DEPARTMENT OF THE INTERIOR
Hubert Work, Secretary

U. S. GEOLOGICAL SURVEY
George Otis Smith, Director

WATER-SUPPLY PAPER 563

SURFACE WATER SUPPLY OF THE UNITED STATES

1923

PART III. OHIO RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
A. H. HORTON, LASLEY LEE, H. E. GROSBACH, W. R. KING, and W. E. HALL, District Engineers

Prepared in cooperation with
THE STATES OF WEST VIRGINIA, OHIO, ILLINOIS, KENTUCKY TENNESSEE, AND NORTH CAROLINA

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CONTENTS

ILLUSTRATIONS

SURFACE WATER SUPPLY OF OHIO RIVER BASIN 1923

AUTHORIZATION AND SCOPE OF WORK

This volume is one of a series of 14 reports presenting records of measurements of flow made on streams in the United States during the year ending September 30, 1923.

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, 1895–1924

1895	$12, 500. 00
1896	20, 000. 00
1897 to 1900, inclusive	50, 000. 00
1901 to 1902, inclusive	100, 000. 00
1903 to 1906, inclusive	200, 000. 00
1907	150, 000. 00
1908 to 1910, inclusive	100, 000. 00
1911 to 1917, inclusive	150, 000. 00
1918	175, 000. 00
1919	148, 244. 10
1920	175, 000. 00
1921 to 1923, inclusive	180, 000. 00
1924	170, 000. 00

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 5.

Measurements of stream flow have been made at about 5,600 points in the United States and also at many points in Alaska and

the Hawaiian Islands. In July, 1923, 1,590 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time.

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 a rate of flow, as second-feet, gallons per minute, miners' inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in 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.

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

"Run-off in inches" is the depth to which 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 inches.

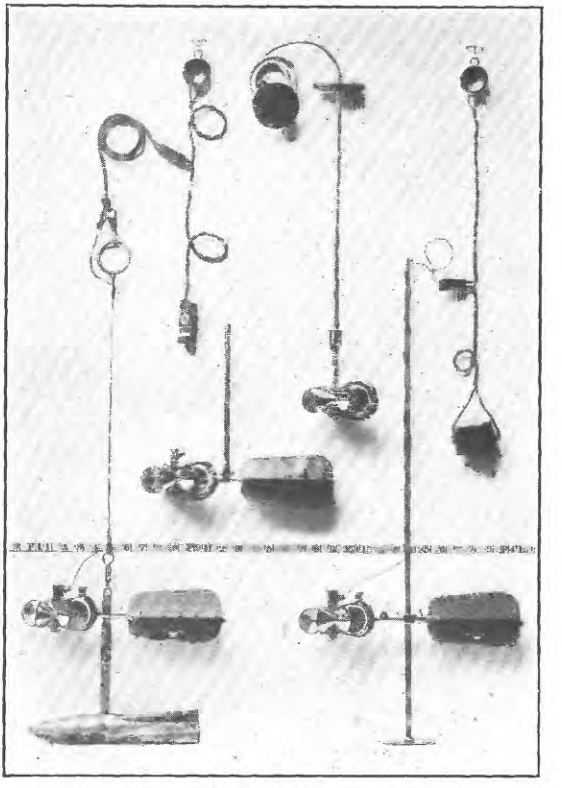
An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

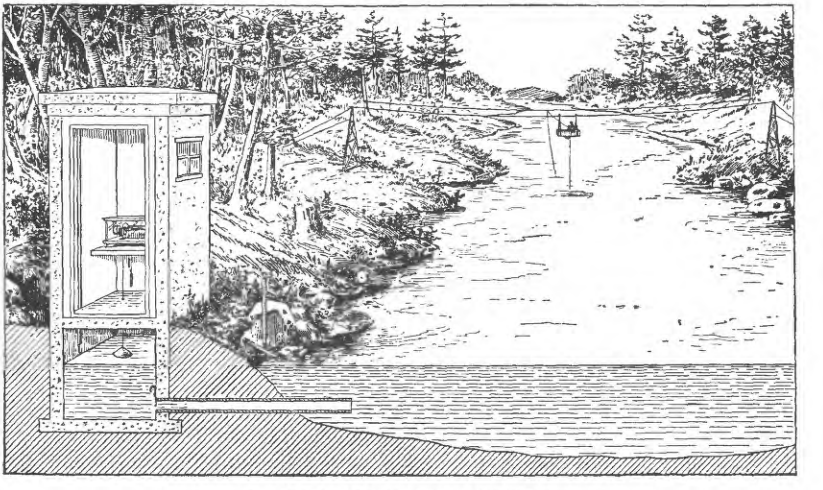
"Stage-discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," a term used to designate the section or sections of the stream channel below the gage which determines the stage-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 gaging station is that point on the gage—the gage height—at which water ceases to flow over the control.

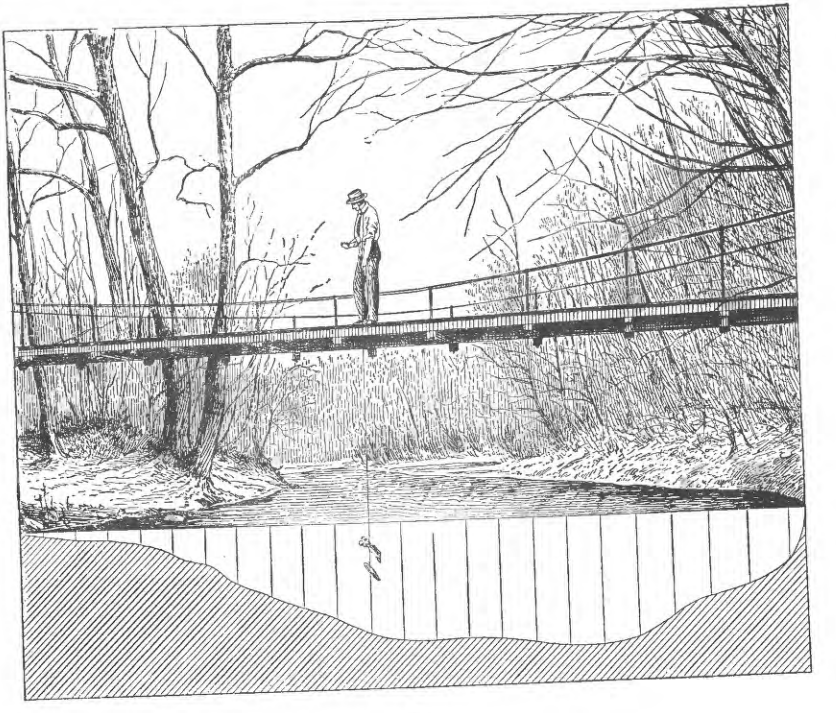


A. PRICE CURRENT METERS



B. TYPICAL GAGING STATION

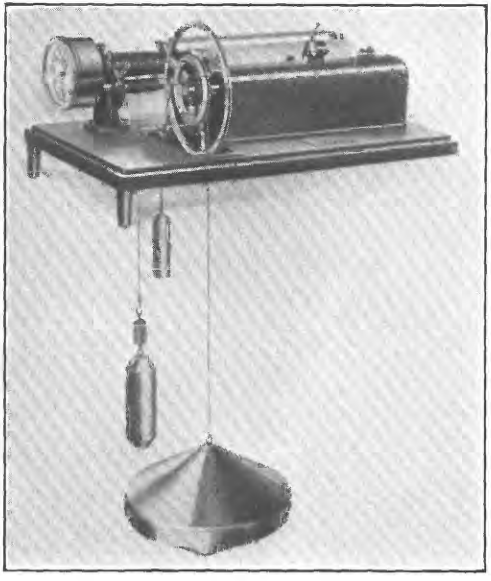
A



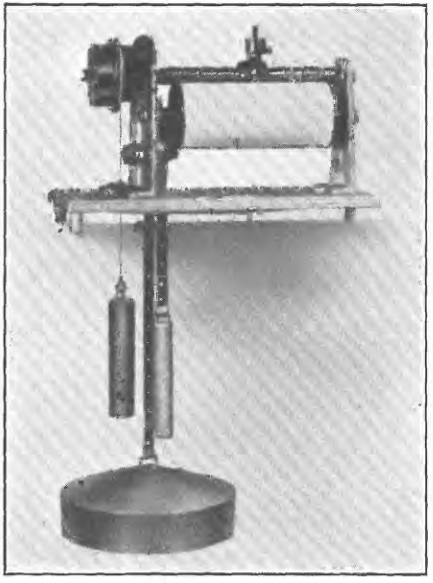
B

TYPICAL GAGING STATIONS

A, For wading measurement; *B*, for bridge measurement



A



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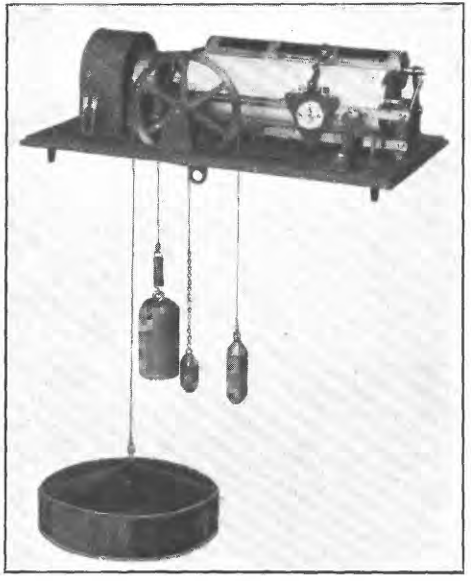

C

WATER-STAGE RECORDERS

A, Au; *B*, Gurley; *C*, Stevens

EXPLANATION OF DATA

The data presented in this report cover the year beginning October 1, 1922, and ending September 30, 1923. At the beginning 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 ice, 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 the year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff or chain gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter by the general methods outlined in standard textbooks on the measurement of river discharge. (See Pls. I–III.)

From the discharge measurements rating tables are prepared that give the discharge for any stage. The application of the daily gage heights to these rating tables gives the discharge from which the monthly and yearly mean discharge is determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving records of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage height and records of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanence of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of backwater. It gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders, the mean daily discharge may be obtained by averaging discharge at reg-

49245—26†—WSP 563——2

ular intervals during the day or by use of the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow 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 headed "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 per second during the month. On this average flow are based computations recorded in the remaining columns, which are defined on page 2.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS

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

A paragraph in the description of the station gives information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage height to the rating table to obtain the daily discharge.

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," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth in inches may be subject to gross errors caused by the inclusion of large noncontributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "Run-off in inches" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off in inches" published by the Survey in earlier reports should be used with caution because of possible inherent sources of error not known to the Survey.

Many gaging stations on streams in the irrigated areas of the United States are situated above most of the diversions from those streams,

and the discharge recorded does not show the water supply available for further development, as prior appropriations below the stations must be first satisfied. To give an idea of the amount of prior appropriations, a paragraph on diversions is presented in each station description. The figures given can not be considered exact but represent the best information available.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than 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 previously published.

COOPERATION

The State of New York cooperated in maintaining the station on Allegheny River at Red House, N. Y.

The work in West Virginia was done in cooperation with the State Geological Survey, I. C. White, State geologist. The United States Engineer Corps also cooperated in maintaining six stations in the Monongahela River basin. The West Penn Power Co. cooperated in maintaining six stations in the Cheat River basin.

Work in Ohio was carried on in cooperation with the Ohio Cooperative Topographic Survey, C. E. Sherman, inspector. The stations on Little Beaver and Yellow creeks were maintained in cooperation with the United States Engineer Corps.

Work in Illinois was carried on in cooperation with the Illinois Department of Public Works, division of waterways, W. L. Sackett, superintendent.

Work in Kentucky in the Cumberland River basin was done in cooperation with the Kentucky Geological Survey, W. R. Jillson, State geologist, and the Nashville office of the United States Engineer Corps, Lieut. Col. J. R. Slattery, district engineer.

Work in Tennessee was done in cooperation with the Tennessee Geological Survey, Wilbur A. Nelson, State geologist; the Chattanooga office of the United States Engineer Corps, Maj. Harold C. Fiske, district engineer; and the Nashville office of the United States Engineer Corps, Lieut. Col. J. R. Slattery, district engineer.

Work in North Carolina was done in cooperation with the North Carolina Geological and Economic Survey, Joseph Hyde Pratt, director, and the Chattanooga office of the United States Engineer Corps, Maj. Harold C. Fiske, district engineer.

Work in the Tennessee River basin in Virginia and Alabama was done in cooperation with the Chattanooga office of the United States Engineer Corps. The Alabama Geological Survey, Eugene Allen Smith, State geologist, paid the observer's salary for Elk River near Elkmont, Ala.

Financial assistance was also rendered by the Tennessee Electric Power Co. (seven stations on Caney Fork and Ocoee and Hiwassee rivers), Embree Iron Co., Watauga Power Co., Hugh L. Cooper & Co., and Aluminum Co. of America.

DIVISION OF WORK

Data for Allegheny River at Red House, N. Y., were collected and prepared for publication under the direction of A. W. Harrington, district engineer, assisted by E. B. Shupe, B. F. Howe, J. L. Lamson, A. E. Johnson, and Miss Agnes D. Buchanan.

Data for stations in West Virginia, and New River at Eggleston, Va., were collected and prepared for publication under the direction of A. H. Horton, district engineer, assisted by J. J. Dirzulaitis, D. S. Wallace, and W. C. Wiggins.

Data for stations in Ohio were collected and prepared for publication under the direction of Lasley Lee, district engineer, assisted by E. E. R. Dornbach, V. B. Lamoureux, F. R. Morgan, W. W. Perrin, W. A. Werner, F. A. English, and L. L. Dickson.

Data for stations in Illinois were collected and prepared for publication under the direction of H. E. Grosbach, district engineer, assisted by A. M. Wahl.

Data for stations in Kentucky, Tennessee, Alabama, Virginia (except New River at Eggleston), and Georgia were collected and prepared for publication under the direction of W. R. King, district engineer, assisted by Warren Withee, P. E. Hanson, P. P. Livingston, J. P. Clawson, L. J. Hall, and Duncan Charlton.

Data for stations in North Carolina, prior to July 1, 1923, were collected under the direction of Warren E. Hall, district engineer, Asheville, N. C., assisted by L. J. Hall. After that date the records were collected under the nominal direction of W. R. King, district engineer, Chattanooga, Tenn. All records for the year were prepared for publication under direction of Warren E. Hall, assisted by J. H. Morgan, L. J. Hall, and Mrs. Effie T. Workman.

The records were reviewed and manuscript assembled by B. J. Peterson.

GAGING-STATION RECORDS

ALLEGHENY RIVER BASIN

ALLEGHENY RIVER AT RED HOUSE, N. Y.

LOCATION.—At highway bridge in Red House, Cattaraugus County, 5 miles below Salamanca and 13 miles above boundary between New York and Pennsylvania.

DRAINAGE AREA.—1,640 square miles.

RECORDS AVAILABLE.—September 4, 1903, to September 30, 1923.

GAGE.—Gurley seven-day graph water-stage recorder on left bank just below highway bridge; installed September 3, 1917. Prior to this date, chain gage attached to upstream side of bridge near left end. Recorder inspected by W. E. Coe.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Coarse gravel; occasionally shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 10.32 feet at midnight March 5 (discharge, 22,900 second-feet); minimum stage from water-stage recorder, 2.80 feet from 4 to 6 a. m. August 28 (discharge, 102 second-feet).

