,500	1,750	1,510	667
5	850	1,170	1,370	3,570	3,550	5,360	3,480	2,490	1,420	2,060	1,360	841
6	850	1,170	1,370	3,550	3,170	6,470	3,480	2,220	1,650	2,800	1,150	759
7	850	2,480	1,370	3,360	2,990	5,360	3,190	2,840	1,720	2,220	1,110	690
8	780	1,480	1,370	3,550	2,810	5,360	3,050	2,560	1,450	1,830	1,180	667
9	780	3,550	1,370	5,100	2,640	5,630	2,920	2,360	1,310	2,030	1,220	759
10	1,080	2,480	1,320	3,550	2,640	4,850	2,920	2,160	1,250	2,220	1,360	667
11	2,990	1,940	1,370	3,360	2,640	4,610	2,790	2,000	1,210	2,730	1,110	690
12	1,940	1,480	1,370	3,170	2,480	4,850	2,660	2,110	1,210	2,310	1,020	724
13	1,080	2,480	1,370	3,170	2,480	4,850	2,540	1,960	1,140	1,990	1,020	806
14	1,000	2,190	1,370	2,810	2,480	4,380	2,540	1,840	1,960	1,890	1,020	724
15	1,000	1,940	1,480	2,480	4,850	10,900	2,420	1,690	1,800	1,720	1,020	1,590
16	925	1,700	2,060	2,330	5,360	9,080	2,240	2,030	1,600	1,690	1,220	1,150
17	1,270	1,700	2,060	2,330	4,610	5,410	2,410	1,880	1,420	1,800	1,180	806
18	10,200	3,360	1,700	2,810	4,380	4,260	2,440	1,770	1,310	2,060	1,260	925
19	8,620	2,480	1,480	3,360	4,610	3,780	2,140	1,650	1,210	2,220	1,090	998
20	3,360	2,060	2,060	2,990	4,610	3,330	2,140	1,540	1,170	2,220	1,020	690
21	1,940	1,940	3,950	2,480	9,890	3,050	2,030	1,500	1,080	2,220	1,050	667
22	1,700	1,700	8,620	2,330	10,900	2,790	3,530	1,500	1,100	1,960	1,050	667
23	1,590	1,700	4,850	2,330	7,070	3,780	3,530	1,500	1,280	1,750	1,090	3,860
24	1,480	2,060	4,850	2,330	6,180	6,280	2,700	1,350	1,210	1,570	962	1,890
25	1,370	1,940	4,380	2,190	6,470	5,410	2,360	1,350	2,870	1,600	901	1,220
26	1,370	1,700	5,360	2,190	14,400	3,940	2,240	1,390	2,310	1,380	841	1,090
27	1,320	1,700	9,570	2,190	9,570	3,480	3,380	1,540	1,960	1,420	1,090	1,290
28	1,270	1,820	7,690	2,060	7,380	3,330	3,430	2,440	1,800	1,210	901	1,020
29	1,220	2,190	4,850	10,600	6,470	3,630	4,780	2,790	1,570	1,140	782	962
30	1,170	1,940	3,550	12,300	.....	14,000	3,770	2,360	1,500	1,140	782	806
31	1,170	.....	8,310	6,770	.....	6,280	.....	1,720	.....	1,140	782	.....

Daily discharge, in second-feet, of Little Tennessee River, at Judson, N. C., for the years ending Sept. 30, 1912–1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	925	667	611	1,360	2,160	3,020	3,960	1,420	1,410	748	.....	789
2	782	1,050	667	1,220	1,890	2,580	3,550	1,350	1,340	748	.....	737
3	782	667	1,090	1,290	2,210	2,260	1,170	1,350	1,340	1,190	.....	737
4	782	667	877	1,150	2,630	2,080	3,040	1,280	1,410	1,190	.....	737
5	782	667	1,770	1,150	2,290	1,970	2,840	1,220	1,210	1,130	.....	820
6	782	645	2,690	1,150	1,970	1,860	2,660	1,220	1,210	960	.....	895
7	901	1,410	1,660	1,090	1,840	1,740	2,460	1,220	1,560	852	.....	717
8	901	1,220	1,320	1,220	1,660	1,590	2,320	1,280	2,110	748	.....	638
9	901	962	1,130	1,290	1,540	1,590	2,210	1,420	1,630	748	.....	638
10	901	841	1,020	1,290	1,510	2,720	2,210	1,350	2,270	697	.....	737
11	901	782	999	1,320	2,080	2,630	2,750	1,220	1,790	748	.....	618
12	962	782	901	1,810	3,450	2,130	3,110	1,220	1,410	1,320	.....	542
13	901	782	925	1,940	2,460	2,090	2,630	1,160	1,270	1,050	.....	495
14	841	841	877	1,740	2,130	13,300	2,400	1,160	1,140	831	.....	523
15	633	782	782	1,390	1,940	13,600	2,480	1,220	1,080	748	.....	542
16	611	690	782	1,290	1,770	8,500	2,320	1,350	1,080	748	.....	737
17	667	667	782	1,170	1,660	6,100	2,210	1,220	971	647	.....	949
18	962	667	962	1,590	1,630	4,290	2,160	1,220	971	667	.....	895
19	1,020	667	962	1,390	1,510	3,550	1,980	1,220	1,340	647	.....	737
20	1,250	667	780	1,290	1,770	3,260	1,940	1,160	1,080	647	.....	657
21	925	667	782	1,390	2,160	3,260	1,900	1,160	1,030	697	.....	1,160
22	806	667	759	1,290	1,770	3,220	1,780	1,500	971	697	.....	895
23	782	667	759	1,250	1,630	2,210	1,670	7,470	971	697	.....	737
24	841	667	1,180	1,510	1,510	2,900	1,670	3,450	916	697	.....	618
25	667	611	999	2,980	1,510	3,040	1,670	2,210	971	800	.....	542
26	667	556	877	2,160	1,480	3,170	1,670	2,540	916	960	.....	495
27	667	556	962	3,960	5,880	14,300	1,590	2,460	862	1,350	.....	495
28	667	556	925	3,650	5,010	9,330	1,510	2,050	862	1,130	.....	495
29	611	645	806	2,630	.....	5,880	1,510	1,650	862	960	.....	523
30	611	611	1,710	2,130	.....	5,190	1,440	1,570	862	960	.....	1,080
31	611	.....	1,890	2,420	.....	4,520	.....	1,650	.....	1,020	.....	.....
1913–14.												
1	792	690	998	1,290	1,950	1,400	1,900	1,320	730	453	459	449
2	620	690	1,250	1,180	1,340	1,290	1,830	1,300	710	782	459	449
3	562	680	866	1,180	1,140	1,230	1,640	1,220	680	834	475	529
4	544	680	782	1,100	1,060	1,240	1,520	1,220	730	553	615	459
5	544	670	730	1,030	1,010	1,190	1,400	1,620	730	730	554	420
6	500	670	720	1,010	1,440	1,260	1,320	1,780	941	581	523	400
7	460	670	1,350	975	2,170	1,210	1,290	1,320	1,060	518	657	393
8	460	876	1,380	959	1,750	1,170	1,660	1,350	941	468	574	400
9	460	952	987	975	1,440	1,100	2,000	1,220	834	553	727	412
10	460	803	887	1,050	1,340	1,100	1,520	1,190	750	680	991	393
11	500	730	845	991	1,380	1,400	1,400	1,120	730	650	835	408
12	544	710	803	911	1,210	3,400	1,420	1,080	680	535	713	434
13	460	730	761	895	1,380	2,640	1,330	1,060	630	517	587	416
14	460	720	761	879	2,150	2,040	2,240	1,060	782	710	762	393
15	460	720	782	879	1,720	1,750	3,640	1,030	782	1,060	872	390
16	460	720	740	872	1,500	1,580	2,950	1,030	630	1,190	671	386
17	460	771	720	857	1,310	1,460	2,430	998	782	887	554	380
18	526	720	700	812	1,290	1,460	2,120	941	782	813	511	434
19	690	670	690	804	1,830	1,310	1,970	941	1,120	710	499	608
20	1,230	670	660	812	1,380	1,640	3,140	919	782	553	493	487
21	720	660	640	820	2,170	1,560	2,600	887	750	553	567	541
22	562	650	630	797	1,830	1,400	2,250	834	680	710	699	475
23	562	640	740	727	1,760	1,320	2,040	834	630	492	574	434
24	1,340	630	876	706	1,870	1,240	1,880	834	610	468	511	434
25	1,870	620	876	919	1,610	1,190	1,780	834	553	492	517	517
26	1,010	600	1,560	872	1,540	1,200	1,700	782	650	390	561	459
27	866	600	1,180	783	1,480	1,260	1,610	730	630	400	727	408
28	866	600	1,020	748	1,420	1,400	1,520	750	553	534	790	400
29	792	600	1,470	727	.....	1,520	1,500	730	517	1,060	574	390
30	740	750	1,810	713	.....	1,830	1,440	730	468	581	529	383
31	660	.....	1,500	2,060	.....	2,080	.....	730	.....	453	493	.....

NOTE.—Mean discharge for August, 1913, estimated at 870 second-feet by comparison with gage readings at old Geological Survey station.

Monthly discharge of Little Tennessee River at Judson, N. C., for the years ending Sept. 30, 1912–1914.

[Drainage area, 675 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1911–12.					
October	10,200	780	1,830	2.71	3.12
November	3,550	1,040	1,890	2.80	3.12
December	9,570	1,320	3,120	4.62	5.33
January	12,300	2,060	3,910	5.79	6.68
February	14,400	2,480	5,210	7.72	8.33
March	14,000	2,790	5,350	7.93	9.14
April	5,930	2,030	3,170	4.70	5.24
May	3,060	1,350	2,050	3.04	3.50
June	2,870	1,080	1,510	2.24	2.50
July	2,800	1,140	1,830	2.71	3.12
August	2,720	782	1,140	1.69	1.95
September	3,860	667	991	1.47	1.64
The year	14,400	667	2,660	3.94	53.67
1912–13.					
October	1,250	611	808	1.20	1.38
November	1,410	556	744	1.10	1.23
December	2,690	611	1,070	1.59	1.83
January	3,960	1,090	1,690	2.50	2.88
February	5,880	1,480	2,180	3.23	3.36
March	14,300	1,590	4,450	6.59	7.60
April	3,960	1,440	2,290	3.39	3.78
May	7,470	1,160	1,710	2.53	2.92
June	2,270	862	1,230	1.82	2.03
July	1,350	647	872	1.29	1.49
August	.....	.....	870	1.29	1.49
September	1,160	495	706	1.05	1.17
The year	14,300	.....	1,550	2.30	31.16
1913–14.					
October	1,870	460	683	1.01	1.16
November	952	600	696	1.03	1.15
December	1,810	630	959	1.42	1.64
January	2,060	706	946	1.40	1.61
February	2,170	1,010	1,550	2.30	2.40
March	3,400	1,100	1,510	2.24	2.58
April	3,640	1,290	1,900	2.81	3.14
May	1,780	730	1,040	1.54	1.78
June	1,120	468	728	1.08	1.20
July	1,190	390	642	.951	1.10
August	991	459	615	.911	1.05
September	541	380	436	.646	.72
The year	3,640	380	972	1.44	19.53

NOTE.—See footnote to table of daily discharge.

LITTLE TENNESSEE RIVER AT McGHEE, TENN.

Location.—At Louisville & Nashville Railroad bridge, one-third mile south of McGhee and one-half mile below mouth of Tellico River.

Drainage area.—2,470 miles.

Records available.—November 29, 1904, to December 31, 1913.

Gage.—Chain gage on crossties, upstream side of the railroad bridge, owned by United States Weather Bureau; read once daily to tenths. 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 feet.

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

Channel and control.—Practically permanent. 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. The assumption that their low water is the same as lowest records places the point of zero flow at about —0.3 foot by gage datum.

Extremes of stage.—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 feet in March, 1867, and 38.5 feet in 1884.

Winter flow.—Discharge relation not affected by ice.

Cooperation.—Gage-height records furnished by United States Weather Bureau.

Station has not been visited since November 3, 1911, and nothing is known as to permanency of the gage after that date. Daily gage heights subsequent to December 31, 1913, are withheld from publication until station is visited again.

Daily gage height, in feet, of Little Tennessee River at McGhee, Tenn., for the period Oct. 1 to Dec. 31, 1913.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	2.6	2.8	2.8	11	2.2	2.8	3.2	21	3.6	2.8	2.7
2	2.8	2.6	3.8	12	2.2	2.6	3.1	22	3.2	2.7	2.7
3	2.6	2.6	3.5	13	2.2	2.6	3.0	23	2.6	2.7	2.7
4	2.4	2.6	3.1	14	2.2	2.6	3.0	24	2.6	2.7	2.9
5	2.4	2.6	2.9	15	2.2	2.8	2.9	25	3.2	2.6	3.1
6	2.4	2.6	2.8	16	2.2	2.8	2.9	26	3.8	2.6	3.3
7	2.2	2.6	3.1	17	2.2	3.0	2.9	27	3.6	2.6	3.9
8	2.2	2.6	4.6	18	2.2	2.8	2.8	28	3.2	2.5	3.5
9	2.2	3.2	3.8	19	2.8	2.8	2.8	29	3.2	2.5	3.3
10	2.2	3.0	3.4	20	3.8	2.8	2.7	30	2.8	2.5	4.2
								31	2.8	.....	4.2

TUCKASEGEE RIVER AT BRYSON CITY, 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 Tennesee River.