1903–1923: Maximum stage recorded, 13.6 feet at 10 a. m. March 2, 1910 (discharge, 41,000 second-feet); minimum stage, 2.7 feet several days in December, 1908 (discharge, about 100 second-feet).

ICE.—Stage-discharge relation usually affected by ice.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice from December to March. Previous rating was revised below 450 second-feet to agree more closely with current discharge measurements, and new rating used throughout the year. Rating curve well defined between 100 and 10,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph, or for days of considerable fluctuation by averaging discharge for intervals of day. Records good, except during periods of ice effect for which they are fair.

Discharge measurements of Allegheny River at Red House, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 9	A. W. Harrington	3.32	497	Mar. 30	E. B. Shupe	5.10	3,400
Jan. 9	B. F. Howe	[a] 4.26	1,560	Aug. 17	A. W. Harrington	2.91	174
Feb. 2	do	4.49	2,070				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Allegheny River at Red House, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		375	865	4,000	1,560	1,600	2,300	1,610	1,500	409	541	119
2		367	1,890	5,000	2,170	1,700	2,120	1,520	1,360	367	448	125
3		367	1,500	4,200	4,700	5,800	2,210	1,300	1,230	352	514	125
4		367	1,160	3,200	5,780	14,900	3,500	1,210	1,180	524	550	125
5		359	1,080	2,800	4,580	22,200	9,480	1,120	1,150	600		154
6		359	1,160	2,400	3,380	18,700	12,000	919	1,140	469		173
7	350	367	1,040	1,800	2,700	13,200	10,200	856	1,280	426	320	218
8		384	1,160	1,600	2,580	9,520	8,500	958	1,700	375		290
9		452	1,720	1,600	2,410	6,940	7,090	1,340	1,520	336		344
10		505	1,560	1,400	2,000	5,500	5,360	2,010	1,260	344		352
11		478	1,040	1,300	1,700	6,500	4,320	2,280	1,040	344	186	
12		443	958	1,200	1,600	9,250	3,720	3,340	919	367	166	
13		384	850	1,000	1,600	14,900	3,270	6,350	808	352	160	
14	478	359	850	1,000	2,000	9,520	2,880	6,640	749	344	173	
15	426	392	850	1,100	1,800	8,340	2,560	6,640	705	328	206	
16		514	850	1,100	1,600	9,910	2,370	7,240	661	297	192	220
17		541		1,200	1,600	13,200	2,210	6,350	620	283	173	
18		532		1,800	1,500	10,600	2,000	5,230	570	275	166	
19	360	496		2,000	1,500	9,520	1,890	4,580	523	261	154	
20		460	750	3,000	1,500	7,550	1,750	3,960	487	247	148	
21		443		3,600	1,300	6,350	1,610	5,020	452	225	148	
22	320	434		5,920	1,200	5,920	1,540	6,060	434	212	131	
23	328	426	700	5,360	1,100	8,490	1,650	5,920	418	206	125	261
24	434	443	650	4,320	1,000	10,200	1,780	5,230	400	206	119	268
25	550	460	650	3,270	950	8,340	1,730	4,080	375	199	114	218
26	550	469	650	3,030	950	7,400	1,560	3,380	384	192	119	192
27	496	460	750	2,560	1,000	6,060	1,320	2,840	418	192	114	166
28	452	452	2,000	2,080	1,200	4,580	1,260	2,430	434	199	114	212
29	443	434	3,000	1,890	-------	3,490	1,280	2,120	409	192	119	320
30	418	452	2,800	1,860	-------	3,270	1,350	1,850	426	212	125	297
31	392	----	2,200	1,580	-------	2,860	-------	1,650	-------	472	125	-------

NOTE.—Discharge, Oct. 1–13, estimated from comparison with record of Cattaraugus Creek at Versailles Discharge for the following periods estimated because gage did not operate properly: Oct. 14, 16–21, Dec 17–23, Apr. 22, May 13, Aug. 5–11, Sept. 11–22. Discharge, Dec. 13 to Jan. 21 and Feb. 10 to Mar. 3, de termined from gage heights corrected for ice effect by means of two discharge measurements and study o gage-height graph and weather records.

Monthly discharge of Allegheny River at Red House, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 1,640 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	550	320	387	0.236	0.27
November	541	359	432	.263	.29
December	3,000	650	1,180	.720	.83
January	5,920	1,000	2,520	1.54	1.78
February	5,780	950	2,030	1.24	1.29
March	22,200	1,600	8,590	5.24	6.04
April	12,000	1,260	3,490	2.13	2.38
May	7,240	856	3,420	2.09	2.41
June	1,700	375	818	.499	.56
July	600	192	316	.193	.22
August	550	114	226	.138	.16
September	352	119	220	.134	.15
The year	22,200	114	1,980	1.21	16.38

MONONGAHELA RIVER BASIN

TYGART RIVER NEAR DAILEY, W. VA.

LOCATION.—At Burnt Bridge, on Staunton-Parkersburg pike, 1 mile northeast of Dailey, Randolph County, and 2 miles south of Beverly on Western Maryland Railway. Stalnaker Run enters river on right 1,000 feet below station.

DRAINAGE AREA.—194 square miles.

RECORDS AVAILABLE.—April 20, 1915, to September 30, 1923.

GAGE.—Vertical staff on face of right abutment of bridge near downstream end; read by Mrs. M. B. Chenoweth.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Flow of Stalnaker Run is included.

CHANNEL AND CONTROL.—One channel at all stages, straight for 100 feet above and 1,300 feet below bridge. Right bank high; left bank low; large overflow through meadows at high stages. Stream bed is rocky, but banks are sandy. Control probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.7 feet at 8 a. m. on February 2 (discharge, 6,150 second-feet); minimum stage, 0.58 foot October 6–8 (discharge, 4.2 second-feet).

1915–1923: Maximum stage recorded, 15.9 feet at 5 p. m. March 13, 1918 (discharge, 9,150 second-feet); minimum stage, 0.58 foot October 6–8, 1922 (discharge, 4.2 second-feet).

ICE.—Stage-discharge relation affected by ice at times.

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined between 10 and 4,800 second-feet; extended beyond these limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods affected by ice. Records good.

The following discharge measurement was made by Dirzulaitis and Wallace:
April 2, 1923: Gage height, 1.70 feet; discharge, 123 second-feet.

Daily discharge, in second-feet, of Tygart River near Dailey, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5.6	7.2	10	515	3,950	595	124	144	47	144	1,560	18
2	5.2	6.5	10	811	5,140	475	120	118	43	105	723	15
3	4.9	5.6	20	475	1,970	437	96	105	36	81	679	13
4	4.9	4.6	24	367	1,240	456	109	100	31	68	998	16
5	4.6	4.6	767	244	857	437	166	96	29	56	1,050	89
6	4.2	5.2	475	216	437	679	595	89	35	47	950	74
7	4.2	6.2	230	190	351	2,230	351	81	68	55	456	47
8	4.2	5.9	1,400	244	274	1,140	335	74	107	81	289	419
9	4.9	5.9	637	335	230	767	259	124	91	55	244	259
10	6.5	5.9	515	401	216	595	203	178	52	41	216	144
11	10	5.9	289	437	203	998	155	335	320	34	1,790	81
12	17	5.9	244	335	166	950	134	437	1,190	71	1,290	61
13	18	5.9	259	230	2,620	903	178	456	3,180	74	1,850	52
14	15	5.9	216	190	1,400	767	903	515	2,490	47	595	36
15	11	5.9	320	1,140	723	437	811	437	811	36	289	32
16	10	11	259	723		515	595	419	595	33	216	26
17	9.7	24	1,340	440		903	456	384	320	25	155	22
18	7.8	24	1,340	440		767	304	320	216	21	134	20
19	7.2	29	1,090	244		515	230	259	166	16	101	26
20	6.5	52	401	335		419	190	203	134	13	84	24
21	6.5	33	230	723	150	351	166	190	103	12	63	351
22	6.5	25	178	1,340		304	134	155	79	30	50	384
23	6.5	20	144	767		679	120	134	65	47	47	166
24	11	16	124	595		2,100	103	122	63	36	43	105
25	9.6	12	116	595		767	91	105	1,620	1,620	36	77
26	18	12	92	367		555	87	94	401	259	34	57
27	13	12	77	767	351	384	74	85	456	114	27	45
28	11	12	81	2,970	857	274	81	81	259	857	26	36
29	10	13	107	2,360	-------	203	216	70	289	1,090	24	34
30	9.7	12	105	1,090	-------	178	190	60	216	637	22	26
31	7.8	-------	100	1,050	-------	144	-------	52	-------	2,560	19	-------

NOTE.—Stage-discharge relation affected by ice Jan. 17, 18, and Feb. 16-26, discharge estimated by study of weather records and observer's notes.

Monthly discharge of Tygart River near Dailey, W. Va., for the year ending Sept. 30, 1923

[Drainage area, 194 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	18	4.2	8.74	0.045	0.05
November	52	4.6	13.1	.068	.08
December	1,400	10	361	1.86	2.14
January	2,970	190	675	3.48	4.01
February	5,140	----------	808	4.16	4.33
March	2,230	144	675	3.48	4.01
April	903	74	253	1.30	1.45
May	515	52	194	1.00	1.15
June	3,180	29	450	2.32	2.59
July	2,560	12	270	1.39	1.60
August	1,850	19	454	2.34	2.70
September	419	13	91.8	.473	.53
The year	5,140	4.2	352	1.81	24.64

TYGART RIVER AT BELINGTON, W. VA.

LOCATION.—At highway bridge at Belington, Barbour County, a quarter of a mile above mouth of Mill Creek.

DRAINAGE AREA.—390 square miles.

RECORDS AVAILABLE.—June 5, 1907, to September 30, 1923.

GAGE.—Chain gage attached to upstream side of bridge; read by M. C. Johnson. Sea-level elevation of zero of gage, 1,679.89 feet.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or by wading.

CHANNEL AND CONTROL.—Channel straight above and below bridge. Bed composed of firm, coarse gravel. Banks high. Control slightly shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.9 feet at 7.15 a. m. and 3.30 p. m. February 2 (discharge, 8,920 second-feet); minimum stage, 1.97 feet at 3.30 p. m. October 22 and 7.15 a. m. October 23 (discharge, 16 second-feet).

1907–1923: Maximum stage recorded, 21.48 feet March 13, 1917 (discharge, 20,100 second-feet); minimum stage, 1.70 feet October 2, 1914 (discharge, 3 second-feet).

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation probably permanent during year, except as affected by ice. Rating curve well defined between 20 and 7,000 second-feet, extended beyond these limits. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good, except for extreme low water, which are fair.

The following discharge measurement was made by Dirzulaitis and Wallace: March 31, 1923: Gage height, 3.60 feet; discharge, 395 second-feet.

Daily discharge, in second-feet, of Tygart River at Belington, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	17	28	38	1,370	4,310	1,700	321	452	121	570	3,520	47
2	17	24	33	2,620	8,920	1,130	282	385	132	385	1,370	47
3	17	24	38	1,190	5,840	959	246	321	110	282	797	42
4	17	24	44	797	3,140	959	246	282	90	213	1,020	36
5	17	24	407	595	1,700	850	282	264	90	183	1,250	42
6	17	24	1,440	452	1,070	850	498	246	90	183	1,190	73
7	17	24	522	430	850	2,870	797	230	121	246	850	121
8	24	24	694	694	620	2,870	694	213	183	230	546	100
9	24	24	1,780	745	522	1,560	570	407	213	170	546	282
10	24	24	959	1,310	522	1,250	475	595	170	144	430	342
11	24	24	595	1,020	570	2,230	385	694	170	110	1,020	198
12	17	24	498	850	498	2,070	342	959	2,870	110	1,070	132
13	17	24	595	694	4,840	2,150	385	1,040	2,960	170	1,780	100
14	17	24	522	546	4,730	1,500	2,870	1,130	6,180	156	1,370	82
15	29	28	745	1,310	1,850	1,070	2,790	904	2,000	110	694	59
16	34	44	1,440	1,780		904	1,700	904	1,370	90	430	59
17	34	44	2,540	1,020		1,850	1,130	1,020	904	90	350	47
18	29	44	4,620	694		1,700	797	797	595	90	264	47
19	24	55	1,630	797		1,310	620	694	407	66	230	59
20	24	69	850	1,020		959	522	522	302	59	170	59
21	24	69	570	1,310	380	797	430	452	264	47	144	246
22	20	76	452	2,620		644	385	407	198	53	156	904
23	20	62	321	2,070		797	342	342	170	183	156	430
24	24	55	282	1,630		3,910	282	363	198	170	110	264
25	24	44	230	1,850		2,460	246	342	620	110	100	170
26	24	38	204	1,250	282	1,370	230	302	1,130	797	73	132
27	24	33	189	1,310	595	959	213	264	1,070	321	73	110
28	28	38	161	4,010	2,380	694	183	230	797	213	59	90
29	33	28	213	6,060	-------	498	363	213	1,370	2,380	66	73
30	33	28	189	2,300	-------	430	570	170	1,020	904	59	59
31	33	-------	204	1,310	-------	385	-------	156	-------	2,070	47	-------

NOTE.—Stage-discharge relation affected by ice Feb. 16–25; mean discharge estimated by study of weather records and observer's notes. Gage not read May 13 and Aug. 17; discharge interpolated.

Monthly discharge of Tygart River at Belington, W. Va., for the year ending Sept. 30, 1923

[Drainage area, 390 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	34	17	23.5	0.060	0.07
November	76	24	36.5	.094	.10
December	4,620	33	742	1.90	2.19
January	6,060	430	1,470	3.77	4.35
February	8,920		1,680	4.31	4.49
March	3,910	385	1,410	3.62	4.17
April	2,870	183	640	1.64	1.83
May		156	494	1.27	1.46
June	6,180	90	864	2.22	2.48
July	2,380	47	352	.903	1.04
August	3,520	47	643	1.65	1.90
September	904	36	148	.379	.42
The year	8,920	17	704	1.81	24.50

TYGART RIVER AT FETTERMAN, W. VA.

LOCATION.—At highway bridge at Fetterman, Taylor County, three-fourths mile above Otter Creek.

DRAINAGE AREA.—1,340 square miles.

RECORDS AVAILABLE.—June 3, 1907, to September 30, 1923.

GAGE.—Chain gage attached to downstream side of highway bridge; read by Joseph Weaver. Sea-level elevation of zero of gage, 957.86 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Channel straight above and below bridge. Banks high. Control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.0 feet at 7 a. m. February 2 (discharge, 27,100 second-feet); minimum stage, 3.05 feet October 2–7 (discharge, 45 second-feet).

1907–1923: Maximum stage recorded, 29.1 feet July 25, 1912 (discharge, about 57,600 second-feet); minimum stage, 2.30 feet October 27, 28, and November 4–10, 1912 (discharge, 12 second-feet).

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice. Rating curve well defined between 80 and 24,000 second-feet; extended beyond these limits. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods of ice effect. Records good.

The following discharge measurement was made by Dirzulaitis and Wallace: March 30, 1923: Gage height, 4.86 feet; discharge, 1,480 second-feet.

Daily discharge, in second-feet, of Tygart River at Fetterman, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	50	105	120	7,000	9,500	6,450	1,030	1,500	422	3,110	4,860	173
2	50	114	120	10,500	26,100	4,340	895	1,330	350	2,000	3,810	173
3	48	120	120	5,210	18,900	3,460	772	1,100	288	1,330	2,430	173
4	45	120	138	3,460	9,700	3,110	772	895	250	895	1,750	134
5	45	105	665	2,600	5,910	2,770	1,180	830	235	645	2,180	134
6	45	105	3,640	2,000	3,810	3,110	2,770	750	225	570	3,110	438
7	48	105	2,600	1,750	2,770	5,910	2,430	588	278	1,500	2,430	364
8	50	105	2,430	2,260	2,260	8,140	2,430	501	338	1,180	2,260	331
9	50	105	4,860	3,810	1,840	5,210	2,000	960	485	960	2,090	517
10	65	105	3,460	6,090	1,180	4,160	1,580	1,580	685	715	1,750	438
11	65	105	2,430	4,160	1,920	6,630	1,330	2,180	570	570	1,410	552
12	70	105	2,090	3,110	2,430	6,630	1,180	3,110	1,180	525	4,340	400
13	78	105	1,920	2,430	17,500	6,450	1,750	5,210	4,160	715	3,280	283
14	65	105	1,920	2,260	15,100	5,210	9,700	4,340	10,300	525	5,740	230
15	58	138	2,180	4,160	6,630	3,640	12,000	3,110	7,000	485	2,600	173
16	58	210	4,680	5,740	3,460	3,110	6,820	3,110	4,340	408	1,580	152
17	58	240	10,500	3,980	2,600	3,640	4,160	3,110	2,940	370	1,100	134
18	62	191	13,300	2,770	2,000	4,510	3,110	2,770	2,000	324	1,110	102
19	65	200	7,000	2,600		3,810	2,430	2,260	1,330	261	761	117
20	78	250	3,280	2,600		3,110	1,920	1,920	960	220	606	331
21	90	261	2,180	3,640		2,430	1,500	1,580	715	196	477	2,770
22	90	305	1,660	10,100		2,260	1,330	1,410	552	173	818	1,920
23	105	370	1,330	8,520	960	3,110	1,100	1,180	485	173	675	1,660
24	155	318	1,030	6,270		8,140	895	1,030	570	173	477	895
25	127	240	772	8,710		8,140	830	895	4,860	477	364	561
26	155	200	665	6,090		4,510	715	895	4,860	2,000	300	400
27	120	155	615	5,210		3,110	665	772	3,810	1,180	245	331
28	114	148	960	10,700	6,090	2,430	796	645	3,640	655	220	272
29	105	138	1,580	15,300	-------	1,920	2,260	570	11,800	2,260	272	220
30	105	138	1,410	8,900	-------	1,580	1,750	485	6,090	2,600	331	173
31	105	-------	1,840	4,860	-------	1,250	-------	485	-------	1,840	245	-------

NOTE.—Stage-discharge relation affected by ice Feb. 19–27; mean discharge estimated by study of weather records. Gage-height increased 0.50 foot May 20 as afternoon reading appeared to be 1 foot in error.

Monthly discharge of Tygart River at Fetterman, W. Va., for the year ending Sept. 30, 1923

[Drainage area, 1,340 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	155	45	78.2	0.0584	0.07
November	370	105	167	.125	.14
December	13,300	120	2,630	1.96	2.26
January	15,300	1,750	5,380	4.01	4.62
February	26,100	-------	5,300	3.96	4.12
March	8,140	1,250	4,270	3.19	3.68
April	12,000	665	2,400	1.79	2.00
May	5,210	485	1,650	1.23	1.42
June	11,800	225	2,520	1.88	2.10
July	3,110	173	937	.699	.81
August	5,740	220	1,730	1.29	1.49
September	2,770	102	485	.362	.40
The year	26,100	45	2,280	1.70	23.11

MONONGAHELA RIVER AT LOCK 15, HOULT, W. VA.

LOCATION.—At Lock 15, at Hoult, 2½ miles below county highway bridge at Fairmont, Marion County, and 4 miles below mouth of West Fork. Buffalo Creek enters on left three-fourths mile above station.

DRAINAGE AREA.—2,430 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1923. Upper and lower gages at Lock 15 have been read under direction of United States Engineer Corps since May 1, 1904.

GAGE.—Upper vertical staff gage at lock. Lower section is set in recess in left lock wall just above upper gate; upper section, 61.5 feet from face of right lock wall, directly opposite lower section, was used until January 29, 1918, when it was carried away by ice; slope gage installed on revetment wall opposite end of dam during May, 1923. Read by Charles R. Hall, lockmaster.

DISCHARGE MEASUREMENTS.—Made from bridge at Fairmont or by wading on crest of dam at lock. Flow of Buffalo Creek is added to discharge measured at bridge.

CHANNEL AND CONTROL.—One channel at all stages; straight for half a mile above and below bridge. Control for station is crest of dam, permanent. Point of zero flow, gage height 7.00 feet, elevation of crest of dam. Leakage through lock and occasional opening of valves of lock may reduce gage height below crest of dam.

EXTREMES OF STAGE.—Maximum stage recorded during year, 15.3 feet at 4 a. m on February 2; minimum stage, 6.00 feet at 8 a. m. on October 20, due to opening valves.

1915–1923: Maximum stage recorded, 21.2 feet at 8 a. m. January 2, 1919 (discharge, 92,200 second-feet); minimum stage, 6.00 feet at 8 a. m. on October 20, 1923, due to opening valves; minimum stage under normal conditions, 7.00 feet September 2, 1917. Flood of 1888, before dam No. 15 was built, reached a stage represented by gage height of about 26 feet.

ICE.—Stage-discharge relation affected by ice when ice in pool above dam forms close to crest of dam.

DIVERSIONS.—Leakage through lock and water used for lockages.

REGULATION.—None under normal conditions. Pool No. 15 may be lowered at times in the interest of navigation.

ACCURACY.—Stage-discharge relation permanent except for effect of operations at lock and change in leakage through lock, the change depending on which gates are open. Gage read to hundredths twice daily. Gage-height records good. Records of daily discharge are withheld pending a revision of the rating for low stages. See "Accuracy" paragraph on page 45, Water-Supply Paper 523.

The following discharge measurement was made by Dirzulaitis and Wallace:

March 29, 1923: Gage height, 8.68 feet; discharge, 2,780 second-feet.

Daily gage height, in feet, of Monongahela River at Lock 15, Hoult, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.06	7.10	7.12	11.20	11.40	10.74	8.20	8.77	7.62	9.34	9.59	7.40
2	7.06	7.10	7.10	12.30	15.20	9.96	8.02	8.44	7.52	8.54	9.49	7.36
3	7.04	7.08	7.10	10.50	13.70	9.47	7.91	8.18	7.39	8.24	8.84	7.34
4	7.02	7.08	7.16	9.46	11.52	9.16	7.92	8.04	7.41	8.10	8.39	7.30
5	7.01	7.08	8.10	9.07	10.42	9.00	7.98	7.96	7.42	7.95	8.28	7.39
6	7.01	7.11	9.70	8.76	9.60	9.28	8.97	7.91	7.42	7.82	8.99	7.64
7	7.01	7.10	9.23	8.62	9.15	10.84	9.14	7.87	7.35	8.22	8.88	7.80
8	7.06	7.11	8.84	8.83	8.86	11.36	8.97	7.82	7.46	8.66	8.54	8.05
9	7.16	7.08	10.65	9.95	8.70	10.30	8.73	8.10	7.54	8.16	8.86	8.22
10	7.30	7.08	10.03	11.15	8.66	9.80	8.63	8.72	7.70	7.98	8.49	7.94
11	7.54	7.06	9.00	10.30	8.74	10.90	8.30	8.98	7.74	7.82	8.34	7.84
12	7.31	7.08	8.75	9.60	8.90	10.75	8.19	9.77	7.62	7.81	9.50	7.78
13	7.21	7.08	9.06	9.16	13.80	10.87	7.98	10.64	9.22	8.26	9.74	7.64
14	7.16	7.08	8.70	8.85	13.40	10.32	12.80	10.34	10.46	8.20	10.54	7.51
15	7.17	7.14	8.66	10.25	10.90	9.66	13.41	9.52	10.22	8.02	9.34	7.42
16	7.16	7.28	9.46	10.60	9.55	9.26	11.32	9.24	9.02	7.84	8.46	7.34
17	7.19	7.39	11.30	9.85	9.06	9.54	10.06	9.30	8.96	7.68	8.24	7.33
18	6.79	7.31	12.85	9.15	8.75	9.94	9.39	9.14	8.62	7.62	8.33	7.28
19	6.09	7.40	10.55	9.00	8.34	9.64	9.00	8.83	8.23	7.57	8.23	7.28
20	6.02	7.50	9.45	8.81	8.34	9.15	8.68	8.53	7.94	7.52	7.90	7.32
21	6.22	7.50	9.14	9.80	8.22	8.94	8.44	8.44	7.80	7.44	7.79	9.45
22	6.38	7.37	8.50	12.72	8.10	8.76	8.34	8.28	7.69	7.38	7.86	9.64
23	6.59	7.29	8.33	11.86	8.06	9.19	8.21	8.12	7.58	7.34	8.26	8.88
24	6.89	7.28	8.10	10.71	7.88	11.28	8.05	8.00	7.69	7.27	7.92	8.31
25	7.30	7.30	8.02	11.95	7.90	11.24	7.96	7.97	8.64	7.38	7.73	7.94
26	7.24	7.28	7.94	10.95	7.90	10.08	7.88	7.94	9.44	7.97	7.59	7.83
27	7.19	7.20	7.85	10.20	8.60	9.38	7.82	7.83	9.46	8.29	7.44	7.74
28	7.18	7.16	7.88	11.96	10.66	8.95	8.01	7.76	9.34	8.20	7.40	7.62
32	7.15	7.16	9.20	12.85	-------	8.68	10.14	7.71	12.20	8.10	7.44	7.54
90	7.14	7.16	9.15	11.40	-------	8.43	9.12	7.66	10.52	9.02	7.42	7.46
31	7.12	-------	8.76	9.99	-------	8.29	-------	7.66	-------	9.34	7.42	-------

MIDDLE FORK AT MIDVALE, W. VA.

LOCATION.—A third of a mile above Midvale railroad station on Coal & Coke Railway, two-thirds mile below post office at Ellamore, Randolph County. Laurel Creek enters river on right 1¾ miles above station.

DRAINAGE AREA.—122 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 3, 1915, to September 30, 1923.

GAGE.—Vertical and inclined staff on right bank; read by Miss Anna Riley.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—One channel at all stages; straight 300 feet above and 100 feet below cable. Banks are high and wooded. Control may shift occasionally. Gage height at which flow would be zero was about 0.56 foot, April 1, 1923.

EXTREMES OF STAGE.—Maximum stage recorded during year, 9.98 feet at 5 p. m. February 1; minimum stage, 1.17 feet at 6.30 p. m. October 1, 7 a. m. October 2, 7 a. m. October 23, and 7 p. m. September 3.

1915–1923: Maximum stage recorded, 16.1 feet at 7.30 a. m. January 28, 1918 (stage-discharge relation affected by ice); minimum stage, 1.12 feet August 29, 1917 (discharge, 2.6 second-feet).

Floods of 1888 and 1912 reached gage height of about 18 feet.

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation probably permanent. Rating curve not fully developed. Gage read to hundredths twice daily. Records good.

The following discharge measurement was made by Dirzulaitis and Wallace:

April 1, 1923: Gage height, 2.04 feet; discharge, 98 second-feet.

Daily gage height, in feet, of Middle Fork at Midvale, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1.18	1.25	1.38	4.50	8.92	4.14	2.46	2.38	1.82	2.94	3.78	1.29
2	1.18	1.24	1.40	4.06	7.88	3.58	2.22	2.31	1.76	2.66	3.80	1.23
3	1.20	1.26	1.44	3.41	6.22	3.44	2.16	2.26	1.70	2.42	3.24	1.18
4	1.21	1.28	1.48	2.98	4.80	3.32	2.18	2.20	1.64	2.24	3.30	1.26
5	1.20	1.26	2.92	2.74	4.04	3.12	2.26	2.16	1.59	2.02	3.26	1.34
6	1.18	1.26	2.60	2.58	3.38	3.47	2.76	2.14	1.62	1.90	3.18	1.30
7	1.20	1.34	2.74	2.56	2.97	4.60	2.66	2.06	1.88	1.88	2.33	1.38
8	1.20	1.38	3.62	2.65	2.76	4.21	2.65	2.08	2.36	1.96	2.47	1.50
9	1.20	1.40	3.04	2.90	2.64	3.68	2.54	2.92	2.05	1.94	2.50	1.66
10	1.30	1.39	2.64	3.53	2.80	3.86	2.46	2.94	1.87	1.76	2.35	1.47
11	1.40	1.38	2.36	3.12	2.76	4.70	2.34	3.41	2.88	1.72	4.56	1.37
12	1.45	1.36	2.30	2.99	2.62	4.58	2.28	3.52	4.68	2.70	3.18	1.33
13	1.40	1.36	2.48	2.74	6.94	4.43	2.56	3.70	5.84	2.29	3.95	1.34
14	1.34	1.36	2.38	2.86	4.24	3.88	4.40	3.56	5.28	2.03	3.13	1.30
15	1.30	1.36	3.32	4.22	3.81	3.35	4.10	3.32	3.88	1.82	2.60	1.26
16	1.28	1.48	3.32	3.82	3.42	3.50	3.64	4.00	3.59	1.74	2.34	1.24
17	1.29	1.60	5.56	3.24	3.04	4.22	3.30	3.62	3.00	1.68	2.12	1.24
18	1.30	1.52	4.48	3.05	2.66	3.94	3.00	3.32	2.60	1.55	2.10	1.26
19	1.32	1.54	3.52	3.12	2.53	3.72	2.79	3.08	2.38	1.46	1.92	1.31
20	1.34	1.66	2.78	3.00	2.56	3.72	2.60	2.72	2.16	1.38	1.82	1.50
21	1.32	1.54	2.62	3.40	2.43	3.24	2.49	2.66	2.10	1.32	1.74	2.12
22	1.23	1.48	2.38	4.94	2.44	3.04	2.34	2.49	1.93	1.84	1.69	2.02
23	1.18	1.46	2.22	4.25	2.28	3.60	2.28	2.42	1.82	1.76	1.62	1.70
24	1.30	1.44	2.12	4.50	2.24	5.22	2.20	2.42	3.62	1.84	1.58	1.56
25	1.46	1.42	2.03	4.60	2.23	4.30	2.12	2.28	6.36	4.66	1.53	1.48
26	1.43	1.40	1.96	3.82	2.23	3.74	2.06	2.22	3.65	2.52	1.48	1.44
27	1.37	1.40	1.94	3.88	3.68	3.28	2.02	2.16	3.68	2.32	1.44	1.39
28	1.35	1.38	1.96	5.62	4.72	2.96	2.08	2.08	2.94	3.10	1.48	1.30
29	1.30	1.38	2.00	5.46	-------	2.64	2.72	2.00	3.92	3.62	1.50	1.24
30	1.28	1.36	1.86	4.25	-------	2.58	2.46	1.92	3.58	3.80	1.43	1.27
31	1.28	-------	2.04	4.28	-------	2.44	-------	1.86	-------	4.73	1.38	-------

BUCKHANNON RIVER AT HALL, W. VA.