Drainage area.—662 square miles.

Records available.—November 7, 1897, to September 30, 1914.

Gage.—Friez recording gage installed February 3, 1914, by the Knoxville Power Co., about 200 feet below the bridge to which old Geological Survey staff gage was attached. Vertical staff gage attached to the right bank bridge pier used prior to installation of Friez gage.

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

Channel and control.—Channel probably changes slightly after each flood, but conditions quickly become normal. Control consists of bowlders; practically permanent.

Extremes of stage.—The flood of March 19, 1899, reached a height of 11 feet.

Winter flow.—Discharge relation not affected by ice.

Accuracy.—Results good for medium and low stages. Rating curve not well defined for high stages.

Cooperation.—Results of discharge measurements and estimates of daily discharge in following tables furnished by the Knoxville Power Co., Alcoa, Tenn.

Discharge measurements of Tuckasegee River at Bryson City, N. C., during the years ending Sept. 30, 1912–1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1911–12.		*Feet.*	*Sec. ft.*	1912–13.		*Feet.*	*Sec. ft.*
July 29	H. S. Spencer	1.68	1,170	Apr. 12	C. M. Scudder	3.09	3,390
Aug. 1	do	2.56	2,500	21	do	2,13	1,880
1	do	2.37	2,130	26	do	1.98	1,680
2	do	1.78	1,300	28	do	1.97	1,620
1912–13.				May 3	do	1.82	1,400
Oct. 11	do	1.25	628	14	do	1.65	1,150
15	do	1.28	926	24	do	3.50	3,950
19	do	1.62	1,340	Sept. 12	H. S. Spencer	1.14	524
Nov. 7	do	2.17	1,740	27	do	1.23	630
Apr. 2	C. M. Scudder	2.74	3,190	1913–14.			
4	do	2.49	2,770	Sept. 22		1.19	[a] 584
7	do	2.41	2,240	23		1.06	[a] 446
9	do	2.28	2,030				

[a] Velocity determined by the mid-depth method.

Daily discharge, in second-feet, of Tuckasegee River at Bryson City, N. C., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	755	755	1,330	1,180	1,750	1,350	2,380	1,250	678	491	470	470
2	599	699	1,900	1,070	1,360	1,320	2,370	1,230	647	940	460	439
3	599	699	876	1,070	1,190	1,270	2,120	1,200	637	851	470	512
4	599	699	814	1,000	1,120	1,190	1,940	1,190	647	647	564	449
5	581	678	755	966	1,060	1,180	1,870	1,780	914	790	553	397
6	555	647	699	940	1,940	1,160	1,820	1,520	1,040	605	512	356
7	555	647	1,670	940	2,610	1,150	1,750	1,290	876	512	543	366
8	555	1,070	1,200	876	1,850	1,120	1,700	1,310	802	491	491	377
9	515	1,000	966	876	1,660	1,150	1,730	1,270	689	512	543	408
10	555	790	876	1,000	1,540	1,140	1,700	1,230	657	637	578	377
11	555	699	814	940	1,480	1,330	1,660	1,190	699	585	710	387
12	599	699	814	814	1,390	3,030	1,600	1,150	626	522	678	522
13	531	755	814	721	1,440	2,120	1,580	1,110	689	481	744	418
14	515	755	814	699	1,620	1,760	1,970	1,100	689	876	1,000	356
15	515	1,200	790	755	1,360	1,620	2,740	1,060	678	790	1,000	345
16	515	1,200	755	755	1,190	1,590	2,400	1,040	647	1,440	689	325
17	515	1,270	699	814	1,120	1,560	1,990	1,040	678	876	585	325
18	581	839	699	721	1,140	1,540	1,800	1,030	1,330	1,020	522	439
19	581	755	699	755	1,700	1,510	1,720	992	1,180	790	491	564
20	1,270	721	699	814	2,540	1,480	3,400	953	790	668	481	460
21	755	699	647	914	2,100	1,480	2,370	940	710	595	543	533
22	618	699	647	755	1,780	1,450	2,050	927	678	553	585	657
23	599	699	755	721	1,700	1,410	1,900	914	626	522	491	481
24	2,250	647	966	755	1,750	1,360	1,790	876	585	512	460	449
25	1,750	618	914	1,180	1,590	1,320	1,660	839	585	481	481	564
26	1,600	599	1,540	839	1,480	1,310	1,630	790	678	533	491	470
27	1,140	599	1,040	814	1,450	1,310	1,520	790	720	605	605	377
28	1,200	599	940	814	1,390	1,900	1,430	790	647	605	802	366
29	966	599	1,310	814	.....	1,870	1,400	755	585	733	647	335
30	839	599	1,600	839	.....	2,280	1,350	839	512	553	564	335
31	814	.....	1,330	2,810	.....	2,500	.....	744	.....	481	512	.....

NOTE.—Daily discharge determined from rating curve well defined below and poorly defined above 1,600 second-feet.

Monthly discharge of Tuckasegee River at Bryson City, N. C., for the year ending Sept. 30, 1914.

[Drainage area, 662 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)
	Max mum.	Minimum.	Mean.	Per square mile.	
October	2,250	515	793	1.20	1.38
November	1,270	599	764	1.15	1.28
December	1,900	647	980	1.48	1.71
January	2,810	699	934	1.41	1.63
February	2,610	1,060	1,580	2.39	2.49
March	3,030	1,120	1,540	2.33	2.69
April	3,400	1,350	1,910	2.89	3.22
May	1,780	744	1,070	1.62	1.87
June	1,330	512	731	1.10	1.23
July	1,440	481	668	1.01	1.16
August	1,000	460	589	.890	1.03
September	657	325	429	.648	.72
The year	3,400	325	995	1.50	20.41

NOTE.—Computed by engineers of the Geological Survey from records of daily discharge furnished by the Knoxville Power Co.

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.

Drainage area.—410 square miles.

Records available.—June 26, 1896, to August 8, 1897; October 19, 1897, to September 30, 1914.

Gage.—Chain gage attached to downstream side of bridge near site of original wire-rope gage; read once daily to half-tenths. Limits of use: Half-tenths below and tenths above 7 feet. Datum unchanged since October 20, 1897. Record of datum of former gage lost when wire rope broke on August 8, 1897.

Discharge measurements.—Made from upstream side of bridge.

Channel and control.—Rock and gravel; less permanent than the channel at measuring section, where bottom is rough and rocky. Point of zero flow, approximately at gage height 4.4 feet.

Extremes of discharge.—Maximum stage recorded during year: 7.7 feet April 20; discharge, 3,120 second-feet. Minimum stage recorded: 4.8 feet September 18; discharge, 140 second-feet.

The flood of March 19, 1899, reached a height of 18.4 feet.

Winter flow.—Discharge relation not affected by ice.

Regulation.—The few small mill dams on the stream are too far upstream to cause noticeable diurnal fluctuation at the gage.

Accuracy.—Results good.

Discharge measurements of Hiwassee River at Murphy, N. C., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 20	Warren E. Hall and B. M. Hall, jr	5.20	326	Apr. 15	Warren E. Hall	7.21	2,270
Feb. 14	Warren E. Hall	5.84	798	16	do	6.95	1,930
17	do	5.54	568	17	do	6.54	1,460

Daily discharge, in second-feet, of Hiwassee River at Murphy, N. C., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	395	280	365	530	845	645	1,020	685	335	208	208	230
2	308	280	495	495	645	605	975	645	335	230	208	230
3	280	280	365	495	530	568	888	605	308	230	255	208
4	255	280	338	530	495	530	765	605	308	230	605	230
5	255	280	308	568	460	568	685	765	460	280	280	185
6	255	280	308	530	530	605	685	845	365	230	230	185
7	255	255	460	495	1,110	568	645	685	460	208	208	185
8	230	308	568	460	888	530	765	765	530	208	208	185
9	230	460	428	428	725	530	845	725	460	230	428	230
10	230	335	395	395	645	495	765	605	335	255	530	208
11	230	335	365	395	725	530	685	568	308	395	395	185
12	255	308	335	395	568	2,270	725	568	308	605	335	255
13	230	308	335	365	568	1,360	685	530	308	280	255	230
14	230	308	308	365	805	1,020	725	530	308	230	255	185
15	230	280	335	365	685	805	2,930	495	335	335	460	185
16	230	280	335	335	645	765	2,000	460	308	395	308	185
17	230	365	308	335	568	685	1,530	460	395	530	255	162
18	255	335	308	335	530	725	1,260	460	308	765	230	140
19	308	308	308	335	605	605	1,060	428	605	395	230	230
20	765	280	280	335	1,110	805	3,120	428	335	308	208	230
21	365	280	280	335	930	765	1,640	428	308	308	255	335
22	308	280	280	335	805	685	1,310	428	280	255	230	230
23	308	280	308	308	725	685	1,110	395	308	230	230	208
24	308	280	365	308	845	605	1,020	395	255	230	255	185
25	495	255	335	605	725	530	930	395	255	208	230	255
26	395	255	495	428	725	568	845	365	230	208	255	230
27	335	255	460	395	685	645	805	365	308	185	280	185
28	335	255	395	365	645	765	765	365	255	208	280	185
29	335	255	495	335	.....	725	725	335	255	428	255	185
30	308	255	765	335	.....	725	765	335	230	230	280	185
31	255	.....	605	568	.....	1,360	.....	335	.....	208	230	.....

NOTE.—Daily discharge determined from a well-defined rating curve, except for the period Jan. 1–13, when it was estimated from information furnished by the observer. Low-water section of rating curve based on discharge measurement made Nov. 6, 1914, at gage height 4.99 feet.

Monthly discharge of Hiwassee River at Murphy, N. C., for the year ending Sept. 30, 1914.

[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.		
October	765	230	303	0.739	0.85	A.
November	460	255	293	.715	.80	A.
December	765	280	388	.946	1.09	A.
January	605	308	413	1.01	1.16	B.
February	1,110	460	706	1,72	1.79	A.
March	2,270	495	751	1.83	2.11	B.
April	3,120	645	1,090	2.66	2.97	A.
May	845	335	516	1.26	1.45	A.
June	605	230	337	.822	.92	A.
July	765	185	298	.727	.84	A.
August	605	208	286	.698	.80	A.
September	335	140	208	.507	.57	B.
The year	3,120	140	464	1.13	15.35	

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.

Drainage area.—1,180 square miles.

Records available.—August 17, 1900, to December 31, 1913, when station was discontinued.

Gage.—Vertical staff attached to a tree on right bank 150 feet above the bridge; read once daily to half-tenths. Limits of use: Half-tenths below and tenths above 2.5 feet.

Discharge measurements.—Made from the upstream side of 5-span steel highway bridge 1,000 feet below gage.

Channel and control.—A rock ledge crosses the river diagonally. The lower end of the natural dam has been built up to some extent to pond the water for a small mill.

Extremes of stage.—Maximum stage recorded during period October 1 to December 31, 1913: 1.6 feet October 1. Minimum stage recorded: 0.85 foot, October 17.

The flood of November 19, 1906, reached a height of 15.2 feet.

Winter flow.—Not affected by ice.

Regulation.—None above station. The operation of a small mill below may affect the low-water flow.

The discharge measurement made on May 15, 1913, indicates a change in the discharge relation as expressed by the rating curve used prior to March 27, 1913. As additional discharge measurements have not been made to determine the extent of this change, no estimates of daily discharge have been prepared.

Daily gage height, in feet, of Hiwassee River at Reliance, Tenn., for the period Oct. 1 to Dec. 31, 1913.

[C. V. Higdon, *observer.*]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	1.6	1.05	1.3	11	1.0	1.15	1.2	21	0.95	1.05	1.05
2	1.2	1.0	1.5	12	1.0	1.15	1.15	22	1.2	1.0	1.05
3	1.05	1.0	1.4	13	1.0	1.1	1.1	23	1.1	1.0	1.05
4	1.0	1.0	1.2	14	.95	1.05	1.1	24	1.15	1.0	1.15
5	1.0	1.0	1.1	15	.9	1.05	1.15	25	1.15	1.0	1.2
6	1.0	1.0	1.1	16	.9	1.15	1.15	26	1.35	1.0	1.3
7	.95	1.0	1.2	17	.85	1.15	1.15	27	1.35	1.0	1.5
8	.95	1.0	1.4	18	.9	1.15	1.1	28	1.25	.95	1.3
9	.95	1.1	1.4	19	1.0	1.1	1.1	29	1.25	.95	1.3
10	1.0	1.3	1.3	20	1.0	1.1	1.1	30	1.15	1.0	1.4
								31	1.05	.....	1.25

Days of deficiency in discharge of Hiwassee River at Reliance, Tenn., for years ending Sept. 30, 1901–1912.