LOCATION.—500 feet below ruins of an old milldam, a quarter of a mile above post office and county highway bridge at Hall, Barbour County, and 1 mile from Baltimore & Ohio Railroad station. Pecks Run enters river on left, 1 mile below gaging station.

DRAINAGE AREA.—277 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 7, 1907, to May 25. 1909; April 15, 1915, to September 30, 1923.

GAGE.—Vertical and inclined staff on right bank used since April 15, 1915; read by James Newcomb. Form 1907 to 1909, a chain gage at county highway bridge, one-quarter of a mile below was used.

DISCHARGE MEASUREMENTS.—Made from county highway bridge or by wading.

CHANNEL AND CONTROL.—Gage is about midway between beginning and end of rapids, having approximately 10-foot fall. Bed of stream in rapids composed of large boulders, rocks, and gravel; practically permanent. Banks are high and wooded and are not overflowed except into an old mill race on left bank.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.85 feet at 7 a. m. on February 2 (discharge, 7,600 second-feet); minimum stage, 1.62 feet from 6 p. m. October 4 to 6 p. m. October 7 (discharge, 6 second-feet).

1915–1923: Maximum stage recorded, 14.7 feet March 14, 1918 (discharge not determined); minimum stage, 1.62 feet October 4–7, 1922 (discharge, 6 second-feet). Highest flood known prior to establishment of station reached a gage height of about 14 feet in 1888 referred to present gage.

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 10 and 2,600 second-feet; fairly well defined between 2,600 and 4,500 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

The following discharge measurement was made by Dirzulaitis and Wallace: March 27, 1923: Gage height, 3.17 feet; discharge, 665 second-feet.

Daily discharge, in second-feet, of Buckhannon River at Hall, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8	9	21	1,960	3,400	1,460	206	220	102	830	930	20
2	7	8	20	2,620	7,540	1,030	163	188	84	495	780	21
3	7	8	20	1,080	4,370	780	145	170	69	368	540	19
4	7	8	19	780	2,070	680	163	156	56	259	423	19
5	6	9	206	585	1,460	540	179	138	49	202	980	17
6	6	10	1,180	477	830	585	414	131	49	188	930	15
7	6	9	495	368	632	1,510	495	124	72	179	780	14
8	7	8	830	423	477	1,620	405	118	174	192	477	19
9	7	8	1,240	930	390	1,080	345	259	264	300	477	18
10	8	8	730	1,510	338	830	306	495	210	188	477	38
11	7	9	486	930	477	1,510	248	540	163	138	1,620	41
12	8	10	450	680	585	1,620	226	680	680	288	1,080	32
13	11	11	495	495	3,780	1,730	282	980	1,290	282	3,310	24
14	15	10	450	414	3,020	1,180	2,290	1,030	2,070	226	1,960	19
15	17	11	632	1,080	1,240	830	1,960	730	1,130	145	830	16
16	16	14	1,130	1,290	730	680	1,180	632	1,080	115	486	16
17	14	18	2,070	830	585	1,080	730	780	880	99	312	14
18	14	25	3,120	585	450	1,080	540	632	495	90	242	14
19	13	36	1,290	540	345	880	423	495	360	67	202	16
20	12	44	680	495	270	730	330	423	248	43	145	25
21	12	49	477	680	242	585	282	338	184	30	105	44
22	11	78	345	2,290	206	495	237	288	141	32	90	188
23	10	51	264	1,840	170	980	197	226	115	33	84	138
24	10	35	210	1,730	141	2,290	174	206	148	28	62	72
25	9	29	179	2,510	128	1,730	156	179	1,290	118	46	44
26	8	27	159	1,400	179	1,030	134	174	1,130	345	38	33
27	8	23	145	1,180	495	730	124	156	1,290	188	32	26
28	11	20	138	2,290	1,840	495	121	145	1,030	105	29	20
29	13	20	254	3,220	-------	368	232	166	2,180	330	23	17
30	12	20	264	1,510	-------	300	294	141	1,510	368	20	16
31	11	-------	197	930	-------	259	-------	118	-------	1,290	19	-------

Monthly discharge of Buckhannon River at Hall, W. Va., for the year ending Sept. 30, 1923

[Drainage area, 277 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	17	6	10.0	0.036	0.04
November	78	8	20.8	.075	.08
December	3,120	19	587	2.12	2.44
January	3,220	368	1,220	4.40	5.07
February	7,540	128	1,300	4.69	4.88
March	2,290	259	990	3.57	4.12
April	2,290	121	433	1.56	1.74
May	1,030	118	357	1.29	1.49
June	2,180	49	618	2.23	2.49
July	1,290	28	244	.881	1.02
August	3,310	19	565	2.04	2.35
September	188	14	33.8	.122	.14
The year	7,540	6	528	1.91	25.86

WEST FORK AT BUTCHERVILLE, W. VA.

LOCATION.—At Weston & Clarksburg Electric Railway Co.'s trolley bridge, a quarter of a mile upstream from Butcherville, Lewis County, 3 miles north of Weston. Freemans Creek enters river on left 1 mile below station.

DRAINAGE AREA.—181 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 8, 1915, to September 30, 1923.

GAGE.—Chain gage on upstream side of trolley bridge; read by Miss Virna Butcher.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—One channel except at extreme high stages, when river overflows right bank and a little water passes through two small culverts in trollery embankment; straight for 500 feet above and curved for 1,000 feet below station. Stream bed composed of sand and gravel. Control is rock ledge; probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 17.42 feet at 5 p. m. on December 17; minimum stage, 2.42 feet at 7 a. m. October 5.

1915–1923: Maximum stage recorded, 24.0 feet at 4.30 p. m. March 13, 1918, and 9.30 a. m. January 2, 1919; minimum stage, 2.42 feet at 7 a. m. October 5, 1922.

Highest flood known is reported to have reached a stage represented by gage height of about 27 feet in 1888. Dam, since washed out, may have increased height of this flood.

ICE.—Stage-discharge relations affected by ice during severe winters.

ACCURACY.—Stage-discharge relation probably permanent; may be slightly affected by ice during winter. Measurements of flow do not indicate noteworthy backwater from the growth of aquatic plants below the gage. Rating curve not fully developed. Gage read to hundredths twice daily. The control for this station is a solid rock ledge, the lowest point being at gage height 3.2 feet. Therefore all gage readings below this point are apparently in error. Gage-height records poor.

Discharge measurements of West Fork at Butcherville, W. Va., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Mar. 25	D. S. Wallace	7.02	543	Mar. 27	Dirzulaitis and Wallace	5.77	220
25	do	6.80	490	Apr. 15	J. J. Dirzulaitis	9.42	1,590

Daily gage height, in feet, of West Fork at Butcherville, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.60	3.30	3.21	13.46	13.85	7.04	4.76	5.41	3.97	5.52	7.14	3.92
2	2.55	3.68	3.12	9.15	13.26	6.20	4.56	4.90	4.28	5.16	5.75	3.83
3	2.50	3.52	3.00	6.46	7.40	5.76	4.48	4.70	4.13	4.78	5.12	3.81
4	2.46	3.40	3.68	6.20	6.78	5.55	4.76	4.60	4.06	4.44	6.19	4.16
5	2.76	3.34	9.20	5.87	6.20	5.32	5.44	4.50	3.96	4.27	7.04	4.28
6	3.63	3.25	7.12	5.70	5.87	5.29	6.62	4.40	4.15	5.24	5.88	4.15
7	4.02	3.36	6.14	5.29	5.78	8.22	6.40	4.10	4.67	6.64	5.24	4.71
8	4.30	3.44	8.56	7.28	5.24	6.13	6.10	4.64	5.23	5.28	5.02	5.32
9	4.68	3.34	7.44	8.83	4.90	5.88	5.90	5.24	4.60	4.79	6.64	5.89
10	4.84	3.30	6.10	8.60	4.68	6.61	5.68	6.15	4.35	4.49	5.79	5.02
11	4.14	3.32	5.70	7.20	4.58	7.90	5.04	5.89	4.70	4.33	5.12	4.48
12	3.89	3.44	7.00	6.24	5.52	6.90	4.76	6.36	5.78	6.56	8.65	4.15
13	3.80	3.68	5.96	5.54	15.71	8.24	6.13	8.78	6.68	6.64	12.93	3.90
14	3.71	3.90	5.69	5.69	8.72	6.56	14.24	6.68	6.82	5.42	7.38	3.74
15	3.60	4.20	6.34	7.24	6.12	5.99	9.40	5.90	5.52	4.90	5.79	3.65
16	3.70	4.32	8.14	6.59	5.88	5.82	7.16	5.66	7.02	4.70	5.24	3.94
17	3.83	4.64	17.12	5.84	5.56	5.74	6.16	5.53	6.85	4.60	5.27	3.84
18	3.72	5.04	8.54	5.60	5.08	5.59	5.90	5.36	6.59	4.48	5.08	3.75
19	3.55	5.20	6.60	5.37	4.78	5.43	5.58	5.18	6.50	4.40	4.78	4.04
20	3.50	5.48	5.93	5.18	4.83	5.33	5.38	4.94	6.18	4.34	4.60	4.68
21	3.44	4.72	5.70	7.92	5.02	5.28	5.12	4.84	5.78	4.28	4.32	10.33
22	3.37	4.58	5.35	11.08	5.18	5.45	4.92	4.71	5.61	4.10	4.30	6.42
23	3.37	4.06	5.06	8.48	4.82	6.61	4.80	4.64	5.46	3.90	4.39	5.60
24	3.60	3.97	4.82	10.25	4.72	8.96	4.71	4.54	5.32	4.52	4.24	5.38
25	3.64	3.83	4.72	9.02	4.63	7.28	4.60	4.46	5.09	6.16	4.14	4.89
26	3.50	3.77	4.63	6.38	4.57	6.08	4.39	4.35	5.22	5.69	4.04	4.36
27	3.40	3.64	4.26	6.60	7.56	5.75	4.20	4.30	6.30	4.74	3.93	4.17
28	3.34	3.52	4.98	10.75	8.34	5.32	5.20	4.25	7.12	4.92	3.84	3.96
29	3.26	3.40	7.86	8.53	-------	5.09	6.23	4.20	9.02	5.50	4.04	3.84
30	3.42	3.30	6.08	5.80	-------	4.95	5.92	4.12	7.10	5.75	3.70	3.90
31	3.39	-------	5.87	6.60	-------	4.85	-------	4.00	-------	6.06	3.15	-------

WEST FORK AT CLARKSBURG, W. VA.

LOCATION.—At dam of Clarksburg waterworks, three-fourths mile south of Clarksburg, Harrison County W. Va., Elk Creek enters on right 1 mile below station.

DRAINAGE AREA.—384 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 3, 1923, to September 30, 1923.

GAGE.—Gurley seven-day graph water-stage recorder fastened to upstream wall of gatehouse on right bank referred to a float gage near downstream wall of gatehouse. Recorder inspected by R. D. Bates.

DISCHARGE MEASUREMENTS.—Made from trolley bridge half a mile upstream from dam or by wading.

CHANNEL AND CONTROL.—One channel at all stages, straight above and below for about 200 feet. Concrete dam of Clarksburg waterworks forms control for gage.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 4.70 feet at 8 p. m. April 14 (discharge, 7,280 second-feet). Minimum mean daily discharge, 18 second-feet, September 4.

ICE.—No ice effect during period of record.

DIVERSION.—Water supply for the city of Clarksburg is pumped from the river above the dam, the amount pumped is measured by a Venturi meter with a continuous graphic recorder. The daily pumpage is added to the discharge as determined from the water-stage recorder.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Daily discharge ascertained by use of discharge integrator, or by averaging discharge for intervals of the day, and for a few days of low stage by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records excellent.

Discharge measurements of West Fork at Clarksburg, W. Va., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Mar. 25	J. J. Dirzulaitis	2.02	1,600	Apr. 3	D. S. Wallace	0.42	150
25	do	1.81	1,370	15	J. J. Dirzulaitis	3.77	4,950
26	Wallace and Dirzulaitis	1.27	735	16	do	2.28	1,960
28	do	.80	348				

Daily discharge, in second-feet, of West Fork at Clarksburg, W. Va., for the year ending Sept. 30, 1923

Day	March	April	May	June	July	August	September
1	------	171	329	45	405	742	36
2	------	146	234	38	252	434	32
3	590	143	173	70	168	217	21
4	427	138	151	61	144	155	18
5	346	190	124	34	112	634	30
6	545	827	105	26	91	386	305
7	2,130	717	98	26	1,060	213	278
8	1,970	468	105	60	423	152	412
9	1,010	355	262	118	207	277	476
10	767	278	756	74	129	362	296
11	1,760	223	650	54	90	386	163
12	1,650	184	404	52	245	440	99
13	2,140	228	2,100	193	646	3,290	64
14	1,300	5,170	1,580	626	418	1,740	44
15	924	4,850	730	426	231	496	29
16	730	1,910	550	558	142	263	26
17	1,130	914	542	581	126	255	23
18	932	557	402	318	123	518	20
19	647	395	303	174	83	297	20
20	484	310	242	115	61	188	398
21	357	263	228	91	48	130	1,950
22	305	218	198	70	43	123	1,400
23	594	180	161	100	34	128	443
24	2,660	159	148	130	25	119	248
25	1,580	140	129	162	52	99	167
26	810	125	117	171	157	84	121
27	508	115	61	183	150	66	100
28	367	262	52	408	140	48	77
29	289	824	52	1,730	241	67	56
30	237	540	94	944	270	57	42
31	195	------	66	------	279	44	------

NOTE.—Recorder not working properly Mar. 31 to Apr. 2 (discharge estimated by comparison with West Fork at Butcherville) and June 23 and 24 (discharge interpolated).

Monthly discharge of West Fork at Clarksburg, W. Va., for the year ending Sept. 30, 1923

[Drainage area, 384 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
March 3-31	2,660	195	944	2.46	2.65
April	5,170	115	700	1.82	2.03
May	2,100	52	360	.938	1.08
June	1,730	26	255	.664	.74
July	1,060	25	213	.555	.64
August	3,290	44	400	1.04	1.20
September	1,950	18	246	.641	.72

BUFFALO CREEK AT BARRACKVILLE, W. VA.

LOCATION.—At steel highway bridge 1,000 feet above covered highway bridge at Barrackville, Marion County, and 2¾ miles northeast of Fairmont. Finch's Run enters on left 1,600 feet below station.

DRAINAGE AREA.—115 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 3, 1907, to December 31, 1908; May 8, 1915, to September 30, 1923.

GAGE.—Chain gage fastened to downstream side of bridge; read by E. M. Beall.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—One channel at all stages; straight about 100 feet above and below station. Banks high. Stream bed rocky; some gravel. Control not permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 8.20 feet at 8 a. m. on February 13 (discharge, 3,100 second-feet); minimum stage, 1.04 feet at 6.45 a. m. on July 24 (discharge, 3 second-feet).