Discharge in second-feet.	Days of deficient discharge.											
	1900–01	1901–2	1902–3	1903–4	1904–5	1905–6	1906–7	1907–8	1908–9	1909–10	1910–11	1911–12
380	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
440	.....	.....	.....	.....	28	.....	.....	.....	.....	.....	.....	.....
500	.....	.....	.....	6	37	.....	.....	.....	.....	.....	.....	.....
550	.....	.....	.....	11	47	.....	.....	.....	.....	.....	.....	2
600	.....	.....	2	34	51	.....	.....	.....	.....	.....	.....	6
650	.....	.....	2	37	55	1	.....	.....	.....	.....	6	9
700	.....	.....	2	43	68	5	.....	2	8	.....	20	14
750	.....	3	15	79	73	14	.....	2	8	.....	28	17
800	.....	23	15	95	82	30	.....	10	16	.....	38	22
850	.....	23	15	108	90	43	.....	13	18	.....	45	22
900	.....	36	47	147	104	48	.....	18	31	2	74	29
950	.....	36	47	148	104	48	.....	18	31	2	83	49
1,000	2	51	67	154	109	53	.....	28	39	23	106	54
1,100	13	66	79	186	118	56	3	36	45	37	127	63
1,200	25	66	79	216	139	58	5	56	62	65	138	87
1,300	37	78	93	226	153	60	14	73	77	77	147	92
1,400	40	104	103	246	171	65	27	92	83	83	179	106
1,600	64	145	127	273	194	80	46	104	94	103	203	137
1,800	76	169	161	288	212	95	55	133	106	129	225	157
2,000	102	201	196	306	243	123	65	150	123	166	253	171
2,500	154	233	230	327	293	183	141	182	158	237	296	212
3,000	213	268	250	341	317	229	226	224	189	270	317	238
4,000	281	309	279	353	341	302	301	315	251	319	332	296
5,000	304	331	301	358	349	325	328	335	294	340	342	332
10,000	339	353	351	364	361	358	357	359	349	362	358	361
15,000	353	356	360	366	362	361	362	364	357	365	361	364
25,000	360	361	362	.....	365	365	364	366	363	.....	365	365
35,000	364	364	365	.....	.....	.....	364	.....	365	.....	.....	366
45,000	365	365	.....	.....	.....	.....	364	.....	.....	.....	.....	.....
56,000	.....	.....	.....	.....	.....	.....	365	.....	.....	.....	.....	.....

VALLEY RIVER AT TOMOTLA, N. C.

Location.—At steel highway bridge 600 feet from Tomotla post office, which is on Southern Railway 5 miles from Murphy, one-half mile above Rodgers Creek, and 1 mile below Colvards Creek.

Drainage area.—120 square miles.

Records available.—June 29, 1904, to December 31, 1909, and January 19 to September 30, 1914.

Gage.—Consists of two sections. Lower section, 0 to 5.4 feet, is on a sloping timber bolted to marble bedrock; upper section, 5.4 to 10 feet, is a vertical staff rod bolted to timber on old bridge pier. Same gage which was in use when station was discontinued in 1909. No change in gage datum.

Discharge measurements.—Made from new single-span steel bridge over site of old footbridge.

Channel and control.—Channel consists of gravel and may shift slightly. Right bank is high and rarely overflows; left bank overflows for about 1,000 feet during extreme floods. Current straight and regular. A solid ledge of marble about 50 feet downstream forms the low-water control. Shifting of banks, and cutting of timber along the banks below gage, may have some effect on the high-water control. Soundings taken at the low-water control indicate that there would be no flow past the gage if the stage were to fall to about 0.0 foot.

Extremes of discharge.—Maximum stage recorded during year: 5.0 feet at 6 p. m., February 19; discharge, 1,140 second-feet. Minimum stage recorded: 0.9 foot at 7 a. m. and 6 p. m., September 21–24; discharge, 45 second-feet.

Winter flow.—Discharge relation seldom affected by ice.

Accuracy.—Since reestablishing station the new measurements plot on a smooth curve, but this curve has no relation to that used prior to 1909. Apparently the discharge relation was changed when the new bridge was built in 1913.

Discharge measurements of Valley River at Tomotla, N. C., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 21	B. M. Hall, jr	1.28	90	Apr. 16	Warren E. Hall	3.06	465
Feb. 16	Warren E. Hall	2.11	237	16	....do	3.04	452

Daily discharge, in second-feet, of Valley River at Tomotla, N. C., for the year ending Sept. 30, 1914.

[J. T. Hayes.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	92	214	590	157	78	54	65	65
2	.....	107	204	590	157	78	107	54	65
3	.....	107	184	397	157	78	72	54	65
4	.....	123	175	302	224	78	72	72	54
5	.....	184	166	224	290	85	65	72	54
6	.....	397	194	224	224	78	65	65	54
7	.....	447	268	204	349	140	54	54	54
8	.....	385	224	194	214	100	54	60	72
9	.....	373	184	279	194	78	54	100	60
10	.....	349	175	246	184	78	54	157	54
11	.....	385	214	194	166	78	54	148	60
12	.....	361	690	175	157	78	60	107	54
13	.....	337	447	214	140	78	60	85	54
14	.....	373	314	434	140	92	72	235	54
15	.....	314	290	500	140	78	140	115	54
16	.....	268	268	447	140	72	279	92	54
17	.....	257	246	373	123	72	290	78	54
18	.....	279	235	349	123	132	235	65	54
19	78	760	214	500	123	85	132	65	54
20	85	970	204	830	123	78	100	72	54
21	85	397	184	500	123	72	85	148	45
22	78	314	175	410	107	65	65	92	45
23	92	302	175	385	107	65	65	65	45
24	132	361	175	337	100	65	54	65	45
25	140	325	235	268	92	65	54	72	72
26	123	257	214	214	92	60	54	72	60
27	107	224	214	175	78	85	54	72	54
28	92	235	235	166	78	115	60	166	54
29	107	.....	325	157	78	72	92	123	54
30	123	.....	373	157	85	54	65	85	54
31	107	.....	620	.....	85	.....	65	65	.....

NOTE.—Daily discharge computed from a rating curve well defined between 54 and 590 second-feet (gage heights, 1 and 3.5 feet).

Monthly discharge of Valley River at Tomotla, N. C., for the year ending Sept. 30, 1914.

[Drainage area, 120 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January 19–31	140	78	104	0.867	0.42	A
February	970	92	332	2.77	2.88	B
March	690	166	259	2.16	2.49	A.
April	830	157	334	2.78	3.10	B.
May	349	78	147	1.22	1.41	A.
June	140	54	81.1	.676	.75	A.
July	290	54	89.9	.749	.86	A.
August	235	54	91.6	.763	.88	A.
September	72	45	55.7	.464	.52	B.

NOTTELY RIVER AT RANGER, N. C.

Location.—About half a mile downstream from Ranger, which is on Louisville & Nashville Railroad, 7½ miles from Murphy, 8 miles upstream from junction of Nottely and Hiwassee rivers.

Drainage area.—272 square miles.

Records available.—February 16, 1901, to December 31, 1905; January 22 to September 30, 1914.

Gage.—Rod fastened to a large birch tree on left bank 75 feet upstream from highway bridge. Zero of gage same as that of original gage destroyed in 1913 when old wooden bridge was replaced by one of steel.

Discharge measurements.—Made from downstream side of steel highway bridge on road from Ranger to Murphy. On account of poor section and irregular current, discharge measurements must be made with extreme care.

Channel and control.—Channel permanent, composed of bowlders, gravel, and sand. Right bank high; left bank overflows beyond bridge end at stages above 18 feet. A low shoal about 300 feet downstream should form a good control.

Extremes of discharge.—Maximum stage recorded during year: 8.0 feet at 6 a. m., April 20; discharge, 1,910 second-feet. Minimum stage recorded: 2.1 feet at 6 a. m., July 2–3, August 9, and September 9–11, 14–16, and 29–30; discharge, 89 second-feet.

Winter flow.—Discharge relation not affected by ice.

Accuracy.—On account of unfavorable section for making discharge measurements results are only fair.

Discharge measurements of Nottely River at Ranger, N. C., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 22	B. M. Hall, jr.	2.66	186
Feb. 17	Warren E. Hall	3.00	281
Apr. 18	....do	4.08	530

Daily discharge, in second-feet, of Nottely River at Ranger, N. C., for the year ending Sept. 30, 1914.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	406	287	457	357	182	106	115	162
2	.....	310	265	431	310	182	89	115	162
3	.....	265	265	381	310	182	89	115	143
4	.....	244	254	357	310	182	106	182	124
5	.....	234	254	333	565	202	124	162	124
6	.....	287	265	310	431	202	124	143	106
7	.....	621	287	265	357	223	124	124	106
8	.....	406	265	333	333	202	106	106	106
9	.....	333	265	431	310	182	381	89	89
10	.....	287	254	357	287	182	357	202	89
11	.....	333	244	333	287	172	483	431	89
12	.....	265	800	333	287	162	406	381	106
13	.....	265	510	287	244	223	333	265	106
14	.....	406	381	1,200	244	202	406	244	89
15	.....	310	333	1,510	244	143	333	202	89
16	.....	287	287	1,390	244	143	483	162	89
17	.....	265	265	920	244	202	431	162	143
18	.....	265	287	537	244	182	357	172	143
19	.....	265	265	483	234	182	265	143	124
20	.....	357	333	1,910	234	172	202	143	124
21	.....	333	381	800	223	162	182	143	124
22	192	287	333	593	212	143	162	143	124
23	192	357	310	510	212	143	143	152	162
24	192	287	265	457	202	124	152	124	162
25	254	287	265	406	202	124	134	124	143
26	223	287	265	381	192	124	124	124	124
27	223	287	310	357	192	124	124	143	106
28	202	265	310	310	192	124	106	143	106
29	202	.....	310	287	182	106	106	124	89
30	202	.....	310	431	182	106	124	182	89
31	182	.....	265	.....	182	.....	124	162	.....

NOTE.—Daily discharge computed from a rating curve fairly well defined between 124 and 650 second-feet and poorly defined beyond these limits.

Monthly discharge of Nottely River at Ranger, N. C., for the year ending Sept. 30, 1914.

[Drainage area, 272 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January 22–31	254	182	206	0.757	0.28	B.
February	406	234	314	1.15	1.20	B.
March	800	244	313	1.15	1.33	B.
April	1,910	265	570	2.10	2.34	B.
May	565	182	266	.978	1.13	B.
June	223	106	166	.610	.68	B.
July	483	89	219	.805	.93	B.
August	431	89	168	.618	.71	B.
September	162	89	118	.434	.48	C.

OCOEE RIVER AT COPPER HILL, TENN.

Location.—At highway bridge in Copper Hill, half a mile above mouth of Fightingtown Creek.

Drainage area.—374 square miles.

Records available.—March 21, 1903, to December 31, 1913, when station was discontinued.

Gage.—Chain gage attached to upstream side of bridge, installed August 2, 1911; read daily, morning and evening, to half-tenths. Limits of use: Hundredths below 0.5, half-tenths from 0.5 to 1.5, and tenths above 1.5 feet. (See Water-Supply Paper 323 for history of gage.)

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

Channel and control.—Channel shifts slightly, but discharge relation is practically permanent.

Extremes of discharge.—The flood of November 19, 1906, reached a height of 18.5 feet.

Winter flow.—Discharge relation not affected by ice.

Regulation.—As there are only a few small water-power plants operating above the station, diurnal fluctuation is noticeable only during extremely low stages.

Accuracy.—Records reliable.

No discharge measurements were made at this station during the year ending September 30, 1914.

Daily discharge, in second-feet, of Ocoee River at Copper Hill, Tenn., for the period Oct. 1 to Dec. 31, 1913.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	440	270	975	11	270	310	390	21	270	270	390
2	370	270	630	12	270	310	390	22	310	270	390
3	370	270	465	13	270	310	390	23	350	270	390
4	350	270	390	14	270	270	390	24	310	270	572
5	310	290	390	15	290	270	490	25	310	310	490
6	290	330	910	16	270	290	440	26	310	290	780
7	290	310	572	17	270	270	440	27	270	270	572
8	290	310	440	18	270	270	390	28	270	270	545
9	270	290	440	19	270	270	390	29	270	270	545
10	270	290	390	20	270	270	390	30	290	330	780
								31	290	.....	720

NOTE.—Daily discharge computed from a rating curve well defined between 310 and 3,100 second-feet.

Monthly discharge of Ocoee River at Copper Hill, Tenn., for the period Oct. 1 to Dec. 31, 1913.

[Drainage area, 374 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	440	270	297	0.794	0.92	B.
November	330	270	285	.762	.85	B.
December	975	390	512	1.37	1.58	B.

BIG BEAR RIVER NEAR RED BAY, ALA.

Location.—At Norman Bridge, 2½ miles east of Red Bay and about 4 miles below Blue Creek.

Drainage area.—Not measured.

Records available.—August 24, 1913, to September 30, 1914.

Gage.—Vertical staff attached to a sweet-gum tree on left bank, 25 feet upstream from bridge; read daily, morning and evening, to tenths.

Discharge measurements.—Made from bridge.

Channel and control.—Probably shifting; during extreme low water current is sluggish and irregular.

Extremes of stage.—Maximum stage recorded during year: 13.1 feet April 1. Minimum stage recorded: 0.5 foot July 8–9 and September 18.

Winter flow.—Discharge relation not affected by ice.

Cooperation.—Gage readings furnished by the Geological Survey of Alabama.

Data insufficient for estimating discharge.

No discharge measurements were made at this station during the year ending September 30, 1914.

Daily gage height, in feet, of Big Bear River near Red Bay, Ala., for the year ending Sept. 30, 1914.

[Ed. Bullen, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.6	0.8	1.0	1.4	1.4	2.4	13.0	2.0	0.9	0.6	0.9	1.2
2	1.4	.8	1.0	1.4	1.7	2.3	12.0	1.8	.9	.6	.8	1.0
3	1.1	.8	.9	1.3	1.5	2.1	9.3	1.8	.9	.6	1.0	1.0
4	1.0	.8	.9	1.3	1.3	2.0	6.4	1.7	.8	.6	.9	1.9
5	.9	.7	.9	1.3	1.5	2.0	4.8	1.7	.8	.6	2.0	1.5
6	.8	.7	.9	1.2	3.3	2.1	3.9	1.9	2.5	.6	1.5	1.2
7	.8	.7	1.0	1.2	8.7	2.1	3.1	2.0	3.6	.6	1.2	1.0
8	.7	.8	1.0	1.2	6.4	2.0	3.8	3.0	4.0	.5	1.1	.8
9	.7	.8	1.0	1.1	3.9	2.0	3.6	3.3	1.9	.5	1.0	.7
10	.7	.8	1.0	1.1	3.0	1.9	3.0	2.7	1.5	1.0	.8	.7
11	.8	.8	.9	1.1	4.3	1.9	2.7	2.0	1.3	1.1	.8	.6
12	.8	.8	.9	1.1	4.6	2.4	3.1	1.8	1.7	1.4	.8	.6
13	.8	.8	.9	1.0	3.6	5.2	5.1	1.6	1.8	1.0	1.1	.6
14	.7	.8	.9	1.0	3.7	3.8	3.9	1.5	1.2	.8	2.4	.7
15	.7	.8	1.0	1.0	3.9	3.2	5.0	1.4	1.2	.7	2.2	.6
16	.7	.8	1.1	1.0	3.2	2.8	4.0	1.4	2.0	4.4	1.3	.6
17	.7	.8	1.1	1.0	3.0	2.5	3.4	1.3	2.5	6.1	1.0	.6
18	.7	.8	1.1	1.0	2.7	2.2	3.0	1.4	1.8	2.8	.9	.5
19	.7	.9	1.0	1.0	2.5	2.1	2.5	1.4	1.3	1.8	.8	.6
20	.8	.9	1.0	.9	2.7	2.0	2.4	1.3	1.2	1.1	.8	.8
21	.8	.8	1.0	.9	3.0	2.0	2.2	1.2	1.1	.9	.7	1.0
22	.8	.8	.9	.9	2.5	1.8	2.0	1.1	1.0	.9	.8	.9
23	.7	.8	.9	.9	2.2	1.7	2.0	1.1	1.0	.8	.9	.8
24	1.0	.8	1.0	.9	2.6	1.6	1.9	1.1	.9	.8	.9	.7
25	1.1	.8	1.2	1.0	2.8	1.5	1.8	1.1	.8	.8	.8	2.7
26	1.0	.8	1.7	1.2	2.6	1.5	1.8	1.0	.8	.7	.7	1.5
27	.9	.8	1.8	1.2	2.4	1.7	1.7	1.0	.7	.7	.9	1.2
28	.9	.8	1.6	1.1	2.5	1.8	1.6	1.0	.7	.7	1.1	1.0
29	.9	.8	1.5	1.0	.....	1.8	1.8	1.0	.7	.7	1.3	.9
30	.8	.9	1.5	1.0	.....	5.3	2.1	1.0	.7	.7	2.5	.8
31	.8	.....	1.5	1.1	.....	12.9	.....	.9	.....	1.2	1.4	.....

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous discharge measurements were made on streams in the Ohio River basin:

Miscellaneous measurements in Ohio River drainage basin in 1913–14.

Date.	Steam.	Tributary to—	Locality.	[a] Gage height.	Discharge.	Drainage area.
1913.				*Feet.*	*Sec.-ft.*	*Sq. miles*
June 6	Miami River [b]	Ohio River	Troy Pike Bridge above Dayton, Ohio.	737.75	748	1,150
16	Wolf Creek [b]	Miami River	Edgewater Avenue Bridge, Dayton, Ohio.	724.5	18.2	81
5	Stillwater River [b]	do	Athletic Park Bridge, Dayton, Ohio.	737.6	[c] 230	655
7	do. [b]	do	Markee Road Bridge, Dayton, Ohio.	756.8	[c] 274	643
6	Mad River [b]	do	Keowee Street Bridge, Dayton, Ohio.	733.3	577	648
1914.						
June 15	Scioto River [d]	Ohio River	Lucasville, Ohio		945	6,100
July 19	do	do	do		789	6,100
Sept. 24	do	do	Portsmouth, Ohio		524	6,410
June 12	Paint Creek [d]	Scioto River	Chillicothe, Ohio		123	1,100
July 18	do	do	do		123	1,100
Oct. 13	do	do	do		55	1,100

[a] Sea-level elevation.
[b] Measurement made by engineers of the Morgan Engineering Co.
[c] Conditions unfavorable for accurate results.
[d] Measurement made by C. E. Ellsworth and R. M. Adams.

INDEX.

STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

1885–1914

PART III.—OHIO RIVER BASIN

STREAM-GAGING STATIONS AND PUBLICATIONS RELATING TO WATER RESOURCES, 1885-1914.

INTRODUCTION.

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, underground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the monographs, bulletins, professional papers, and annual reports.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below:

Part I. North Atlantic slope basins.
II. South Atlantic slope and eastern Gulf of Mexico basins.
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.
IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins (in three volumes).

HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED.

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.

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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:

Boston, Mass., Customhouse.
Albany, N. Y., Room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
St. Paul, Minn., Old Capitol Building.
Austin, Tex., Old Post Office Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 403 New Post Office Building.
Phoenix, Ariz., 417 Fleming Building.
Salt Lake City, Utah, 421 Federal Building.
Boise, Idaho, 615 Idaho Building.
Tacoma, Wash., 406 Federal Building.
Portland, Oreg., 416 Couch Building.
San Francisco, Cal., 328 Customhouse.
Los Angeles, Cal., 619 Federal Building.
Honolulu, Hawaii, Kapiolani Building.

A list of the Geological Survey's publications may be obtained by applying to the Director, United States Geological Survey, Washington, D. C.

STREAM-FLOW REPORTS.

Stream-flow records have been obtained at more than 3,400 points in the United States, and the data obtained have been published in the reports tabulated below:

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	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	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	Description, 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.

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

Report.	Character of data.	Year.
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.
WS 351 to 362[a]	do	1913.
WS 381 to 394[a]	do	1914.

[a] In preparation.

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

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The following table gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1914. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data from 1902 to 1914 for any station in the area covered by Part III are published in Water-Supply Papers 83, 98, 128, 169, 205, 243, 263, 283, 303, 323, 353, and 383, which contain records for the Ohio River basin for those years.

Number of water-supply papers containing results of stream measurements, 1899-1914.

Year.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
												North Pacific slope basins.		
	North Atlantic slope (St. John River to York River).	South Atlantic and eastern Gulf of Mexico (James River to the Mississippi).	Ohio River.	St. Lawrence River and Great Lakes.	Hudson Bay and upper Mississippi River.	Missouri River.	Lower Mississippi River.	Western Gulf of Mexico.	Colorado River.	Great Basin.	Pacific slope in California.	Pacific slope in Washington and upper Columbia River.	Snake River basin.	Lower Columbia River and Pacific slope in Oregon.
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[k]98, 99, [m]100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 169, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332A	332B	332C
1913	351	352	353	354	355	356	357	358	359	360	361	362A	362B	362C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394

[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 IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohave River only.
[f] Kings and Kern rivers and south Pacific coast basins.
[g] 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 IV.
[h] Wissahickon and Schuylkill rivers to James River.
[i] Scioto River.
[j] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries to St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers.
[r] Great Basin in California except Truckee and Carson river basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz rivers only.

In these papers and in the following lists the stations are arranged in downstream order. The main stem of any river is determined by measuring or estimating its drainage area; that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. All stations from the source to the mouth of the main stem of the river are presented first, and the tributaries in regular order from source to mouth follow, the streams in each tributary basin being listed before those of the next basin below.

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

PART III. OHIO RIVER BASIN.

PRINCIPAL STREAMS.

The Ohio River basin includes Ohio River with all its tributaries, the most important being Allegheny, Monongahela, Beaver, Muskingum, New (or Kanawha), Scioto, Miami, Kentucky, Wabash, Cumberland, and Tennessee rivers. The streams drain parts of the States of Alabama, Georgia, Illinois, Indiana, Kentucky, Mississippi, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.

In addition to the list of gaging stations and the annotated list of publications relating specifically to the Ohio River basin, the following pages contain a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects, and also brief references to reports published by State and other organizations. (See p. XVIII.)

GAGING STATIONS.

NOTE.—Dash following a date indicates that the station was being maintained September 30, 1914. Period after date indicates discontinuance.

Allegheny River (head of Ohio River) at Red House, N. Y., 1903–
Allegheny River at Kittanning, Pa., 1904–1913.
Ohio River at Wheeling, W. Va., 1905–6.
Conewango Creek:
Chadakoin River (Chatauqua Lake outlet) near Jamestown, N. Y., 1904–5.
Kiskiminitas River at Avonmore, Pa., 1907–1913.
Kiskiminitas River at Salina, Pa., 1904–1905.
Blacklick Creek at Blacklick, Pa., 1904–1906; 1907–1913.
Tygart River (head of Monongahela River) at Belington, W. Va., 1907–
Tygart River at Fetterman, W. Va., 1907–
Monongahela River at Morgantown, W. Va., 1914–
Monongahela River at Lock No. 4, Pa., 1886–1905. Flood stage record only.
Buckhannon River at Hall, W. Va., 1907–1909.
West Fork River at Enterprise, W. Va., 1907–
Elk Creek near Clarksburg, W. Va., 1910–
Buffalo Creek at Barrackville, W. Va., 1907–8.
Deckers Creek at Morgantown, W. Va., 1914–
Dry Fork (head of Cheat River):
Cheat River near Parsons, W. Va., 1913–
Cheat River at Rowlesburg, W. Va., 1914–
Cheat River near Morgantown, W. Va., 1899–1900; 1902–1905; 1913–
Blackwater River at Hendricks, W. Va., 1914–
Shavers Fork at Parsons, W. Va., 1910–
Big Sandy Creek at Rockville, W. Va., 1909–
Youghiogheny River at Friendsville, Md., 1898–1904.

Ohio River tributaries—Continued.
Tennessee River tributaries—Continued.
Holston River, South Fork (head of Holston River), near Chilhowie, Va., 1907–1909.
Holston River, South Fork, at Bluff City, Tenn., 1900–
Holston River near Rogersville, Tenn., 1904–
Middle Fork of Holston River at Chilhowie, Va., 1907–1909.
Watauga River at Butler, Tenn., 1900–1901.
Watauga River near Elizabethton, Tenn., 1903–1908.
Elk Creek at Lineback, Tenn., 1900–1901.
Roane Creek at Butler, Tenn., 1900–1901.
Doe River at Blevins, Tenn., 1911–
Doe River at Valley Forge, Tenn., 1911–
Doe River at Elizabethton, Tenn., 1907–8; 1912.
North Fork of Holston River at Saltville, Va., 1907–8.
Little Tennessee River near Franklin, N. C., 1907–1910.
Little Tennesse River at Judson, N. C., 1896–
Little Tennessee River at McGhee, Tenn., 1905–
Cullasagee River at Cullasagee, N. C., 1907–1909.
Nantahala River near Nantahala, N. C., 1907–1909.
Tuckasegee River near East Laport, N. C., 1907–1909.
Tuckasegee River at Bryson, N. C., 1897–
Scott Creek near Dillsboro, N. C., 1907–8.
Oconalufty River near Cherokee, N. C., 1907–8.
Cheoah River at Millsaps, N. C., 1907–8.
Clinch River at Clinchport, Va., 1907–1909.
Hiwassee River near Hayesville, N. C., 1907–1909.
Hiwassee River at Murphy, N. C., 1897–
Hiwassee River at Reliance, Tenn., 1900–1913.
Hiwassee River at Charleston, Tenn., 1899–1902.
Tusquitee Creek near Hayesville, N. C., 1907–1909.
Valley River at Tomotla, N. C., 1904–1909; 1914–
Nottely River at Ranger, N. C., 1901–1905; 1914–
Toccoa River (head of Ocoee River) near Dial, Ga., 1907–8.
Toccoa River near Blueridge, Ga., 1898–1903.
Ocoee River at McCays (Copper Hill), Tenn., 1903–1913.
Big Bear River near Red Bay, Ala., 1913–
Elk River near Elkmont, Ala., 1904–1908.
Duck River at Columbia, Tenn., 1904–1908.

REPORTS ON WATER RESOURCES OF THE OHIO RIVER BASIN.[1]

PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

WATER-SUPPLY PAPERS.

Water-supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Water-supply papers are of octavo size.

*21. Wells of northern Indiana, by Frank Leverett. 1899. 82 pp., 2 pls. (Continued in No. 26.)
Discusses by counties the glacial deposits and the sources of well waters; gives many well sections.

*24. Water resources of the State of New York, Part I, by G. W. Rafter. 1899. 99 pp., 13 pls. 15c.