1907–1908; 1915–1923: Maximum stage recorded, 14.22 feet January 22, 1917 (discharge, about 6,800 second-feet); no flow during greater part of September, October, and November, 1908. Flood of July, 1912, reached a stage represented by about 16 feet on present gage.

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation not permanent; not affected by ice during year. Rating curve fairly well defined between 15 and 700 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods indicated in footnote to daily-discharge table. Records poor, owing to missing gage heights and shifting control.

The following discharge measurement was made by Dirzulaitis and Wallace: March 30, 1923: Gage height, 1.88 feet; discharge, 73 second-feet.

Daily discharge, in second-feet, of Buffalo Creek at Barrackville, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8	13	17	1,860	726	196	44	121	13	28	27	
2	8	38	14	190	365	184	33	92	12	15	13	
3	7	26	13		298	172	33	76	11	11	30	
4	6	19	12	130	266	151	32	66	9	8	12	
5	6	20	150	116	251	130	61	56	9	6	13	130
6	4	20	140	87	209	314	119	53	7	9	14	
7	9	66	130	60	172	818	108	46	9	16	37	
8	16	48	196	494	150	382	72	43	11	65	23	
9	35	48	266	494	130	282	66	236	9	13	70	
10	86	30	180	331	109	266	58	172	8	6	28	37
11	75	21	130	222	89	750		184	12	6	17	26
12	50	19	101	172	69	456		475	16	6	75	19
13	28	17	93	150	2,210	314		266	25	78	13	16
14	18	15	86	200	554	282		184	16	32	15	11
15	15	97	107	726	161	222		331	14	22	17	9
16	13	78	98	382	121	172		209	46	11	11	8
17	17	54	348	282	107	150		140	33	9	14	6
18	15	38	314	236	89	130	220	121	21	9	10	5
19	14	34	140	209	71	172		93	9	9		8
20	13	30	29	418	53	130		236	8	7	35	23
21	11	52	36	1,150	47	114		161	6	5		84
22	9	40		418	37	107		69	4	4		87
23	12	36	40	514	35	970		52	4	3	43	45
24	50	23		266	28	970		43	4	3	32	25
25	53	19		365	25	236		30	7	31	21	19
26	38	18	40	298	48	196	29	30	37	16	14	19
27	29	16	39	365	331	114	27	23	19	9	8	16
28	23	16	78	418	298	97	130	21	23	172	6	10
29	22	12	116	365	-------	72	251	19	100	400	6	8
30	20	14	140	314	-------	66	196	17	42	172	6	8
31	15	-------	500	251	-------	56	-------	15	-------	68	5	-------

NOTE.—Discharge for following periods when gage was not read, estimated by study of weather records: Oct. 29, Nov. 5, 12, 13, 19, 26, 30, Dec. 3, 10, 19, 22–25, 30, 1922, and Jan. 2, 3, 7, 14, 21, Feb. 11, 18, 25, Mar. 4, 11, Apr. 1, 11–25, May 28, 30, June 17, 18, July 1, 4, 8, 15, 22, 29, Aug. 3, 5, 9, 12, 14, 19–22, 26, Sept. 1–9, 16, 23, and 30, 1923. Gage height increased 1 foot Mar. 1 and 0.5 foot Mar. 2 and decreased 1 foot Apr. 2 as gage readings appeared to be in error. Braced figures show mean discharge for periods included.

Monthly discharge of Buffalo Creek at Barrackville, W. Va., for the year ending Sept. 30, 1923

[Drainage area, 115 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	86	4	23.4	0.203	0.23
November	97	----------	32.6	.283	.32
December	----------	12	118	1.03	1.19
January	1,860	----------	377	3.28	3.78
February	2,210	----------	252	2.19	2.28
March	970	56	280	2.43	2.80
April	----------	----------	152	1.32	1.47
May	475	15	119	1.03	1.19
June	100	4	18.1	.157	.18
July	----------	3	40.3	.350	.40
August	----------	5	23.2	.202	.23
September	----------	5	55.3	.481	.54
The year	2,210	3	124	1.08	14.61

CHEAT RIVER NEAR PARSONS, W. VA.

LOCATION.—At Moss highway bridge, 2 miles north of Parsons, Tucker County, and 2 miles below junction with Shavers Fork.

DRAINAGE AREA.—719 square miles (determined from topographic maps).

RECORDS AVAILABLE.—January 1, 1913, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge; read by Mrs. E. C. Linger.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Rocky and probably permanent. Water is swift and turbulent at high stages. Point of zero flow about 0.80 foot determined August 27, 1923.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.0 feet at 6 p. m. February 1 (discharge, 19,000 second-feet); minimum stage, 1.68 feet at 6 p. m. October 9 (discharge, 47 second-feet).

1913–1923: Maximum stage recorded, 17.98 feet March 12, 1917 (discharge, about 40,000 second-feet); minimum stage, 1.52 feet September 6, 1917 (discharge, 29 second-feet).

ICE.—Stage-discharge relation affected by ice during severe winters.

REGULATION.—Some regulation at various pulp mills and sawmills. Effect probably compensating.

ACCURACY.—Stage-discharge relation probably permanent except as affected by ice. Rating curve well defined between 70 and 20,000 second-feet, and fairly well defined beyond these limits. Gage read to quarter-tenths once daily October 1 to May 14, and twice daily from May 15 to September 30. Daily discharge ascertained by applying mean daily gage height to rating table, except for period of ice effect. Records good.

COOPERATION.—Results of current-meter measurements and records of discharge furnished by West Penn Power Co.

Discharge measurements of Cheat River near Parsons, W. Va., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Mar. 21	James E. Stewart	3.96	1,730	June 29	Stewart and Davis	3.99	1,730
Apr. 15	do	5.70	4,580	Aug. 22	James E. Stewart	2.82	538
June 6	Stewart and Davis	3.06	741	27	do	2.11	156

Daily discharge, in second-feet, of Cheat River near Parsons, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	87	80	118	7,420	19,000	1,380	438	760	310	718	1,920	124
2	80	69	251	3,480	12,100	1,510	558	635	270	520	945	97
3	73	60	265	2,060	9,660	1,710	377	595	246	388	1,320	71
4	73	54	337	1,640	5,000	2,660	635	486	407	371	995	67
5	69	50	6,060	1,320	2,820	2,360	760	420	945	413	1,260	179
6	65	65	2,660	1,150	1,920	1,780	2,360	432	805	520	995	486
7	62	80	2,060	850	1,380	5,000	1,580	520	898	945	805	432
8	52	97	2,820	850	1,200	4,020	1,260	850	1,320	558	760	850
9	47	97	3,140	805	1,100	2,060	995	995	898	382	1,040	1,200
10	80	92	3,140	675	995	3,660	805	1,150	675	321	1,710	595
11	118	92	2,660	675	850	3,140	675	1,380	1,440	310	760	388
12	207	92	1,780	595	718	6,500	635	1,710	6,500	486	945	279
13	150	92	1,150	520	9,660	6,060	1,100	1,710	11,000	1,260	1,640	232
14	134	87	1,150	635	6,060	3,840	6,720	1,440	6,280	635	1,040	203
15	124	118	4,600	5,000	3,840	2,820	4,400	1,100	3,140	451	595	219
16	118	194	2,660	2,820	2,820	4,400	3,140	1,260	2,510	305	432	164
17	118	219	10,200	1,320	1,380	4,020	2,210	1,320	1,780	274	382	143
18	124	228	5,840	1,380		2,820	1,780	995	1,200	246	635	147
19	118	265	4,200	1,580		2,060	1,380	850	945	207	558	186
20	113	337	3,140	1,920		1,510	1,100	898	850	164	337	451
21	102	265	1,510	3,300		1,710	945	1,100	898	150	284	3,140
22	92	186	1,150	3,140		1,780	850	995	675	124	326	2,660
23	87	168	898	2,660	650	2,210	805	898	486	445	284	1,320
24	102	113	805	2,360		3,300	718	760	394	348	232	718
25	113	97	760	1,780		2,660	635	675	675	1,710	194	558
26	118	92	675	1,380		2,360	520	675	760	1,150	147	432
27	113	92	595	1,780		1,580	451	635	760	718	137	360
28	105	92	1,150	11,600	2,510	1,260	486	595	675	520	137	265
29	105	92	1,040	5,840	-------	995	1,710	520	1,780	2,360	134	211
30	97	92	1,580	3,660	-------	718	898	438	1,100	1,260	153	183
31	92	-------	1,780	2,210	-------	558	-------	365	-------	945	143	-------

NOTE.—Discharge, Feb. 18–27, estimated because of ice, from weather records and observer's notes.

Monthly discharge of Cheat River near Parsons, W. Va., for the year ending Sept. 30, 1923

[Drainage area, 719 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	207	47	101	0.140	0.16
November	337	50	125	.174	.19
December	10,200	118	2,260	3.14	3.62
January	11,600	520	2,460	3.42	3.94
February	19,000	-------	3,200	4.45	4.63
March	6,500	558	2,660	3.70	4.27
April	6,720	377	1,360	1.89	2.11
May	1,710	365	876	1.22	1.41
June	11,000	246	1,690	2.35	2.62
July	2,360	124	619	.861	.99
August	1,920	134	685	.953	1.10
September	3,140	67	545	.758	.85
The year	19,000	47	1,370	1.91	25.89

CHEAT RIVER AT ROWLESBURG, W. VA.

LOCATION.—At Baltimore & Ohio Railroad bridge at Rowlesburg, Preston County, 300 feet above mouth of Salt Lick Creek.

DRAINAGE AREA.—978 square miles (including Salt Lick Creek).

RECORDS AVAILABLE.—July 19, 1912, to September 30, 1923.

GAGE.—Chain gage on railroad bridge installed April 27, 1921; read by Charles R. Schaefer until October 21, 1921, and by L. M. Mayfield after that date. See Water-Supply Paper 543 for description of other gages at this station.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Channel is curved above and below bridge. Control consists of small boulders. Salt Lick Creek enters between control and gage. Stage at which flow would be zero was about 0.45 foot in September, 1917; 1.03 feet, September, 1922; and 0.4 foot, July, 1923.

EXTREMES OF STAGE.—Maximum stage recorded during year, 9.71 feet at 7.30 a. m. February 2; minimum stage, 1.82 feet at 6 p. m. October 1.

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Rating curve not fully developed. Gage read to hundredths twice daily. Records good.

COOPERATION.—Records furnished by West Penn Power Co.

Discharge measurements of Cheat River at Rowlesburg, W. Va., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 21	J. J. Dirzulaitis	2.08	120	July 23	James E. Stewart [a]	2.14	187
Feb. 14	do	6.36	9,790	Aug. 20	do	2.58	492
15	do	5.22	5,820				

[a] Engineer, West Penn Power Co.

Daily gage height, in feet, of Cheat River at Rowlesburg, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1.85	2.01	2.13	5.67	8.28	4.34	2.99	3.29	2.50	3.24	3.68	2.13
2	1.90	1.99	2.14	5.71	9.44	3.86	2.90	3.10	2.43	2.96	3.32	2.05
3	1.87	1.98	2.45	4.47	6.64	3.98	2.95	2.96	2.40	2.79	3.00	2.01
4	1.87	1.96	2.49	3.99	5.71	4.48	2.88	2.86	2.36	2.68	3.38	1.99
5	1.89	1.94	4.33	3.63	4.88	4.41	3.04	2.82	2.52	2.75	3.16	1.99
6	1.89	1.98	4.97	3.47	4.18	4.16	3.79	2.78	3.28	2.68	3.24	2.58
7	1.94	2.00	3.73	3.35	3.81	5.04	4.14	2.74	3.04	3.29	3.05	2.62
8	1.95	2.05	3.59	3.41	3.68	5.02	3.57	2.74	3.40	2.96	2.86	2.56
9	1.94	2.08	4.92	3.97	3.58	4.26	3.38	3.06	3.17	2.77	3.34	2.77
10	2.19	2.07	4.13	4.24	3.47	4.34	3.26	3.38	2.87	2.58	3.02	2.70
11	2.39	2.06	3.65	3.68	3.54	5.51	3.14	3.86	2.75	2.50	2.93	2.64
12	2.37	2.07	3.39	3.54	3.34	5.18	3.04	3.96	4.88	2.71	3.20	2.46
13	2.33	2.07	3.57	3.34	7.24	6.11	3.10	4.58	4.78	3.26	3.76	2.37
14	2.30	1.97	3.39	3.24	6.41	5.08	7.02	4.20	6.04	3.21	3.28	2.27
15	2.15	2.11	4.02	5.84	5.41	4.28	5.82	3.75	4.58	2.74	2.92	2.22
16	2.16	2.19	4.82	4.86	4.11	4.24	5.37	3.58	4.08	2.59	2.70	2.16
17	2.14	2.39	6.95	3.91	3.56	5.26	4.67	3.56	3.66	2.50	2.67	2.12
18	2.06	2.39	6.67	3.57	------	4.64	4.15	3.39	3.38	2.40	2.77	2.10
19	2.05	2.43	4.95	3.98	------	4.29	3.82	3.22	3.13	2.32	2.82	2.24
20	2.04	2.45	4.05	4.16	2.86	4.01	3.56	3.12	2.97	2.28	2.62	2.32
21	1.98	2.57	3.73	4.61	------	3.84	3.40	3.10	3.12	2.23	2.48	4.24
22	2.01	2.51	3.45	6.04	------	3.66	3.26	3.24	2.88	2.16	2.60	4.66
23	2.04	2.37	3.25	5.18	2.56	------	3.18	3.08	2.77	2.16	2.71	3.40
24	2.08	2.27	3.18	4.41	------	5.90	3.06	2.99	2.88	2.39	2.50	3.14
25	2.09	2.21	3.09	4.33	------	4.84	2.96	2.98	3.16	3.08	2.36	2.85
26	2.26	2.16	2.95	4.01	------	4.28	2.89	2.88	3.07	3.32	2.30	2.69
27	2.25	2.13	2.91	3.91	------	3.94	2.85	2.80	3.48	2.89	2.21	2.56
28	2.23	2.16	2.89	6.51	4.36	3.66	2.86	2.76	3.57	2.69	2.20	2.48
29	2.13	2.13	3.11	6.96	------	3.44	3.44	2.70	4.88	3.80	2.21	2.40
30	2.09	2.07	3.13	5.16	------	3.28	3.59	2.62	3.96	3.49	2.22	2.32
31	2.04	------	2.99	4.48	------	3.18	------	2.58	------	3.08	2.16	------

NOTE.—Gage not read on days for which no gage height is given.

CHEAT RIVER NEAR MORGANTOWN, W. VA.

LOCATION.—On highway bridge at Uneva, Monongalia County, 10 miles above mouth of river and 7 miles from Morgantown. Parallel of 39° 40′ crosses river at this bridge.

DRAINAGE AREA.—1,380 square miles.

RECORDS AVAILABLE.—July 8, 1899, to December 29, 1900; August 21, 1902, to December 31, 1905; November 18, 1908, to December 31, 1917; and October 22, 1922, to September 30, 1923.

GAGE.—Chain gage installed October 24, 1922, on new bridge about 200 feet downstream from site of old bridge which was carried out by ice on February 9, 1918, and where a chain gage had been located since September 28, 1904. Gage read by J. G. Smith October 27 to December 23, 1922, and by E. G. Brown after December 28. Datum of present gage is 0.64 foot higher than that of the one taken out by ice February 9, 1918.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1923, 7.95 feet at 5 p. m. February 13 (discharge not determined); minimum stage, 1.30 feet at 6 a. m. September 20 (discharge not determined).

1899; 1900; 1902–1905; 1908–1917: Maximum discharge recorded, 51,000 second-feet at 5 p. m. March 12, 1917; minimum discharge, 135 second-feet from September 29 to October 1, 1904, and October 5, 1917.

ICE.—Stage-discharge relation seriously affected by ice during severe winters.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice. Gage read to half-tenths once daily October 27 to December 23, 1922, and twice daily after December 28, 1922. Stage-discharge relation not determined. Records good.

COOPERATION.—Records furnished by West Penn Power Co.

Discharge measurements of Cheat River near Morgantown, W. Va., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 22	Dirzulaitis and Rudolph	1.23	124	July 21	Stewart and Davis	1.62	359

Daily gage height, in feet, of Cheat River near Morgantown, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	------	1.79	1.88	4.18	5.28	3.91	2.69	2.96	2.06	2.80	2.35	1.65
2	------	1.79	1.88	5.51	4.43	3.50	2.75	2.74	1.86	2.48	2.82	1.72
3	------	1.69	------	4.11	6.83	3.22	2.59	2.59	1.83	2.36	2.42	1.70
4	------	1.69	1.88	3.61	5.91	3.85	2.42	2.46	1.73	2.23	2.52	1.55
5	------	------	2.18	3.26	4.41	3.62	2.59	2.46	1.66	2.03	2.42	1.42
6	------	1.69	3.78	3.01	3.68	3.82	3.52	2.32	1.73	2.06	2.55	1.48
7	------	1.69	4.88	2.98	3.43	4.28	3.07	2.22	1.81	2.08	2.42	1.80
8	------	1.69	4.67	2.96	3.13	4.22	2.17	2.02	2.16	2.48	2.35	2.02
9	------	1.79	3.87	3.61	3.03	3.75	1.99	2.34	2.39	2.13	2.70	1.88
10	------	1.79	------	3.94	2.92	3.58	2.79	2.79	2.42	1.97	2.45	1.78
11	------	1.79	3.77	3.53	2.97	3.72	2.64	3.15	2.45	1.95	2.30	1.98
12	------	------	3.67	3.15	2.72	4.31	2.58	3.38	2.42	2.07	2.28	1.90
13	------	1.79	3.47	2.97	7.12	5.69	2.88	4.15	3.98	2.47	2.58	1.78
14	------	1.79	3.27	2.77	6.20	4.59	7.51	3.75	5.28	2.75	2.68	1.68
15	------	1.89	3.37	5.20	5.22	3.81	6.06	3.38	4.45	2.37	2.30	1.60
16	------	1.99	4.77	4.90	4.77	3.44	5.26	3.13	3.55	2.07	2.08	1.52
17	------	1.98	------	3.85	3.37	3.77	4.46	3.05	3.00	2.09	1.98	1.52
18	------	2.18	6.97	3.45	3.00	4.07	3.86	3.93	2.82	1.92	1.95	1.42
19	------	------	5.07	3.37	2.77	3.67	3.44	2.78	2.70	1.89	2.08	1.38
20	------	2.18	4.07	3.63	2.71	3.47	3.16	2.75	2.64	1.69	1.90	1.40
21	------	2.18	3.57	3.94	2.69	3.27	3.03	2.60	2.44	1.60	1.82	3.15
22	1.23	2.28	3.37	5.54	2.69	3.30	2.67	2.54	2.17	1.52	1.90	3.82
23	------	2.28	3.27	4.96	2.46	3.56	2.65	2.44	2.04	1.52	1.95	3.02
24	------	2.18	------	4.14	2.53	3.48	2.45	2.37	2.09	1.50	1.92	2.52
25	------	2.08	------	3.89	2.31	3.33	2.37	2.32	2.31	1.65	1.82	2.18
26	------	------	------	3.62	2.36	3.83	2.37	2.30	2.27	2.35	1.75	2.02
27	1.79	2.08	------	3.32	2.73	3.48	2.37	2.30	2.24	2.38	1.65	1.90
28	------	1.98	2.32	5.49	4.11	3.26	2.57	2.17	2.69	2.12	1.60	1.80
29	------	1.88	2.37	6.94	------	2.98	2.67	2.14	4.27	2.15	1.65	1.72
30	1.79	------	2.77	5.72	------	2.86	3.33	2.10	4.03	2.92	1.58	1.67
31	1.79	------	2.49	4.43	------	2.78	------	2.03	------	2.48	1.62	------

NOTE.—Gage not read on days for which no gage heights are given. The gage height was increased 1 foot June 18, as the recorded gage height appeared to be 1 foot in error.

BLACKWATER RIVER AT DAVIS, W. VA.

LOCATION.—Half a mile south of Davis, Tucker County, 1¾ miles above "Blackwater Fall," and 400 feet below dam and railroad bridge of Babcock Lumber & Boom Co. Beaver Creek enters on right about half a mile above station.

DRAINAGE AREA.—87 square miles (measured by West Penn Power Co. on topographic maps).

RECORDS AVAILABLE.—April 26, 1921, to September 30, 1923.

GAGE.—Slope gage on right bank 100 feet above cable and opposite railroad scale house of the Babcock Lumber & Boom Co.; read by I. K. Skidmore.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and 200 feet below station. Banks not subject to overflow. Bed of stream composed of small stones; smooth and clean. Control 20 feet below gage, composed of large and small boulders. Inspection of control on June 4, 1923, showed that water-logged timber had lodged on the control. When the obstructions were removed on August 25, 1923, the stage fell 0.3 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year ending September 30, 1923, 6.29 feet at 4 p. m. February 2 (discharge, 1,600 second-feet); minimum stage, 1.2 feet at 8 a. m. September 4, 5, and 16–18 (discharge, 12 second-feet).

1921–1923: Maximum stage recorded, 6.95 feet December 24, 1921 (discharge, 1,900 second-feet); minimum stage, that of September 5, 1923.

ICE.—Stage-discharge relation affected by ice during severe winters.

REGULATION.—Dam 400 feet above cable is used to form log forebay for the lumber company. Forebay may occasionally be drained, but it is usually kept full.

ACCURACY.—Stage-discharge relation changed by flood of February 2, 1923; otherwise permanent except as affected by ice. Rating curves well defined between 15 and 1,500 second-feet and fairly well defined beyond these limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Complete records furnished by West Penn Power Co.

Discharge measurements of Blackwater River at Davis, W. Va., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Mar. 29	James E. Stewart	1.96	90.9	Apr. 15	James E. Stewart	4.04	652
Apr. 5	do	2.13	125	June 7	Stewart and Davis	1.93	88
6	do	2.96	325	Aug. 22	James E. Stewart	1.48	29.4
7	do	2.40	180	25	do	1.35	18.2
14	do	4.94	1,000				

Daily discharge, in second-feet, of Blackwater River at Davis, W. Va., for the years ending Sept. 30, 1921–1923

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1921							1921						
1		75	242	48	39	53	16		99	43	280	242	44
2		72	255	103	134	41	17		91	48	170	181	37
3		72	156	53	980	35	18		83	170	83	383	37
4		521	123	38	710	44	19		75	357	72	205	35
5		1,200	103	33	357	45	20		68	136	230	119	39
6		675	89	41	156	65	21		61	65	181	97	218
7		383	79	37	107	181	22		65	52	87	75	521
8		292	72	34	268	123	23		66	58	61	65	242
9		205	66	136	149	218	24		521	68	53	60	132
10		158	61	158	95	230	25		980	57	58	54	75
11		145	65	57	72	119	26	55	900	61	43	48	103
12		230	89	218	72	123	27	55	409	48	44	43	170
13		242	72	140	79	99	28	65	242	48	45	41	193
14		149	77	121	72	65	29	89	409	53	39	39	119
15		115	52	383	409	49	30	83	640	53	111	37	268
							31		357		70	41	

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1921–22												
1	305	1,020	383		60	242	521	72	39	39	34	45
2	129	780	305	160	610	860	318	65	41	30	50	550
3	242	437	465		305	610	242	60	45	383	61	409
4	383	255	331	268	181	383	205	170	46	383	41	230
5	437	193	242	357	132	331	170	280	60	357	33	115
6	292	143		218	130	357	156	357	91	181	30	89
7	181	132		181	100	437	136	305	57	99	26	66
8	149	111	200	151	80	383	123	145	40	75	35	57
9	170	113		181	115	318	111	119	54	89	85	58
10	123	205		170	119	409	95	107	72	65	38	58
11	101	158	151	158	780	437	89	107	43	52	28	72
12	87	136	170		900	357	97	95	83	44	23	103
13	87	119	158		820	255	83	91	61	42	24	72
14	87	181	170		465	437	357	82	39	50	26	48
15	75	255	170			1,100	820	72	32	43	117	40
16	70	230	158	170	230	710	493	61	30	40	128	35
17	61	521	521			383	268	68	147	35	94	34
18	58	521	1,510			305	218	145	136	33	60	31
19	61	318	675		230	255	205	409	75	33	41	30
20	65	465	383	860	1,380	268	170	205	50	30	34	30
21	99	331	409	1,200	940	280	138	117	41	26	27	29
22	91	230	318	860	860	290	205	97	43	23	24	28
23	87	193	1,280	493	357	305	170	83	34	22	22	25
24	55	193	1,920	280	318	318	123	72	28	331	268	25
25	53	820	1,200		242	268	109	65	27	170	521	33
26	48	493	580		465	181	123	75	25	50	218	25
27	48	409	357	100	437	255	140	91	25	43	93	23
28	46	780	268		357	409	107	65	41	55	79	22
29	43	780	230			318	87	52	68	129	58	22
30	44	493	242			255	79	45	68	65	50	20
31	63		230			242		43		41	53	

Daily discharge, in second-feet, of Blackwater River at Davis, W. Va., for the years ending Sept. 30, 1921–1923—Continued

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922–23												
1	20	19	31	331	1,420	220	82	70	39	61	45	17
2	19	18	55	357	1,600	218	73	60	37	51	41	15
3	19	19	45	230	1,020	510	76	54	34	48	35	14
4	18	20	640	156	745	510	82	52	37	45	41	19
5	18	19	437	135	350	322	103	52	171	47	45	12
6	18	19	147	125	218	206	308	52	73	46	35	33
7	19	23	242	123	149	640	171	48	85	61	31	28
8	22	25	409	119		350	103	48	138	48	26	38
9	25	23	292			250	85	68	79	36	34	49
10	43	21	292	100	115	540	78	92	56	29	31	30
11	79	20	158			570	72	132	116	37	39	21
12	39	19	193		171	900	67	160	230	118	28	17
13	23	19	230	89	1,460	820	182	194	364	295	37	16
14	25	19	158	193	1,020	420	980	132	308	122	26	14
15	22	25	409	745		336	710	82	182	51	22	13
16	22	40	357			605	570	89	126	43	18	12
17	23	32	980	300		480	350	85	103	42	26	12
18	24	20	1,020		280	308	243	68	78	36	89	12
19	25	14	820			290	182	67	67	32	41	25
20	20	39	521	331		269	138	63	60	28	27	51
21	19	28	230	521		194	118	149	53	26	21	364
22	19	18	158	710		194	110	114	51	26	37	282
23	19	17	158	450		420	92	79	43	76	41	99
24	45	19	115	230		510	85	72	42	35	27	53
25	39		113	230	130	308	76	64	48	230	21	40
26	28		111	220		194	70	56	46	90	20	35
27	24	17	87	280		160	67	56	89	42	17	31
28	22		115	498		134	72	53	56	84	17	26
29	20		147	675	-------	101	171	47	182	124	18	24
30	20		140	409	-------	101	107	43	82	76	28	22
31	18	-------	89	280	-------	85	-------	41	-------	64	21	-------

NOTE.—Discharge for following periods when stage-discharge relation was affected by ice or gage was not read, estimated from weather records, observer's notes, and record of flow of Cheat River near Parsons: Dec. 8-10, 1921; Jan. 1-3, 12-19, Jan. 25 to Feb. 1, Feb. 7, 8, 15-18, Mar. 21, 22, May 3, 14, Aug. 6, 13, 17, 20, Sept. 10, 24, Oct. 22, Nov. 21, 25-30, Dec. 25, 1922; Jan. 5, 6, 9-12, 16-19, 23, 25, Feb. 8-11, Feb. 15 to Mar. 1, Mar. 7, 9, 19, May 24, and July 22, 1923. Braced figures indicate mean discharge for the periods included.

Monthly discharge of Blackwater River at Davis, W. Va., for the years ending Sept. 30, 1921–1923

[Drainage area, 87 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1921					
April 26–30	89	55	69.4	0.798	0.03
May	1,200	61	310	3.56	4.10
June	357	43	97.3	1.12	1.25
July	383	33	109	1.25	1.44
August	980	37	175	2.01	2.32
September	521	35	124	1.43	1.60
1921–22					
October	437	43	124	1.43	1.65
November	1,020	111	367	4.22	4.71
December	1,920	151	446	5.13	5.91
January	1,200	----------	255	2.93	3.38
February	1,380	----------	404	4.64	4.83
March	1,100	181	386	4.44	5.12
April	820	79	205	2.36	2.63
May	409	43	123	1.41	1.63
June	147	25	54.7	.629	.70
July	383	22	98.6	1.13	1.30
August	521	22	78.1	.898	1.04
September	550	20	80.8	.929	1.04
The year	1,920	20	217	2.49	33.94

Monthly discharge of Blackwater River at Davis, W. Va., for the years ending Sept. 30, 1921–1923—Continued

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1922–23					
October	79	18	25.7	0.295	0.34
November	40		21.2	.244	.27
December	1,020	31	287	3.30	3.81
January	745	89	292	3.36	3.87
February	1,600		405	4.66	4.85
March	900	85	360	4.14	4.77
April	980	67	187	2.15	2.40
May	194	41	78.8	.906	1.04
June	364	34	102	1.17	1.30
July	295	26	69.3	.797	.92
August	89	17	31.8	.366	.42
September	364	12	47.2	.543	.61
The year	1,600	12	159	1.83	24.60

SHAVERS FORK AT CHEAT BRIDGE, W. VA.

LOCATION.—At highway bridge at Cheat Bridge, Randolph County.

DRAINAGE AREA.—57.5 square miles (measured by West Penn Power Co. on topographic maps).

RECORDS AVAILABLE.—February 23, 1922, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge; read by Blanche Cromer.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Channel straight for about 800 feet above and 500 feet below station. Banks low, subject to overflow at extreme high water. stream bed consists of small boulders and gravel. Control probably permanent. Point of zero flow at about gage height 0.5 foot, July 1, 1923.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1923, 8.15 feet at 6 p. m. February 1 (discharge, 3,400 second-feet); minimum stage, 1.10 feet on several days during first part of October (discharge, 12 second-feet).

Highest known flood reached a stage represented by gage height of about 14.2 feet in 1886.

ICE.—Stage-discharge relation affected by ice during winter.