[1] For stream-measurement reports see tables on pp. IV–VI.

*25. Water resources of the State of New York, Part II, by G. W. Rafter. 1899. 100 pp., 12 pls. 15c.

No. 24 contains descriptions of the principal rivers of New York and their more important tributaries. and data on temperature, precipitation, evaporation, and stream flow.

No. 25 contains discussion of water-storage projects on Genesee and Hudson rivers, power development at Niagara Falls, descriptions and early history of State canals, and a chapter on the use and value of the water power of the streams and canals; also brief discussion of the water yield of land areas of Long Island.

*26. Wells of southern Indiana (continuation of No. 21), by Frank Leverett. 1899. 64 pp. 5c.

Discusses by counties the glacial deposits and the sources of well water; contains many well sections.

57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. 5c.

61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.

Nos. 57 and 61 contain information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" give information concerning temperature, quality of water, purposes of boring, etc. The lists are arranged by States, and the States are arranged alphabetically. A second revised edition was published in 1905 as Water-Supply Paper 149 (q. v.).

62. Hydrography of the southern Appalachian Mountain region, Part I, by H. A. Pressey. 1902. 95 pp., 25 pls. 15c.

63. Hydrography of the southern Appalachian Mountain region, Part II, by H. A. Pressey. 1902. pp. 96–190, pls. 26–44. 15c.

Nos. 62 and 63 describe in a general way the mountains, rivers, climate, forests, soil, vegetation, and mineral resources of the southern Appalachian Mountains, and then discuss in detail the drainage basins, giving for each an account of the physical features, rainfall, forests, minerals, transportation, discharge measurements, and water powers. Most of the streams described are tributary through Tennessee River to the Ohio, but Part II (No.63) includes also descriptions of several streams in the south Atlantic and eastern Gulf of Mexico drainage basins.

79. Normal and polluted waters in northeastern United States, by M. O. Leighton. 1903. 192 pp. 10c.

Defines essential qualities of water for various uses, the impurities in rain, surface, and underground waters, the meaning and importance of sanitary analyses, and the principal sources of pollution; chiefly "a review of the more readily available records" of examination of water supplies derived from streams in the Merrimac, Connecticut, Housatonic, Delaware, and Ohio River basins; contains many analyses.

91. The natural features and economic development of the Sandusky, Maumee, Muskingum, and Miami drainage areas in Ohio, by B. H. and M. S. Flynn. 1904. 130 pp. 10c.

Describes the topography, geology, and soils of the areas and discusses stream flow, dams, water powers, and public water supplies.

96. Destructive floods in the United States in 1903, by E. C. Murphy. 1904. 81 pp., 13 pls. 15c.

Contains notes on early floods in Mississippi Valley.

102. Contributions to the hydrology of eastern United States, 1903; M. L. Fuller, geologist in charge. 1904. 522 pp. 30c.

Contains brief reports on springs and wells of Alabama, Georgia, Tennessee, and Kentucky. The reports comprise tabulated well records giving information as to location, owner, depth, yield, head, etc., supplemented by notes as to elevation above sea, materials penetrated, temperature, use, and quality; many miscellaneous analyses.

*107. Water powers of Alabama, with an appendix on stream measurements in Mississippi, by B. M. Hall. 1904. 253 pp., 9 pls. 20c.

Contains gage heights, rating tables, estimates of monthly discharge at stations on Tallapoosa, Coosa, Alabama, Cahaba, Black Warrior, Tombigbee, and Tennessee rivers and their tributaries; gives estimates and short descriptions of water powers.

110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c.

Contains reports as follows: Water resources of the Middlesboro-Harlan region of southeastern Kentucky, by George H. Ashley. Describes briefly the topographic features of the area and the water supply of Middlesboro and Pineville.

Water resources of the Cowee and Pisgah quadrangles, North Carolina, by Hoyt S. Gale. Discusses drainage, springs, and mineral waters of one of the units of the geologic atlas of the United States.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.

Contains a brief report on the topography, drainage, geology, and the pollution of wells and streams by oil waste and brine in an area drained by Mississinewa River, a tributary of the Wabash.

114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.

Contains brief reports relating to Ohio River drainage areas, as follows:
Tennessee and Kentucky, by L. C. Glenn.
Ohio, by Frank Leverett.
Illinois, by Frank Leverett.
West Virginia, by M. L. Fuller.
Indiana, by Frank Leverett.
North Carolina, by M. L. Fuller.
South Carolina, by L. C. Glenn.
Georgia, by S. W. McCallie.
Alabama, by E. A. Smith.

Each of these reports describes the geology of the area in its relation to water supplies, notes the principal mineral springs, and gives list of pertinent publications.

115. River surveys and profiles made during 1903, by W. C. Hall and J. C. Hoyt. 1905. 115 pp., 4 pls. 10c.

Contains results of surveys made to determine location of undeveloped power sites. Gives elevations and distances along Hiwassee, Nottely, and Toccoa rivers.

144. The normal distribution of chlorine in the natural waters of New York and New England, by D. D. Jackson. 1905. 31 pp., 5 pls. 10c.

Discusses common salt in coast and inland waters, salt as an index to polution of streams and wells, the solutions and methods used in chlorine determinations, and the use of the normal chlorine map; gives charts and tables for chlorine in the New England States and New York.

145. Contributions to the hydrology of eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls.

Contains "Water resources of the Nicholas quadrangle, West Virginia," by George H. Ashley. Describes topography, geology, and domestic water supply of the hilly region in central West Virginia, a little east of New and Kanawha rivers.

147. Destructive floods in United States in 1904, by E. C. Murphy. 15c.

Contains "Wabash River flood, Indiana," by F. W. Hanna. Describes causes of flood discharge, damage, and prevention of damage; also the drought in the Ohio River basin, its causes and effects; flood in Scottdale Valley, caused by failure of dam on Jacobs Creek (tributary to the Ohio through Youghiogheny River).

149. Preliminary list of deep borings in the United States, second edition with additions, by N. H. Darton. 1905. 175 pp. 10c.

Gives by States (and within the States by counties), location, depth, diameter, yield height of water, and other valuable information concerning wells 400 feet or more in depth; includes all wells listed in Water-Supply Papers 57 and 61; mentions also principal publications relating to deep borings.

159. Summary of the underground-water resources of Mississippi, by A. F. Crider and L. C. Johnson. 1906. 88 pp., 6 pls. 20c.

Describes geography, topography, and general geology of the State; discusses the source, depth of penetration, rate of percolation, and recovery of underground waters; artesian requisites, and special conditions in the Coastal Plain formations; gives notes on wells by counties, deep well records, and selected records in details; treats of sanitary aspect of wells and gives analyses.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

Gives accounts of floods on Allegheny and Ohio rivers, and estimates of flood discharge and frequency on Monongahela, Youghiogheny, and Tennessee rivers; also index to literature on floods in American streams.

*164. Underground waters of Tennessee and Kentucky west of Tennessee River and of an adjacent area in Illinois, by L. C. Glenn. 1906. 173 pp., 7 pls. 25c.

Describes static level and uses of waters, artesian conditions, and source properties of underground water; discusses topography, geology, and water resources by counties; gives logs of wells, analyses of waters, and bibliography of most important reports.

*197. Water resources of Georgia, by B. M. and M. R. Hall. 1907. 342 pp., 1 pl. 50c.

Describes topographic and geologic features of the State; discusses by drainage basins stream flow, river surveys, and water powers.

233. Water resources of the Blue Grass region, Kentucky, by G. C. Matson, with a chapter on the quality of the waters, by Chase Palmer. 1909. 96 pp., 2 pls. 20c.

Describes the geologic formations, physiographic features, soils, and surface waters of the region; the source, conditions of occurrence, amount and recovery of the underground waters, collection and storage of rainwaters, municipal water supplies, and conditions in each county; discusses under "Quality" the industrial uses of the water, comparative hardness, and mineral and table waters; many analyses.

236. The quality of surface waters in the United States: Part I, Analyses of waters east of the one hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.

Describes collection of samples, method of examination, preparation of solutions, accuracy of estimates, and expression of analytical results; gives results of analyses of waters of Allegheny, Cumberland, Kentucky, Miami, Wabash, and Tennessee rivers and some of their tributaries.

239. The quality of the surface waters of Illinois, by W. D. Collins. 1910. 94 pp., 3 pls. 10c.

Discusses the natural and economic features that determine the character of the streams; describes the larger drainage basins and the methods of collecting and analyzing the samples of water, and discusses each river in detail with reference to its source, course, and quality of water; includes short chapters on municipal supplies and industrial uses.

254. Ground waters of north-central Indiana, by S. R. Capps, with a chapter on the chemical character of the waters, by R. B. Dole. 1910. 279 pp., 7 pls. 40c.

Describes relief, drainage, vegetation, soils and crops, industrial development, geologic formations; sources, movements, occurrence, and volume of ground water; methods of well construction and lifting devices; dicusses in detail for each county, surface features and drainage, geology and ground water, city, village, and rural supplies, and gives records of wells and analyses of waters. Discusses also, under chemical character, methods of analyses and expression of results, mineral constituents, effect of the constituents on waters for domestic, industrial and medicinal uses, methods of purification, chemical composition; many analyses and field assays.

259. The underground waters of southwestern Ohio, by M. L. Fuller and F. G. Clapp, with a discussion of the chemical character of the waters, by R. B. Dole. 1912. 228 pp., 9 pls. 35c.

Describes the topography, climate, and geology of the region, the water-bearing formations, the source, mode of occurrence, and head of the waters, and municipal supplies; gives details by counties; discusses in supplement, under chemical character, method of analyses and expression of results, mineral constituents, effect of the constituents on waters for domestic, industrial, or medicinal uses, methods of purification, chemical composition: many analyses and field assays. The matter in the supplement was also published in Water-Supply Paper 254 (The underground waters of north-central Indiana).

334. The Ohio Valley flood of March-April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 32pls.

Although relating specifically to floods in the Ohio Valley, this report discusses also the causes of floods and the prevention of damage by floods.

ANNUAL REPORTS.

Each of the papers contained in the annual reports was also issued in separate form.

Annual reports are distributed free by the Geological Survey as long as its stock lasts. An asterisk(*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

Fourteenth annual report of the United States Geological Survey, 1892–93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II. Accompanying papers, pp. xx, 597, 73 pls. $2.10. Contains:

*Potable waters of the eastern United States, by W J McGee, pp. 1–47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

Seventeenth Annual Report of the United States Geological Survey, 1895–96, Charles D. Walcott, Director. 1896. 3 parts in 4 vols. *Pt. II. Economic geology and hydrography, pp. xxv, 864, 113 pls. $2.35. Contains:

*The water resources of Illinois, by Frank Leverett, pp. 695–849, pls. cviii to cxiii. Describes the physical features of the State, and the drainage basins, including Illinois, Des Plaines, Kankakee, Fox, Illinois-Vermilion, Spoon, Mackinaw, and Sangamon rivers, Macoupin Creek, Rock River, tributaries of the Mississippi in western Illinois, Kaskaskia, Big Muddy, and tributaries of the Wabash; discusses the rainfall and run-off, navigable waters and water powers, the wells supplying water for rural districts, and artesian wells; contains tabulated artesian well data and water analyses.

Eighteenth Annual Report of the United States Geological Survey, 1896–97, Charles D. Walcott, Director. 1897. (Pts. II and III, 1898.) 5 parts in 6 vols. *Pt. IV, Hydrography, pp. x, 756, 102 pls. $1.75. Contains:

*The water resources of Indiana and Ohio, by Frank Leverett, pp. 419–560, pls. xxxiii to xxxvii. Describes the Wabash, Whitewater, Great Miami, Little Miami, Scioto, Hocking, Muskingum, and Beaver rivers and lesser tributaries of the Ohio in Indiana and Ohio, the streams discharging into Lake Erie and Lake Michigan, and streams flowing to the upper Mississippi through the Illinois; discusses shallow and drift wells, the flowing wells from the drift and deeper artesian wells, and gives records of wells at many of the cities; describes the mineral springs, and gives analyses of the waters; contains also tabulated lists of cities using surface waters for waterworks, and of cities and villages using shallow and deep well waters; discusses the source and quality of the city and village supplies; and gives precipitation tables for various points.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Pts. II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. IV, Hydrography, pp. viii, 814, 118 plates. $1.85. Contains:

*The rock waters of Ohio, by Edward Orton, pp. 633–717, pls. lxxi to lxxiii. Describes the principal geological formations of Ohio and the waters from the different strata; discusses the flowing wells at various points and the artesian wells of pre-Glacial channels in Allen, Auglaize, and Mercer counties; discusses city and village supplies; gives analyses of waters from various formations.

MONOGRAPHS.

Monographs are of quarto size. They are not distributed free, but may be obtained from the Geological Survey or from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C., at the prices indicated. An asterisk (*) indicates that the Survey's stock of the paper is exhausted.

XLI. Glacial formations and drainage features of the Erie and Ohio basins, by Frank Leverett. 1902. 802 pp., 26 pls. $1.75.

Treats of an area extending westward from Genesee Valley in New York across northwestern Pennsylvania and Ohio, central and southern Indiana, and southward from Lakes Ontario and Erie to the vicinity of Allegheny and Ohio rivers.

PROFESSIONAL PAPERS.

Professional papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked with an asterisk may, however, be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Professional papers are of quarto size.

37. The southern Appalachian forests, by H. B. Ayres and W. W. Ashe. 1905. 291 pp., 37 pls. 80c.

Describes the relief, drainage, climate, natural resources, scenery, and water supply of the southern Appalachian forests, the trees, shrubs, and rate of growth; gives details concerning forests by drainage basins, including New, Holston (southern tributaries of South Fork only), Watauga, Nolichucky, French Broad, Pigeon, Little Tennessee, Hiwassee, Tallulah-Chatooga, Toxaway, Saluda, and First and Second Broad rivers, Catawba and Yadkin rivers, describing many of the tributaries of each of the master streams.

72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate and population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee river basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chattahoochee, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

BULLETINS.

An asterisk (*) indicates that the Geological Survey's stock of the paper is exhausted. Many of the papers so marked may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Bulletins are of octavo size.

264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

Discusses the importance of accurate well records to the driller, to owners of oil, gas, and water wells, and to the geologist; describes the general method of work; gives tabulated records of wells in Illinois, Indiana, New York, Ohio, Pennsylvania, Tennessee, West Virginia, and Kentucky, and detailed records of wells in Deleware and Jay counties, Ind.; Greene, Warren, and Washington counties, Pa.; and Kanawha, Ritchie, and Wetzel counties, W. Va. These records were selected because they give definite stratigraphic information.

*298 Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania Tennessee, Virginia, and West Virginia, and detailed records of wells in Crawford County, Ill.; Delaware, Martin, Randolph, and Vanderburg counties, Ind.; Hopkins and Metcalf counties, Ky.; Hocking, Noble, Tuscarawas, and Wayne counties, Ohio; Armstrong, Greene, Warren, and Washington counties, Pa.; and Cabell, Harrison, Marion, Monongalia, Wayne, and Wetzel counties, W. Va. The wells of which detailed records are given were selected because they afford definite stratigraphic information.

GEOLOGIC FOLIOS.

Under the plan adopted for the preparation of a geologic map of the United States the entire area is divided into small quadrangles, bounded by certain meridians and parallels, and these quadrangles, which number several thousand, are separately surveyed and mapped.[1] The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute a Geologic Atlas of the United States.

A folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. Each folio includes maps showing the topography, geology, underground structure, and mineral deposits of the area mapped and several pages of descriptive text. The text explains the maps and describes the topographic

[1] Index maps showing areas in the Ohio River basin covered by topographic maps and by geologic folios will be mailed on receipt of request addressed to the Director, U. S. Geological Survey, Washington, D. C.

and geologic features of the country and its mineral products. The topographic map shows roads, railroads, waterways, and, by contour lines, the shapes of the hills and valleys and the height above sea level of all points in the quadrangle. The areal-geology map shows the distribution of the various rocks at the surface. The structural-geology map shows the relations of the rocks to one another underground. The economic-geology map indicates the location of mineral deposits that are commercially valuable. The artesian-water map shows the depth to underground-water horizons. Economic-geology and artesian-water maps are included in folios if the conditions in the areas mapped warrant their publication. The folios are of special interest to students of geography and geology and are valuable as guides in the development and utilization of mineral resources.

The folios numbered from 1 to 163, inclusive, are published in only one form (18 by 22 inches), called the library edition. Some of the folios that bear numbers higher than 163 are published also in an octavo edition (6 by 9 inches). Owing to a fire in the Geological Survey building May 18, 1913, the stock of geologic folios was more or less damaged by fire and water, but 80 or 90 per cent of the folios are usable. They will be sold at the uniform price of 5 cents each, with no reduction for wholesale orders. This rate applies to folios in stock from 1 to 184, inclusive (except reprints), also to the library edition of folio 186. The library edition of folios 185, 187, and higher numbers sells for 25 cents a copy, except that some folios which contain an unusually large amount of matter sell at higher prices. The octavo edition of folio 185 and higher numbers sells for 50 cents a copy, except folio 193, which sells for 75 cents a copy. A discount of 40 per cent is allowed on an order for folios or for folios together with topographic maps amounting to $5 or more at the retail rate.

All the folios contain descriptions of the drainage of the quadrangles. The folios in the following list contain also brief discussions of the underground waters in connection with the economic resources of the areas and more or less information concerning the utilization of the water resources.

An asterisk (*) indicates that the stock of the folio is exhausted.

*16. Knoxville folio, Tennessee-North Carolina.

Describes the geography and geology of the area and, under "Mineral resources," the water supply.

67. Danville folio, Illinois-Indiana. 5c.

Describes the topography and geology of the area and, under "Mineral resources," discusses the shallow dug or open wells, the tubular wells, and the flowing wells; gives also tabulated data concerning depth, head, water-bearing bed, etc., of the wells in the quadrangle.

84. Ditney folio, Indiana. 5c.

Describes the drainage and relief of the area, the geologic formation, geologic structure and history, and, under "Economic resources," briefly discusses the underground water supply.

90. Cranberry folio, North Carolina-Tennessee. 5c.

Describes the geology and topography of an area in Carter and Johnson counties, Tenn., and Ashe, Watauga, Wilkes, Caldwell, and Mitchell counties, N. C., drained in part into the Atlantic, and in part into the Mississippi. Under "Mineral resources" discusses water power.

102. Indiana folio, Pennsylvania. 5c.

Describes the physiographic relations, relief, and drainage of the Indiana quadrangle, the stratigraphic and structural geology, and under "Mineral resources" the surface and underground waters; indicates promising localities for artesian water.

105. Patoka folio, Indiana-Illinois. 5c.

Describes the drainage and relief of the area, the stratigraphic and structural geography and the geologic history, and under "Mineral resources" the water supply of the streams, springs, wells, cisterns, and artificial ponds.

121. Waynesburg folio, Pennsylvania. 5c.

Describes the drainage and surface relief of the area, the geologic formations and the geologic history, and in connection with the discussion of the mineral resources gives an account of the surface and underground water supplies.

123. Elders Ridge folio, Pennsylvania. 5c.

Describes the topography and stratigraphic, structural, and historical geology of the Elders Ridge quadrangle, and under "Mineral resources" discusses briefly the water supplies.

124. Mount Mitchell folio, North Carolina. 5c.

Describes the topography and geology of an area whose waters pass through Tennessee River and the Ohio into the Mississippi, and through Catawba and Broad rivers directly to the Atlantic; under "Economic geology" describes water powers and the various sources of water used for industrial and domestic supplies.

*144. Amity folio, Pennsylvania.

Describes the relief and drainage of the Amity quadrangle in southwestern Pennsylvania, the stratigraphic, structural, and historical geology, and under "Mineral resources" gives a brief discussion of the water supply of the town of Washington.

146. Rogersville folio, Pennsylvania. 5c.

Describes the relief and drainage of the quadrangle in the extreme southwestern corner of Pennsylvania—principally in Greene County; under "Mineral resources" treats briefly of the water supply.

147. Pisgah folio, North Carolina-South Carolina. 5c.

Describes the topography and geology of an area drained in part by streams flowing to the Atlantic and in part by those flowing through Tennessee River into the Ohio and into the Mississippi; under "Economic geology" discusses streams, water powers, and underground waters.

*151. Roan Mountain folio, Tennessee-North Carolina.

Describes the quadrangle in Tennessee and North Carolina which includes Johnson City Tenn., and Elizabethton, N. C., which is drained by tributaries of Tennessee River; describes the relief and the rivers, the stratigraphic and structural geology, and under "Economic geology" the streams and their water powers and the waters available for wells.

160. Accident-Grantsville folio, Maryland-Pennsylvania-West Virginia. 5c.

Describes the drainage, relief, and geology of two quadrangles lying chiefly in Garrett County, Md.; the waters of the Accident quadrangle pass north and west to rivers that join the Ohio; those of the Grantsville quadrangle are about equally divided between tributaries of the Ohio and Savage rivers, and Georges Creek which flow into the Potomac; under "Mineral resources" the folio describes Youghiogheny and Casselman rivers, Savage River, and Georges Creek, and the spring waters; notes possibility of obtaining artesian water.

172. Warren folio,[1] Pennsylvania-New York. 5c.

Describes the topography, drainage, and geology of the Warren quadrangle in the basin of Allegheny River in northwestern Pennsylvania; under "Economic geology" describes briefly the streams, springs, and underground waters.

174. Johnstown folio,[1] Pennsylvania. 5c.

Describes the relief, drainage, and geology of the Johnstown quadrangle, which lies mostly in Cambria County, Pa., but covers also small parts of Somerset, West Moreland, and Indiana counties. Most of it is included in the valley of Conemaugh River and its tributaries; under "Economic geology" describes the city water supply at Johnstown and the water resources of the quadrangle in general.

MISCELLANEOUS REPORTS.

Other Federal bureaus and State and other organizations have from time to time published reports relating to the water resources of the various sections of the country. Notable among those pertaining to the Ohio River basin are the reports of the Chief of Engineers, United States Army; the State geological surveys of Alabama, Illinois, Kentucky, North Carolina, Tennessee, and Virginia; the Illinois Water-Supply Commission and the Rivers and Lakes Commission of Illinois; the New York State Conservation Commission and State Water-Supply Commission; the Water-Supply Commission of Pennsylvania and the Pittsburgh Flood Commission; and the water-power

[1] Issued in two editions. (See p. XVII.) Specify which edition is wanted.

report of the Tenth Census (vol. 17). The following reports deserve special mention:

The Mississippi and Ohio rivers, by Charles H. Ellet. 1853.

Report upon the physics and hydraulics of the Mississippi River, by A. A. Humphreys and H. L. Abbot. 1876.

Preliminary report on a part of the water powers of Alabama, by B. M. Hall: Alabama Geol. Survey Bull. 7, 1903.

The underground water resources of Alabama, by Eugene A. Smith: Alabama Geol. Survey Mon. 6, 1907.

Preliminary report on a part of the water powers of Georgia, compiled by B. M. Hall: Georgia Geol. Survey Bull. 3 A, 1896.

Preliminary report on the underground waters of Georgia, by S. W. McCallie: Georgia Geol. Survey Bull. 15, 1908.

The mineral content of Illinois waters, by Edward Bartow, J. A. Udden, S. W. Parr, and George T. Palmer: Illinois State Geol. Survey Bull. 10, 1909.

Chemical survey of the waters of Illinois, report for the years 1897–1902, by A. W. Palmer, with Geology of Illinois as related to its water supply, by Charles W. Rolfe: University of Illinois publications.

Chemical and biological survey of waters of Illinois, by Edward Bartow: University of Illinois publications 3, 6, 7, 1906–1909.

Report upon the prevention of overflow of Little Wabash and Skillet Fork rivers, by W. J. McEathron and L. L. Hidinger. Rivers and Lakes Commission, 1911.

Papers on the water power of North Carolina, a preliminary report by George F. Swain: North Carolina Geol. Survey Bull. 8, 1899.

Report of the investigations into the purification of the Ohio River water for the improved water supply of the city of Cincinnati, Ohio; made for the board of trustees, commissioners of waterworks, Cincinnati, 1899.

Progress report on a plan of sewerage for the city of Cincinnati, 1912–13.

The mineral waters of Indiana, their location, origin, and character, by W. S. Blatchley: Indiana Dept. Geology and Nat. Res. Twenty-sixth Ann. Rept. 1901.

Report on the flow of Dix River as a source of water power, by August F. Foerste, and Supplementary report on Dix River, by August F. Foerste: Kentucky Geol. Survey Bull. 21, 1912.

Underground waters of Mississippi, a preliminary report, by W. N. Logan and W. R. Perkins: Mississippi Agr. Exper. Sta. Bull. 89.

Hydrology of the State of New York, by George W. Rafter: New York State Mus. Bull. 85, 1905.

A report to the mayor and city council on flood prediction for the city of Columbus, Ohio, 1913.

Report of the filtration commission of the city of Pittsburgh, Pa., 1899.

The water powers of Tennessee, by J. A. Switzer, including a report on Doe River, by A. H. Horton: Tennessee Geol. Survey Bull. 17, 1914.

Hydrography of Virginia, by N. C. Grover and R. H. Bolster: Virginia Geol. Survey Bull. 3, 1906.

Surface water supply of Virginia, by G. C. Stevens: Virginia Geol. Survey Bull. 10, 1916.

Report of the Secretary of Agriculture in relation to the forests, rivers, and mountains of the Southern Appalachian region: 57th Congress, 1st sess., S. Doc. 84, 1902.

Many of these reports can be obtained by applying to the several commissions, and most of them can be consulted in the public libraries of the larger cities.

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GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTEREST.

The following list comprises reports not readily classifiable by drainage basins and covering a wide range of hydrologic investigations:

WATER-SUPPLY PAPERS.

*1. Pumping water for irrigation, by H. M. Wilson. 1896. 57 pp., 9 pls.

Describes pumps and motive powers, windmills, water wheels, and various kinds of engines, also storage reservoirs to retain pumped water until needed for irrigation.

*3. Sewage irrigation, by G. W. Rafter. 1897. 100 pp., 4 pls. (See Water-Supply Paper 22.)

Discusses methods of sewage disposal by intermittent filtration and by irrigation; describes utilization of sewage in Germany, England, and France, and sewage purification in the United States.

*8. Windmills for irrigation, by E. C. Murphy. 1897. 49 pp., 8 pls.