ACCURACY.—Stage-discharge relation probably permanent except when affected by ice. Rating curve well defined between 15 and 2,000 second-feet and fairly well defined between 10 and 15 and between 2,000 and 6,000 second-feet. Gage read to hundredths twice daily. Daily discharge determined by applying mean daily gage height to rating table. Records good.

COOPERATION.—Complete records furnished by West Penn Power Co.

Discharge measurements of Shavers Fork at Cheat Bridge, W. Va., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Mar. 23	James E. Stewart	3.90	813	June 30	Stewart and Davis	1.76	74.6
24	do	3.50	642	July 1	do	1.70	61.3
24	do	3.16	506	Aug. 23	James E. Stewart	1.55	36.3
Apr. 11	do	1.85	92.3				

Daily discharge, in second-feet, of Shavers Fork at Cheat Bridge, W. Va., for the years ending Sept. 30, 1922 and 1923

Day	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922								
1		218	566	76	72	38	59	43
2		686	282	69	76	38	47	50
3		333	218	110	112	170	84	43
4		266	188	282	91	316	69	48
5		218	164	282	266	170	43	36
6		218	144	234	108	84	34	26
7		646	130	158	80	54	48	22
8		367	125	125	80	48	367	20
9		250	133	112	138	80	120	19
10		401	89	115	128	40	74	18
11		646	91	120	115	34	57	18
12		316	59	98	1,050	45	38	30
13		282	80	150	218	43	34	22
14		299	686	234	147	57	31	19
15		1,150	810	188	115	203	47	18
16		454	282	105	78	63	50	17
17		299	203	128	350	31	48	16
18		218	203	266	350	61	39	16
19		188	185	526	188	69	28	15
20		250	179	266	316	40	27	15
21		173	203	185	282	34	22	14
22		164	164	150	250	27	20	14
23	436	218	147	120	120	27	19	14
24	384	203	120	98	103	646	42	14
25	250	299	105	87	87	112	299	13
26	203	282	133	566	67	74	367	13
27	350	299	130	266	72	74	110	12
28	316	766	122	185	67	52	82	12
29		350	89	141	63	74	59	12
30		266	84	94	48	100	52	12
31		282		82		69	48	

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922-23												
1	12	13	20	1,830	2,650		63	78	28	59	367	18
2	13	13	74	282	1,150	110	72	65	28	54	185	18
3	12	14	23	203	1,100		67	57	250	43	133	20
4	12	14	40	144	436	350	96	56	98	30	350	96
5	12	13	1,050	130	266	218	203	43	47	91	234	59
6	12	13	188	120	188	147	367	30	43	43	234	27
7	13	14	133	98	188	566	185	45	52	50	125	84
8	16	14	766	98	179	234	155	47	122	57	87	250
9	17	14	333	96	155	160	125	82	45	34	74	89
10	25	14	218	59	120	161	103	63	31	24	87	52
11	40	13	138		96	179	94	108	367	22	316	35
12	20	13	130	60	87	726	82	266	333	42	606	29
13	17	13	98		566	472	188	203	855	39	418	22
14	16	13	141		367	250	122	147	418	35	218	24
15	14	20	472			203	299	110	218	25	120	21
16	15	47	218			686	282	203	185	21	87	21
17	16	21	1,200	130	165	418	188	152	110	21	89	20
18	16	20	299			250	141	108	89	19	87	19
19	15	91	234			266	125	87	179	16	69	22
20	14	34	155			218	108	84	115	15	87	28
21	14	21	141	418		176	100	108	78	15	47	566
22	14	27	128	490		152	96	91	63	21	33	122
23	15	20	161	203		810	89	74	45	48	28	61
24	28	18	136			526	84	65	141	28	29	40
25	21	19	82		55	266	72	63	144	266	24	35
26	18	21	82	155		203	61	48	89	56	24	30
27	15	21	57			167	61	52	118	33	20	27
28	15	20	203	950		144	52	59	74	418	20	23
29	14	20	158	367		138	188	36	110	203	22	22
30	14	19	130	218		110	100	69	78	138	16	21
31	14		82	218		67		28		316	18	

NOTE.—Stage-discharge relation affected by ice Jan. 11–20, 24–27, and Feb. 15 to Mar. 3; mean discharge estimated from weather records and observer's notes.

Monthly discharge of Shavers Fork at Cheat Bridge, W. Va., for the years ending Sept. 30, 1922 and 1923

[Drainage area, 57.5 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1922					
February 23–28	436	203	326	5.67	1.27
March	1,150	164	355	6.17	7.11
April	810	59	204	3.55	3.96
May	566	69	181	3.15	3.63
June	1,050	48	175	3.04	3.39
July	646	27	95.9	1.67	1.92
August	367	19	79.5	1.38	1.59
September	50	12	21.4	.372	.42
1922–23					
October	40	12	16.4	.285	.33
November	91	13	20.9	.363	.40
December	1,200	20	235	4.09	4.72
January	1,830		244	4.24	4.89
February	2,650		321	5.58	5.81
March	810		277	4.82	5.56
April	367	52	132	2.30	2.57
May	266	28	88.0	1.53	1.76
June	855	28	152	2.64	2.94
July	418	15	73.6	1.28	1.48
August	606	16	137	2.38	2.74
September	566	18	63.4	1.10	1.23
The year	2,650	12	146	2.54	34.43

SHAVERS FORK AT BEMIS, W. VA.

LOCATION.—At highway bridge at Bemis, Randolph County, about one-fourth mile below dam of Bemis Lumber Co.

DRAINAGE AREA.—114 square miles (measured by West Penn Power Co. on topographic maps).

RECORDS AVAILABLE.—February 17 to September 30, 1922, and March 22 to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge; read by Richard Litzenburg.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Channel divided by an island 100 feet above station. Series of rapids begin 100 feet above bridge and extend to the dam, one-fourth mile above. Channel below station straight for about 400 feet. Right bank high and wooded, not subject to overflow; left bank low and subject to overflow in extreme high water. Stream bed consists of bedrock and boulders. Control practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during period March 22 to September 30, 1923, 7.61 feet at 4.30 p. m. June 13; minimum stage, 2.72 feet at 4.30 p. m. September 8.

Highest known flood reached a stage represented by gage height of about 15.3 feet in the spring of 1918. Rainfall records indicate that this stage must have occurred about the middle of March.

ICE.—Stage-discharge relation affected by ice during winter.

REGULATION.—The timber cribbed dam about one-fourth mile above station for holding logs for sawmill of Bemis Lumber Co. is not used at present; dam is in poor condition.

DIVERSIONS.—A planked flume 2 feet by 2 feet by 1 foot, with intake at dam furnishes water to a forebay at sawmill. The flume is in poor condition and most of water taken out finds its way back into river; about 2 second-feet (estimated) runs around gage at stages above 5 feet.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve not fully developed. Gage read to hundredths twice daily. Records good.

COOPERATION.—Records furnished by West Penn Power Co.

Discharge measurements of Shavers Fork at Bemis, W. Va., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Mar. 22	James E. Stewart	4.29	341
Apr. 9	do	3.99	223
Aug. 24	Stewart and Davis	3.29	63.5

Daily gage height, in feet, of Shavers Fork at Bemis, W. Va., for the year ending Sept. 30, 1923

Day	Mar.	Apr.	May	June	July	Aug.	Sept.
1		3.59	3.77	3.25	3.61	5.44	2.91
2		3.77	3.67	3.23	3.57	4.68	2.89
3		3.69	3.60	3.11	3.41	4.41	2.74
4		3.71	3.65	4.43	3.37	5.01	4.68
5		3.81	3.50	3.60	3.31	5.13	3.96
6		4.91	3.45	3.51	3.34	4.71	3.66
7		4.34	3.43	3.77	3.29	4.27	3.56
8		4.10	3.46	3.56	3.27	4.13	5.14
9		4.04	4.61	3.53	3.41	4.21	5.08
10		3.89	3.65	3.27	3.19	4.24	3.81
11		3.79	3.97	4.14	3.10	5.14	3.58
12		3.75	4.35	5.25	3.77	4.58	3.44
13			4.33	7.53	3.51	5.08	3.16
14			4.11	5.54	3.39	4.98	3.31
15		4.71	4.03	4.67	3.23	4.62	3.22
16		4.83	4.17	4.64	3.21	3.97	3.22
17		4.39	4.11	4.31	3.05	3.91	3.23
18		4.15	4.03	3.98	3.01	3.79	3.03
19		4.04	3.90	3.91	2.96	3.67	3.48
20		3.94	3.81	4.57	2.83	3.51	3.34
21		3.90	3.89	3.91	2.81	3.45	6.04
22	4.31	3.82	3.81	3.67	3.13	3.38	4.54
23	5.79	3.73	3.73	3.54	3.88	3.31	3.96
24	5.75	3.67	3.73	3.77	3.19	3.32	3.76
25	4.71	3.65	3.39	4.34	5.59	3.24	3.55
26	4.47	3.59	3.49	3.77	4.38	3.16	3.45
27	4.36	3.87	3.49	4.29	3.76	3.12	3.40
28	4.21	3.52	3.49	3.79	5.37	3.04	3.30
29	3.94	4.27	3.37	4.27	5.12	3.03	3.27
30	4.02	3.97	3.27	3.89	4.42	3.01	3.18
31	3.89		3.27		4.84	2.98	

NOTE.—No gage readings Apr. 13 and 14.

SHAVERS FORK AT PARSONS, W. VA.

LOCATION.—At steel highway bridge 600 feet northeast of railroad station at Parsons, Tucker County, and half a mile above confluence with Dry Fork.

DRAINAGE AREA.—230 square miles (measured by West Penn. Power Co. on topographic maps).

RECORDS AVAILABLE.—October 14, 1910, to September 30, 1923.

GAGE.—Chain gage attached to bridge October 14, 1910, to August 25, 1923 After August 25, 1923, staff gage with lower section on lower side of left pier of railroad bridge about 40 feet upstream from highway bridge; upper section on upper, shore side of left pier of highway bridge; read by R. W Evans until March 30, 1923, and Robert T. Deem after March 31. Sea-level elevation of zero of gage, 1,631.70 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Channel rocky. Control, coarse gravel and rocks. Stage at zero flow was about 2.0 feet in July, 1923.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.3 feet at 8 a. m. February 2 (discharge not determined); minimum stage, 2.6 feet October 2–6, 23, November 2, 6, and 10 (discharge not determined).

1910–1923: Maximum stage recorded, 9.90 feet January 30, 1912, and March 12, 1917 (discharge, 12,300 second-feet); minimum discharge, 1 second-foot October 1, 1914 (gage height, 2.0 feet). High water of 1888 and 1907 reached a stage of approximately 12.5 feet referred to present gage datum.

ICE.—Stage-discharge relation affected by ice during severe winters.

REGULATION.—Flow at low stages may be affected by storage of water at pulp milldam about three-fourths mile above station.

ACCURACY.—Gage read to hundredths once daily. Daily discharge withheld pending additional discharge measurements. Records good.

Discharge measurements of Shavers Fork at Parsons, W. Va., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Mar. 26	James E. Stewart	4.18	795	June 30	Stewart and Davis	3.81	497
Apr. 7	do	3.95	586	July 2	do	3.36	223
10	do	3.51	313	2	do	3.36	223
15	do	4.60	1,230	Aug. 25	do	2.99	84.8
June 6	Stewart and Davis	3.51	291				

Daily gage height, in feet, of Shavers Fork at Parsons, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.7	2.7	2.70	4.75	6.95	------	3.34	3.50	3.02	3.49	4.84	2.82
2	2.6	2.65	2.70	4.80	7.50	3.80	3.30	3.39	2.98	3.34	3.94	2.78
3	2.6	2.7	2.70	4.20	5.60	3.60	3.31	3.32	2.95	3.24	4.08	2.76
4	2.6	2.7	2.70	3.86	5.20	3.90	3.34	3.27	3.38	3.17	4.03	2.76
5	2.6	2.7	4.65	3.70	4.60	4.28	3.42	3.25	3.69	3.08	4.28	3.56
6	2.6	2.6	4.45	3.45	------	------	4.12	3.22	3.54	3.20	3.92	3.43
7	2.7	2.7	3.88	3.50	3.94	4.90	4.00	3.20	3.47	3.46	3.70	3.18
8	2.7	2.7	4.39	3.62	------	------	3.74	3.22	3.46	3.20	3.70	3.38
9	2.7	2.7	4.94	3.66	3.55	4.25	3.62	3.54	3.34	3.09	3.75	3.98
10	2.68	2.6	4.50	3.65	3.40	3.80	3.52	3.62	3.20	3.11	3.50	3.48
11	2.7	2.7	3.92	3.60	3.50	4.00	3.44	3.68	3.47	3.08	3.85	3.28
12	2.8	2.7	3.65	3.40	3.50	4.20	3.38	3.80	5.12	3.10	3.86	3.16
13	2.9	2.7	3.70	3.40	5.55	5.45	3.84	4.08	5.99	3.30	4.56	3.10
14	2.9	2.7	3.75	3.60	5.12	4.70	5.18	3.99	5.55	3.14	3.88	3.02
15	2.9	2.7	4.25	4.25	4.20	4.20	4.70	3.74	4.42	3.02	3.57	2.98
16	2.8	2.8	4.40	------	4.40	4.60	4.42	3.80	4.22	3.04	3.42	2.96
17	2.8	3.15	5.40	3.90	4.44	5.30	4.10	3.80	3.86	3.00	3.36	2.92
18	2.8	3.2	5.20	------	4.00	4.45	3.85	3.66	3.64	2.90	3.32	2.89
19	2.8	2.95	4.35	3.82	3.65	3.90	3.70	3.56	3.50	2.84	3.31	2.98
20	2.8	3.14	4.15	------	------	3.65	3.60	3.39	3.42	2.80	3.18	3.20
21	2.75	3.1	4.00	3.70	3.49	3.92	3.52	3.54	3.51	2.78	3.10	4.28
22	------	3.0	3.82	5.50	------	3.84	3.46	3.51	3.32	2.75	3.19	4.22
23	2.65	3.0	3.60	4.50	3.30	4.00	3.42	3.42	3.24	3.08	3.06	3.64
24	2.7	2.8	3.60	4.20	3.40	5.70	3.34	3.46	3.16	3.22	3.01	3.42
25	2.7	2.9	3.50	4.15	3.40	------	3.30	3.36	3.62	4.12	2.98	3.29
26	2.7	2.9	3.40	3.95	3.40	4.26	3.26	3.29	3.53	3.88	2.96	3.20
27	2.65	2.75	3.35	4.10	------	3.96	3.23	3.26	3.48	3.38	2.91	3.13
28	2.7	2.7	3.34	6.10	4.30	3.74	3.24	3.18	3.56	3.38	2.89	3.07
29	2.7	2.7	3.35	5.45	------	3.62	3.62	3.15	3.85	4.55	2.88	3.02
30	2.7	2.7	3.65	4.75	------	3.53	3.72	3.12	3.76	3.82	2.86	2.97
31	2.7	------	3.50	4.20	------	3.48	------	3.06	------	4.01	2.84	------

NOTE.—Gage not read on days for which no gage height is given.

BIG SANDY CREEK AT ROCKVILLE, W. VA.