Gives results of experimental tests of windmills during the summer of 1896 in the vicinity of Garden, Kans.; describes instruments and methods and draws conclusions.

*14. New tests of certain pumps and water lifts used in irrigation, by O. P. Hood. 1898. 91 pp., 1 pl.

Discusses efficiency of pumps and water lifts of various types.

*20. Experiments with windmills, by T. O. Perry. 1899. 97 pp., 12 pls.

Includes tables and descriptions of wind wheels, makes comparisons of wheels of several types, and discusses results.

*22. Sewage irrigation, Part II, by G. W. Rafter. 1899. 100 pp., 7 pls.

Gives résumé of Water-Supply Paper No. 3; discusses pollution of certain streams, experiments on purification of factory wastes in Massachusetts, value of commercial fertilizers, and describes American sewage disposal plants by States; contains bibliography of publications relating to sewage utilization and disposal.

32. Water resources of Puerto Rico, by H. M. Wilson. 1899. 48 pp., 17 pls. 15c.

Describes briefly topography, climate, rivers, irrigation methods, soils, forestation, water power, and transportation facilities.

*41. The windmill; its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls. 15c.

*42. The windmill; its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp., 2 pls. 10c.

Nos. 41 and 42 give details of results of experimental tests with windmills of various types.

*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp.,15 pls.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11 pls. 15c.

Gives elevations and distance along rivers of the United States, also brief descriptions of many of the streams. Arrangement geographic. Many river profiles are scattered through other reports on surface waters in various parts of the United States.

*56. Methods of stream measurement. 1901. 51 pp., 12 pls. 15c.

Describes the methods used by the Survey in 1901–2. (See also Nos. 64, 94, and 95.)

57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. (See No. 149.) 5c.

61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.

Nos. 57 and 61 contain information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" gives information concerning temperature, quality of water, purposes of boring, etc. The lists are arranged by States, and the States are arranged alphabetically. A second revised edition was published in 1905 as Water-Supply Paper 149 (q. v.). 5c.

64. Accuracy of stream measurements, by E. C. Murphy. 1902. 99 pp., 4 pls. (See No. 95.) 10c.

Describes methods of measuring velocity of water and of measuring and computing stream flow and compares results obtained with the different instruments and methods; describes also experiments and results at the Cornell University hydraulic laboratory. A second enlarged edition published as Water-Supply Paper 95.

*67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls. 15c.

Discusses origin, depth, and amount of underground waters; permeability of rocks and porosity of soils; causes, rates, and laws of motions of underground water; surface and deep zones of flow, and recovery of waters by open wells and artesian and deep wells; treats of the shape and position of the water table; gives simple methods of measuring yields of flowing well; describes artesian wells at Savannah, Ga.

72. Sewage pollution in the metropolitan area near New York City and its effect on inland water resources, by M. O. Leighton. 1902. 75 pp., 8 pls. 10c.

Defines "normal" and "polluted" waters and discuses the damage resulting from pollution.

77. The water resources of Molokai, Hawaiian Islands, by Waldemar Lindgren. 1903. 62 pp., 4 pls. 10c.

Describes briefly the topography, geology, coral reefs, climate, soils, vegetation, forests, fauna of the island, the springs, running streams and wells, and discusses the utilization of the surface and underground waters.

*80. The relation of rainfall to run-off, by G. W. Rafter. 1903. 104 pp. 10c.

Treats of measurements of rainfall and laws and measurements of stream flow; gives rainfall run-off, and evaporation formulas; discusses effect of forests on rainfall and run-off.

87. Irrigation in India (second edition), by H. M. Wilson. 1903. 238 pp., 27 pls. 25c.

First edition was published in part II of the Twelfth Annual Report.

93. Proceedings of first conference of engineers of Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1904. 361 pp. 25c.

Contains, in addition to an account of the organization of the hydrographic [water resources] branch of the United States Geological Survey and the reports of the conference, the following papers of more or less general interest:

Limits of an irrigation project, by D. W. Ross.
Relation of Federal and State laws to irrigation, by Morris Bien.
Electrical transmission of power for pumping, by H. A. Storrs.
Correct design and stability of high masonry dams, by George Y. Wisner.
Irrigation surveys and the use of the planetable, by J. B. Lippincott.
The use of alkaline waters for irrigation, by Thomas A. Means.

*94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls. 10c.

Gives instruction for field and office work relating to measurements of stream flow by current meters. (See also No. 95.)

*95. Accuracy of stream measurements (second, enlarged edition), by E. C. Murphy. 1904. 169 pp., 6 pls.

Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. (See also No. 94.)

103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.)

Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classifies according to scope the statutes enacted in the different States.

110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c.

Contains the following reports of general interest. The scope of each paper is indicated by its title.

Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.

The California or "stovepipe" method of well construction, by Charles S. Slichter.

Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.

Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.

Experiment relating to problems of well contamination at Quitman, Ga., by S. W. McCallie.

Notes on the hydrology of Cuba, by M. L. Fuller.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.

The first paper discusses the pollution of streams by sewage and by trade wastes, describes the manufacture of strawboard and gives results of various experiments in disposing of the waste. The second paper describes briefly the topography, drainage, and geology of the region about Marion, Ind., the contamination of rock wells and of streams by waste oil and brine.

114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.

Contains report on "Occurrence of underground waters," by M. L. Fuller, discussing sources, amount, and temperature of waters, permeability and storage capacity of rocks, water-bearing formations, recovery of water by springs, wells and pumps, essential conditions of artesian flows, and general conditions affecting underground waters in eastern United States.

115. River surveys and profiles made during 1903, by W. C. Hall and J. C. Hoyt. 1905. 115 pp., 4 pls. 10c.

Contains results of surveys made to determine location of undeveloped power sites.

119. Index to the hydrographic progress reports of the United States Geological Survey, 1888 to 1903, by J. C. Hoyt and B. D. Wood. 1905. 253 pp. 15c.

Scope indicated by title.

120. Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879–1904, by M. L. Fuller. 1905. 128 pp. 10c.

Scope indicated by title.

122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Defines and classifies underground waters, gives common-law rules relating to their use, and cites State legislative acts affecting them.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.

Discusses the capacity of sand to transmit water, describes measurements of underflow in Rio Hondo, San Gabriel, and Mohave River valleys, Cal., and on Long Island, N. Y.; gives results of tests of wells and pumping plants, and describes stovepipe method of well construction.

143. Experiments on steel-concrete pipes on a working scale, by J. H. Quinton. 1905. 61 pp., 4 pls.

Scope indicated by title.

144. The normal distribution of chlorine in the natural waters of New York and New England, by D. D. Jackson. 1905. 31 pp., 5 pls. 10c.

Discusses common salt in coast and inland waters, salt as an index to pollution of streams and wells, the solutions and methods used in chlorine determinations, and the use of the normal chlorine map; gives charts and tables for chlorine in the New England States and New York.

145. Contributions to the hydrology of eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls.

Contains brief reports of general interest as follows:

Drainage of ponds into drilled wells, by Robert E. Horton. Discusses efficiency, cost, and capacity of drainage wells, and gives statistics of such wells in southern Michigan.

Construction of so-called fountain and geyser springs, by Myron L. Fuller.

A convenient gage for determining low artesian heads, by Myron L. Fuller

146. Proceedings of second conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15c.

Contains brief account of the organization of the hydrographic [water resources] branch and the Reclamation Service, reports of conferences and committees, circulars of instruction, and many brief reports on subjects closely related to reclamation, and a bibliography of technical papers by members of the service. Of the papers read at the conference those listed below (scope indicated by title) are of more or less general interest:

Proposed State code of water laws, by Morris Bien.
Power engineering applied to irrigation problems, by O. H. Ensign.
Estimates on tunneling in irrigation projects, by A. L. Fellows.
Collection of stream-gaging data, by N. C. Grover.
Diamond-drill methods, by G. A. Hammond.
Mean-velocity and area curves, by F. W. Hanna.
Importance of general hydrographic data concerning basins of streams gaged, by R. E. Horton.
Effect of aquatic vegetation on stream flow, by R. E. Horton.
Sanitary regulations governing construction camps, by M. O. Leighton.
Necessity of draining irrigated land, by Thomas H. Means.
Alkali soils, by Thomas H. Means.
Cost of stream-gaging work, by E. C. Murphy.
Equipment of a cable gaging station, by E. C. Murphy.
Silting of reservoirs, by W. M. Reed.
Farm-unit classification, by D. W. Ross.
Cost of power for pumping irrigating water, by H. A. Storrs.
Records of flow at current-meter gaging stations during the frozen season, by F. H. Tillinghast.

147. Destructive floods in United States in 1904, by E. C. Murphy. 206 pp. 15c.

Contains a brief account of "A method of computing cross-section area of waterways," including formulas for maximum discharge and areas of cross section.

149. Preliminary list of deep borings in the United States, second edition with additions, by N. H. Darton. 1905. 175 pp. 10c.

Gives by States (and within the States by counties), location, depth, diameter, yield, height of water, and other available information concerning wells 400 feet or more in depth; includes all wells listed in Water-Supply Papers 57 to 61; mentions also principal publications relating to deep borings.

150. Weir experiments, coefficients, and formulas, by R. E. Horton. 1906. 189 pp., 38 pls. (See Water-Supply Paper 200.) 15c.

Scope indicated by title.

151. Field assay of water, by M. O. Leighton. 1905. 77 pp., 4 pls. 10c.

Discusses methods, instruments, and reagents used in determining turbidity, color, iron, chlorides, and hardness in connection with the studies of the quality of water in various parts of the United States.

152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp.

Scope indicated by title.

*155. Fluctuations of the water level in wells, with special reference to Long Island, N. Y., by A. C. Veatch. 1906. 83 pp., 9 pls. 25c.

Includes general discussion of fluctuation due to rainfall and evaporation, barometric changes, temperature changes in rivers, changes in lake level, tidal changes, effects of settlement, irrigation, dams, underground water developments, and to indeterminate causes.

*160. Underground water papers, 1906; M. L. Fuller, geologist in charge. 1906. 104 pp., 1 pl.

Gives account of work in 1905, lists of publications relating to underground waters, and contains the following brief reports of general interest:

Significance of the term "artesian," by Myron L. Fuller.
Representation of wells and springs on maps, by Myron L. Fuller.
Total amount of free water in the earth's crust, by Myron L. Fuller.
Use of fluorescein in the study of underground water, by R. B. Dole.
Problems of water contamination, by Isaiah Bowman.
Instances of improvement of water in wells, by Myron L. Fuller.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

163. Bibliographic review and index of underground-water literature published in the United States in 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson. 1906. 130 pp. 15c.

Scope indicated by title.

*179. Prevention of stream pollution by distillery refuse, based on investigations at Lynchburg, Ohio, by Herman Stabler. 1906. 34 pp., 1 pl. 10c.

Describes grain distillation, treatment of slop, sources, character, and effects of effluents on streams; discusses filteration, precipitation, fermentation, and evaporation methods of disposal of wastes without pollution.

*180. Turbine water-wheel tests and power tables, by R. E. Horton. 1906. 134 pp., 2 pls. 20c.

Scope indicated by title.

*185. Investigations on the purification of Boston sewage, by C–E. A. Winslow and E. B. Phelps. 1906. 163 pp. 25c.

Discusses composition, disposal, purification, and treatment of sewages and recent tendencies in sewage-disposal practice in England, Germany, and the United States; describes character of crude sewage at Boston, removal of suspended matter, treatment in septic tanks, and purification in intermittent sand filtration and coarse material; gives bibliography.

*186. Stream pollution by acid-iron wastes: a report based on investigations made at Shelby, Ohio, by Herman Stabler. 1906. 36 pp., 1 pl. 10c.

Gives history of pollution by acid-iron wastes at Shelby, Ohio, and resulting litigation; discusses effect of acid-iron liquors on sewage purification processes, recovery of copperas from acid-iron wastes, and other processes for removal of pickling liquor.

*187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl. 15c.

Scope indicated by title.

*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls. 5c.

Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amounts and character of water used, raw material and finished product, and mechanical filtration.

*194. Pollution of Illinois and Mississippi rivers by Chicago sewage (a digest of the testimony taken in the case of the State of Missouri *v.* the State of Illinois and the Sanitary District of Chicago), by M. O. Leighton. 1907. 369 pp., 2 pls. 40c.

Scope indicated by amplification of title.

*196. Water supply of Nome region, Seward Peninsula, Alaska, 1906, by J. C. Hoyt and F. F. Henshaw. 1907. 52 pp., 6 pls. 15c.

Gives results of measurements of flow of Alaskan streams, discusses available water supply for ditch and pipe lines and power development; presents notes for investors.

*200. Weir experiments, coefficients, and formulas, revision of paper No. 150, by R. E. Horton. 1907. 195 pp., 38 pls. 35c.

Scope indicated by title.

*218. Water-supply investigations in Alaska, 1906–7 (Nome and Kougarok regions, Seward Peninsula; Fairbanks district, Yukon-Tanana region), by F. F. Henshaw and C. C. Covert. 1908. 156 pp., 12 pls. 25c.

Describes the drainage basins, gives results of observations at the gaging stations, and discusses the water supply of the ditches and pipe lines and possibilities of development; gives also meteorological records.

*226. The pollution of streams by sulphite-pulp waste, a study of possible remedies, by E. B. Phelps. 1908. 37 pp., 1 pl. 10c.

Describes manufacture of sulphite pulp, the waste liquors, and the experimental work leading to suggestions as to methods of preventing stream pollution.

228. Water-supply investigations of the Yukon-Tanana region, Alaska, 1907 and 1908 (Fairbanks, Circle, and Rampart districts), by C. C. Covert and C. E. Ellsworth. 1909. 108 pp., 7 pls. 20c.

Describes the drainage basins, gives results of observations at gaging stations, and discusses the water supplies of the ditches and pipe lines and possibilities of hydraulic development.

*229. The disinfection of sewage and sewage filter effluents, with a chapter on the putrescibility and stability of sewage effluents, by E. B. Phelps. 1909. 91 pp., 1 pl. 15c.

Scope indicated by title.

234. Papers on the conservation of water resources. 1909. 96 pp., 2 pls. 15c.

Contains the following papers, whose scope is indicated by their titles: Distribution of rainfall, by Henry Gannett; Floods, by M. O. Leighton; Developed water powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped water powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground waters, by W. C. Mendenhall; Denudation, by R. B. Dole and Herman Stabler; Control of catchment areas, by H. N. Parker.

*235. The purification of some textile and other factory wastes, by Herman Stabler and G. H. Pratt. 1909. 76 pp. 10c.

Discusses waste waters from wool-scouring, bleaching, and dyeing cotton yarn, bleaching cotton piece goods, and manufacture of oleomargarine, fertilizer, and glue.

236. The quality of surface waters in the United States: Part I, Analyses of waters east of the one-hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.

Describes collection of samples, method of examination, preparation of solutions, accuracy of estimates, and expression of analytical results.

238. The public utility of water powers and their governmental regulation, by René Tavernier and M. O. Leighton. 1910. 161 pp. 15c.

Discusses hydraulic power and irrigation, French, Italian, and Swiss legislation relative to the development of water powers, and laws proposed in the French Parliament; reviews work of bureau of hydraulics and agricultural improvement of the French department of agriculture, and gives résumé of Federal and State water-power legislation in the United States.

255. Underground waters for farm use, by M. L. Fuller. 1910. 58 pp., 17 pls. 15c.

Discusses rocks as sources of water supply and the relative safety of supplies from different materials; springs, and their protection; open or dug and deep wells, their location, yield, relative cost, protection, and safety; advantages and disadvantages of cisterns and combination wells and cisterns.

257. Well-drilling methods, by Isaiah Bowman. 1911. 139 pp., 4 pls. 15c.

Discusses amount, distribution, and disposal of rainfall, water-bearing rocks, amount of underground water, artesian conditions, and oil and gas-bearing formations; gives history of well drilling in Asia, Europe, and the United States; describes in detail the various methods and the machinery used; discusses loss of tools and geologic difficulties; contamination of well waters and methods of prevention; tests of capacity and measurement of depth; and costs of sinking wells.

258. Underground water papers, 1910, by M. L. Fuller, F. G. Clapp, G. C. Matson, Samuel Sanford, and H. C. Wolff. 1911. 125 pp., 2 pls. 15c.

Contains the following papers (scope indicated by titles) of general interest:

Drainage by wells, by M. L. Fuller.

Freezing of wells and related phenomena, by M. L. Fuller.

Pollution of underground waters in limestone, by G. C. Matson.

Protection of shallow wells in sandy deposits, by M. L. Fuller.

Magnetic wells, by M. L. Fuller.

259. The underground waters of southwestern Ohio, by M. L. Fuller and F. G. Clapp, with a discussion of the chemical character of the waters, by R. B. Dole. 1912. 228 pp., 9 pls. 35c.

Describes the topography, climate, and geology of the region, the water-bearing formations, the source, mode of occurrence, and head of the waters, and municipal supplies; gives details by counties; discusses in supplement, under chemical character, method of analysis and expression of results, mineral constituents, effect of the constituents on waters for domestic, industrial, or medicinal uses, methods of purification, chemical composition; many analyses and field assays. The matter in the supplement was also published in Water-Supply Paper 254 (The underground waters of north-central Indiana).

274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describes collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water-softening, boiler waters, and water for irrigation; gives results of analyses of waters of the Rio Grande and of Pecos, Gallinas, and Hondo rivers.

280. Gaging stations maintained by the United States Geological Survey, 1888–1910, and Survey publications relating to water resources, compiled by B. D. Wood. 1912. 102 pp. 10c.

314. Surface water supply of Seward Peninsula, Alaska, by F. F. Henshaw and G. L. Parker, with a sketch of the geography and geology by P. S. Smith, and a description of methods of placer mining by A. H. Brooks. 1913. 317 pp., 17 pls. 45c.

Contains results of work at gaging stations.

315. The purification of public water supplies, by G. A. Johnson. 1913. 84 pp., 8 pls. 10c.

Discusses ground, lake, and river waters as public supplies, development of waterworks systems in the United States, water consumption, and typhoid fever; describes methods of filtration and sterilization of water, and municipal water softening.

318. Water resources of Hawaii, 1909–1911, by W. F. Martin and C. H. Pierce. 1913. 552 pp., 15 pls. 50c.

Describes the general features of the islands and gives results of measurements of streams and of observations of rainfall and evaporation; contains a gazetteer.

334. The Ohio Valley flood of March–April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 32 pls. 20c.

Although relating specifically to floods in the Ohio Valley, this report discusses also the causes of floods and the prevention of damage by floods.

336. Water resources of Hawaii, 1912, by C. H. Pierce and G. K. Larrison. 392 pp. 50c.

337. The effects of ice on stream flow, by William Glenn Hoyt, 1913. 76 pp., 7 pls. 15c.

342. Surface water supply of the Yukon-Tanana region, Alaska, by C. E. Ellsworth and R. W. Davenport. 1915. 343 pp., 13 pls.

Presents results of 6 years observations of the water supply of the Yukon-Tanana region, discusses climate and precipitation, and gives station records.

*345. Contributions to the hydrology of the United States, 1914. N. C. Grover, chief hydraulic engineer.

(*e*) A method of determining the daily discharge of rivers of variable slope, by M. R. Hall, W. E. Hall, and C. H. Pierce, pp. 53–65.

(*f*) The discharge of Yukon River at Eagle, Alaska, by E. A. Porter and R. W. Davenport, pp. 67–77, pls. iv–v. 5c.

Describes briefly the location and size of the Yukon basin, the climatic conditions in the basin, and methods of collecting hydrometric data; compares run-off with precipitation, and gives table showing the discharge of some of the large rivers in the United States as compared with the discharge of the Yukon and the Nile.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of waters from rivers, lakes, wells, and springs in various parts of the United States, including the geysers of Yellowstone National Park, hot springs in Montana, brines from Death Valley, water from the Gulf of Mexico, and mine waters from Tennessee, Michigan, Missouri and Oklahoma, Montana, Colorado and Utah, Nevada and Arizona, and California.

371. Equipment for current-meter gaging stations, by G. J. Lyon. 1915. 64 pp., 37 pls.

Describes methods of installing automatic and other gages and of constructing gage wells, shelters and structures for making discharge measurements and artificial controls.

373. Water resources of Hawaii, 1913, by G. K. Larrison. 1915. 190 pp.
Contains results of stream measurements.

375. Contributions to the hydrology of the United States, 1915. N. C. Grover, chief hydraulic engineer.

(c) Relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77–84.
A paper presented at the conference of engineers of the Water Resources Branch in December, 1914.

(e) A method for correcting river discharge for changing stage, by B. E. Jones, pp. 117–130.
A paper presented at the conference of engineers of the Water Resources Branch in December, 1914.

(f) Conditions requiring the use of automatic gages in obtaining stream-flow records, by C. H. Pierce, pp. 131–139.
A paper presented at the conference of engineers of the Water Resources Branch in December, 1914.

400. Contributions to the hydrology of the United States. 1916. N. C. Grover, chief hydraulic engineer.

(a) The people's interest in water-power resources, by G. O. Smith, pp. 1–8.

ANNUAL REPORTS.

*Fifth Annual Report of the United States Geological Survey, 1883–84, J. W. Powell, Director. 1885. xxxvi, 469 pp., 58 pls. $2.25. Contains:

*The requisite and qualifying conditions of artesian wells, by T. C. Chamberlin, pp. 125–173, pl. xxi. Scope indicated by title.

*Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Irrigation in India, by H. M. Wilson, pp. 368–561, pls. cvii to cxlvi. (See Water-Supply Paper 87.)

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. Pt. III, Irrigation, pp. xi, 486, 77 pls. $1.85. Contains:

*American irrigation engineering, by H. M. Wilson, pp. 101–349, pls. cxi to xlv. Discusses the economical aspects of irrigation, alkaline drainage, silt and sedimentation; gives brief history of legislation; describes perennial canals in Idaho-California, Wyoming, and Arizona; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply, pumping, and subirrigation.

Fourteenth Annual Report of the United States Geological Survey, 1892–93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II, Accompanying papers, pp. xx, 597, 73 pls. $2.10. Contains:

*Potable waters of the eastern United States, by W J McGee, pp. 1–47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

*Natural mineral waters of the United States, by A. C. Peale, pp. 49–88, pls. iii and iv. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analysis of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Parts II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. II, papers chiefly of a theoretical nature, pp. v, 958, 172 pls. $2.65. Contains:

*Principles and conditions of the movements of ground water, by F. H. King, pp. 59–294, pls. vi to xvii. Discusses the amount of water stored in sandstone, in soil, and in other rocks, the depth to which ground water penetrates; gravitational, thermal, and capillary movements of ground waters, and the configuration of the ground-water surface; gives the results of experimental investigations on the flow of air and water through a rigid, porous medium, and through sands, sandstones, and silts; discusses results obtained by other investigators, and summarizes results of observations; discusses also rate of flow of water through sand and rock, the growth of rivers, rate of filtration through soil, interference of wells, etc.

*Theoretical investigation of the motion of ground waters, by C. S. Slichter, pp. 295–384, pl. xvii. Scope indicated by title.

Twentieth Annual Report of the United States Geological Survey, 1898–99, Charles D. Walcott, Director. 1899. (Parts II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. IV, Hydrography, pp. vii, 660, 75 pls. $1.40. Contains:

*Hydrography of Nicaragua, by A. P. Davis, pp. 563–637, pls. lxiv to lxxv. Describes the topographic features of the boundary, the lake basin, and Rio San Juan; gives a brief résumé of the boundary dispute; discusses rainfall, temperature, and relative humidity, evaporation, resources, and productions, the ship, railway, and canal projects; gives the history of the investigations by the Canal Commission, and results of measurements on the Rio Grande, on streams tributary to Lake Nicaragua, and on Rio San Juan and its tributaries.

Twenty-second Annual Report of the United States Geological Survey, 1900–1901, Charles D. Walcott, Director. 1901. (Parts III and IV, 1902.) 4 parts. Pt. IV, Hydrography, 690 pp., 65 pls. $2.20. Contains:

*Hydrography of the American Isthmus, by A. P. Davis, pp. 507–630, pls. xxxvii to l. Describes the physiography, temperature, rainfall, and winds of Central America; discusses the hydrography of the Nicaragua Canal route and the Panama Canal route; gives estimated monthly discharges of many of the streams, rainfall, and evaporation tables at various points.

PROFESSIONAL PAPERS.

72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate and population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee River basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chattahoochee, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

86. The transportation of débris by running water, by G. K. Gilbert, based on experiments made with the assistance of E. C. Murphy. 1904. 265 pp., 3 pls. 70c.

The results of an investigation which was carried on in a specially equipped laboratory at Berkeley, Cal., and was undertaken for the purpose of learning "the laws which control the movement of bed load and especially to determine how the quantity of load is related to the stream slope and discharge and to the degree of comminution of the débris."

A highly technical report.

BULLETINS.

*32. Lists and analyses of the mineral springs of the United States (a preliminary study), by A. C. Peale. 1886. 235 pp.

Defines mineral waters, lists the springs by States, and gives tables of analyses so far as available.

264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Bulletins 264 and 298 discuss the importance of accurate well records to the driller, to owners of oil, gas, and water wells, and to the geologist; describes the general methods of work; gives tabulated records of wells by States, and detailed records selected as affording valuable stratigraphic information.

*319. Summary of the controlling conditions of artesian flows, by Myron L. Fuller, 1908. 10c.

Describes underground reservoirs, the sources of underground waters, the confining agents, the primary and modifying factors of artesian circulation, the essential and modifying factors of artesian flow, and typical artesian systems.

*479. The geochemical interpretation of water analyses, by Chase Palmer. 1911. 31 pp. 5c.

Discusses the expression of chemical analyses, the chemical character of water, and the properties of natural waters; gives a classification of waters based on property values and reacting values, and discusses the character of the waters of certain rivers as interpreted directly from the results of analyses; discusses also the relation of water properties to geologic formations, silica in river water, and the character of the water of the Mississippi and the Great Lakes and St. Lawrence River as indicated by chemical analyses.

INDEX BY AREAS AND SUBJECTS.

[A=Annual Reports; M=Monograph; B=Bulletin; P=Professional Paper; W=Water-Supply Paper G F=Geologic folio.]

[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications, as noted in abstracts.

INDEX OF STREAMS.

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