LOCATION.—At highway bridge at Rockville, Preston County, 5 miles above mouth and 6 miles below Bruceton Mills.

DRAINAGE AREA.—202 square miles (determined by West Virginia Development Co.).

RECORDS AVAILABLE.—May 7, 1909, to March 31, 1918, and April 28, 1921, to September 30, 1923.

GAGE.—Chain gage attached to downstream side of bridge; read by W. O. Walls.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel composed of boulders and bedrock. Control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.20 feet at 1 p. m. April 14 (discharge not determined); minimum stage, 2.89 feet October 2–7 (discharge not determined).

1909–1918, 1921–1923: Maximum stage recorded, 15.6 feet on January 13, 1911 (discharge, about 18,600 second-feet); minimum stage, 2.35 feet October 12, 1914 (discharge, approximately 0.4 second-foot).

ICE.—Stage-discharge relation affected by ice during severe winters.

REGULATION.—Operation of gristmills at Rockville, Clifton Mills, and Bruceton Mills may produce fluctuations in stage during low water.

ACCURACY.—Gage read to half-tenths twice daily, except Sunday. Daily discharge withheld pending development of a revised rating curve. Gage-height records good.

COOPERATION.—Records furnished by West Penn Power Co.

The following discharge measurement was made by James E. Stewart: July 21, 1923: Gage height, 4.11 feet; discharge, 51.2 second-feet.

Daily gage height, in feet, of Big Sandy Creek at Rockville, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	-------	3.48	3.85	8.96	7.25	6.09	-------	6.07	4.33	-------	4.31	3.89
2	2.89	3.48	3.75	7.46	8.25	5.14	4.73	5.80	4.23	4.79	4.21	-------
3	2.89	3.43	-------	6.56	7.45	4.89	4.83	5.47	-------	4.56	4.11	3.79
4	2.89	3.38	3.97	6.06	-------	-------	4.83	5.34	4.06	4.41	4.71	3.63
5	2.89	-------	6.97	5.66	6.50	5.79	4.98	5.17	4.01	4.21	-------	3.56
6	2.89	3.38	5.72	5.56	6.55	5.59	6.68	-------	3.99	4.19	4.43	3.81
7	2.94	3.38	5.52	-------	6.50	5.99	6.08	4.92	4.21	4.41	4.43	3.91
8	-------	3.38	5.37	5.51	5.45	5.79	-------	4.87	4.03	-------	4.66	3.91
9	2.99	3.38	4.69	6.46	5.45	5.24	5.08	5.17	4.21	4.16	5.86	-------
10	3.47	3.40	-------	6.71	5.35	6.04	5.33	5.17	-------	4.06	5.11	3.61
11	4.04	3.38	4.97	5.96	-------	-------	5.15	5.40	4.36	5.51	5.79	3.91
12	4.04	-------	4.92	5.76	4.60	7.09	4.93	6.97	4.83	5.36	-------	3.86
13	3.87	3.38	4.67	5.41	8.90	7.89	5.08	-------	4.56	5.09	4.49	3.79
14	3.84	3.38	4.85	-------	8.15	6.44	10.08	6.42	4.51	4.56	4.36	3.69
15	-------	3.46	5.27	8.61	6.70	6.09	-------	6.07	4.21	-------	4.23	3.59
16	3.49	4.28	5.42	7.36	6.10	5.94	8.13	5.92	4.53	4.41	4.23	-------
17	3.49	4.20	-------	6.11	5.80	5.84	6.88	5.67	-------	5.29	4.26	3.51
18	3.39	4.16	7.42	5.86	-------	-------	6.43	5.44	3.81	5.11	4.36	3.61
19	3.41	-------	5.55	5.96	5.25	5.76	6.11	5.20	4.16	4.86	-------	3.81
20	3.29	3.96	5.47	5.78	5.13	5.44	5.93	-------	4.16	4.56	4.03	4.01
21	3.29	3.86	5.07	-------	5.13	5.34	5.31	5.32	4.06	4.19	3.99	4.23
22	-------	3.90	5.12	8.36	5.00	5.39	-------	5.20	4.81	-------	4.71	4.06
23	3.91	3.76	4.97	7.71	4.85	6.89	5.15	5.04	3.99	3.89	4.41	-------
24	3.81	3.66	-------	6.71	4.85	7.94	5.11	4.92	-------	4.01	4.29	3.91
25	3.69	3.58	4.75	6.46	-------	-------	4.93	4.82	4.46	3.89	4.19	3.81
26	3.77	-------	4.57	5.66	4.75	6.39	4.81	4.74	4.39	3.81	-------	3.73
27	3.79	3.66	5.02	5.61	5.55	5.64	4.23	-------	4.21	3.81	4.01	3.49
28	3.71	3.80	5.32	-------	6.25	5.54	4.53	4.42	4.36	4.61	3.91	3.41
29	-------	3.76	6.47	7.71	-------	5.32	-------	4.32	4.11	-------	4.11	3.31
30	3.61	3.98	5.77	6.56	-------	5.14	7.28	4.32	5.81	4.43	3.96	-------
31	3.57	-------	-------	6.31	-------	4.94	-------	4.34	-------	4.46	3.93	-------

NOTE.—Gage not read on Sundays.

BEAVER RIVER BASIN

MAHONING RIVER AT YOUNGSTOWN, OHIO

LOCATION.—At Bridge Street Bridge, at Ohio Works of Carnegie Steel Co., at Youngstown, Mahoning County, 4½ miles upstream from site of station operated in 1903–1906. Mill Creek enters on right three-fourths mile below gage.

DRAINAGE AREA.—899 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 13, 1921, to September 30, 1923.

GAGE.—Chain gage on highway bridge, read by E. B. Dennison. Zero of gage is 826.53 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel straight for 1,000 feet above and below gage. Banks high. One channel at all stages. Bed of stream composed of gravel and small boulders. Control for low water is riffle 150 feet below gage; control for high water is stretch of channel below gage and Baldwin dam 1¾ miles below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.6 feet at 8 a. m. May 13 (discharge, 5,440 second-feet); minimum stage, 1.16 feet at 8.30 a. m. October 21 (discharge, 64 second-feet).

1922–1923: Maximum stage recorded, 8.4 feet at 8 a. m. April 15, 1922 (discharge, 6,320 second-feet); minimum stage, 1.12 feet at 4 p. m. October 22, 1921 (discharge, 59 second-feet).

ICE.—Stage-discharge relation not affected by ice as water is used for cooling purposes in steel mills above station.

DIVERSIONS.—Water is diverted for municipal water supply above the station.

REGULATION.—Flow is regulated at Milton reservoir.

ACCURACY.—Stage-discharge relation for extremely low water changed gradually from May 30 to August 8; not affected by ice. Rating curves well defined up to 4,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table; shifting-control method used May 30 to Aug. 8. Records good.

COOPERATION.—Gage-height record furnished by Carnegie Steel Co.

Discharge measurements of Mahoning River at Youngstown, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
May 29	E. E. R. Dornbach	1.43	120	Aug. 27	L. L. Dickson	1.32	112
Aug. 9	L. L. Dickson	1.45	149	Sept. 13	do	1.38	122
10	do	1.42	136				

Daily discharge, in second-feet, of Mahoning River at Youngstown, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	90	86	117	528	938	865	435	141	64	114	170	135
2	74	88	145	495	1,210	760	435	135	64	109	152	132
3	79	88	159	465	1,790	865	405	135	120	111	190	127
4	77	88	141	405	1,880	1,610	528	135	95	190	159	109
5	93	111	138	435	1,130	2,150	1,530	129	100	177	177	122
6	88	141	141	283	725	1,790	2,980	129	155	132	465	99
7	88	117	141	233	560	1,370	2,330	123	528	117	198	106
8	100	123	173	211	435	1,370	1,450	132	1,050	129	145	132
9	81	114	215	215	375	1,210	1,130	170	725	104	137	140
10	81	100	219	177	331	1,790	760	173	336	106	137	122
11	77	123	170	202	336	3,980	495	248	194	141	122	127
12	72	129	135	211	320	4,280	465	1,970	135	152	152	119
13	84	88	111	211	795	3,880	405	5,220	97	126	143	127
14	81	114	111	405	1,130	2,780	348	3,380	97	93	154	106
15	84	145	109	2,060	725	2,150	405	1,790	111	111	149	111
16	74	138	111	2,060	625	2,330	592	1,880	173	100	143	111
17	83	155	109	2,420	465	2,980	625	2,240	202	102	132	96
18	77	135	111	1,130	375	2,150	560	1,790	155	93	122	106
19	74	123	97	1,530	315	1,610	375	1,130	148	84	135	109
20	67	111	97	1,880	299	1,450	304	830	123	159	116	122
21	66	97	97	3,180	299	1,130	283	900	120	141	152	203
22	84	95	97	4,680	288	1,130	299	938	109	155	135	320
23	102	111	100	4,180	257	2,060	267	625	123	120	109	236
24	117	104	129	2,420	238	1,970	219	264	155	138	119	149
25	111	93	138	2,060	257	1,370	202	257	135	123	109	149
26	109	111	138	830	375	1,050	190	202	129	126	114	138
27	104	109	173	658	690	865	177	194	106	145	116	116
28	102	104	465	900	1,050	658	177	141	120	170	192	109
29	111	109	658	1,610	-------	560	177	126	126	145	173	119
30	97	120	625	1,530	-------	528	166	74	129	170	186	116
31	88	-------	560	1,130	-------	465	-------	64	-------	170	154	-------

NOTE.—Gage not read Nov. 19; discharge interpolated.

Monthly discharge, in second-feet, of Mahoning River at Youngstown, Ohio, for the year ending Sept. 30, 1923

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October	117	66	87.6	May	5,220	64	828
November	155	86	112	June	1,050	64	197
December	658	97	191	July	190	84	131
January	4,680	177	1,250	August	465	109	157
February	1,880	238	650	September	320	96	134
March	4,280	465	1,710				
April	2,980	166	624	The year	5,220	64	508

LITTLE BEAVER CREEK BASIN

LITTLE BEAVER CREEK NEAR EAST LIVERPOOL, OHIO

LOCATION.—At steel highway bridge known as Grimms Bridge, 4 miles above mouth of creek and 4 miles northeast of East Liverpool, Columbiana County. North Fork enters creek on left 3 miles above station.

DRAINAGE AREA.—505 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 17, 1915, to September 30, 1923.

GAGE.—Chain gage on downsteam side of highway bridge; read by Burl Thompson.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—One channel at all stages; at extreme high stages water flows around both bridge abutments. Channel straight for 100 feet above and 300 feet below station. Rapids about 600 feet below bridge act as primary control; probably permanent. Zero flow would occur at gage height 0.1 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 13.1 feet at 8 a. m. May 13; minimum stage, 1.93 feet at 5 p. m. July 26.

1915–1923: Maximum stage recorded, 13.1 feet on May 13, 1923; minimum stage, 1.78 feet on August 22 and 26, 1918 (discharge, 12 second-feet).

Highest known flood reached a stage represented by gage height about 20 feet.

ICE.—Stage-discharge relation affected by ice and ice jams during severe winters.

DIVERSIONS.—Negligible.

REGULATION.—None.

ACCURACY.—Gage read to hundredths twice daily. Records reliable. Rating curve not defined for extremely high water.

No discharge measurements were made during the year.

Daily gage height, in feet, of Little Beaver Creek near East Liverpool, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.03	2.19	2.36	3.74	4.30	4.04	3.74	3.02	2.94	2.46	2.26	2.45
2	2.50	2.22	2.54	-------	4.41	3.68	3.42	2.95	2.88	2.40	2.89	2.28
3	2.06	2.20	2.60	-------	5.14	4.03	3.48	2.87	2.83	2.34	2.56	2.16
4	2.06	2.20	2.56	-------	4.54	4.76	3.90	2.84	2.84	2.49	4.08	2.12
5	2.04	2.18	2.52	3.43	3.84	5.00	4.61	2.80	2.82	2.40	3.99	2.19
6	2.02	2.26	2.55	-------	5.18	4.61	4.42	2.79	2.76	2.36	3.78	2.18
7	2.08	2.52	2.52	-------	3.84	5.08	4.14	2.74	3.42	2.40	3.34	2.42
8	2.18	2.48	2.62	2.96	3.90	4.43	3.88	2.76	3.76	2.29	2.80	2.36
9	2.20	2.53	3.14	-------	3.86	4.44	3.68	3.33	3.35	2.20	2.56	2.28
10	2.34	2.47	3.20	-------	3.65	4.98	3.55	3.33	3.06	2.24	2.52	2.28
11	2.50	2.39	3.05	-------	3.79	6.06	3.44	3.20	2.92	2.76	2.40	2.20
12	2.38	2.36	2.74	3.34	3.58	6.48	3.35	8.88	2.90	2.95	2.38	2.13
13	2.42	2.36	2.10	-------	6.78	6.22	3.32	11.30	2.86	2.44	2.39	2.08
14	2.29	2.36	-------	-------	5.50	5.38	3.54	7.04	2.80	2.31	2.42	2.03
15	2.30	2.55	2.56	6.81	5.69	4.80	4.12	5.63	3.04	2.24	2.41	2.02
16	2.20	2.80	-------	5.81	6.12	5.06	4.28	6.18	3.14	2.46	2.30	2.02
17	2.25	2.78	2.96	4.60	6.10	5.12	4.06	5.38	2.94	2.54	2.22	2.01
18	2.22	2.68	2.39	4.22	5.92	4.44	3.80	4.72	2.76	2.34	2.14	1.96
19	2.25	2.50	-------	4.77	5.68	4.28	3.68	4.32	2.70	2.22	2.10	2.10
20	2.34	2.46	-------	4.52	5.50	4.02	3.53	4.18	2.68	2.14	2.04	2.57
21	2.34	2.45	-------	7.00	-------	3.83	3.44	4.52	2.62	2.09	2.04	3.38
22	2.19	2.42	2.34	6.74	-------	4.30	3.36	4.24	2.54	2.04	2.12	3.56
23	2.19	2.32	-------	4.96	4.80	5.76	3.30	3.88	2.50	1.96	2.10	3.16
24	2.44	2.25	-------	4.50	-------	5.85	3.22	3.64	2.45	2.03	2.02	2.78
25	2.44	2.22	2.66	4.12	-------	4.94	3.12	3.50	2.89	2.00	2.02	2.56
26	2.44	2.25	-------	3.88	4.90	4.64	3.02	3.40	2.90	1.94	2.02	2.48
27	2.38	2.28	-------	3.70	7.74	4.33	3.00	3.34	2.57	2.08	2.02	2.38
28	2.32	2.36	-------	5.55	5.14	4.05	3.14	3.22	2.51	2.40	2.34	2.35
29	2.23	2.30	4.46	5.36	-------	3.80	3.24	3.14	2.54	2.49	2.50	2.66
30	2.23	2.33	-------	5.18	-------	3.74	3.16	3.06	2.52	2.50	2.98	2.49
31	2.24	-------	-------	4.58	-------	3.70	-------	2.97	-------	2.40	2.63	-------

YELLOW CREEK BASIN

YELLOW CREEK AT HAMMONDSVILLE, OHIO

LOCATION.—At covered highway bridge on Steubenville Pike, one-fifth mile southwest of Hammondsville, Jefferson County. North Fork enters on left 1,000 feet below station.

DRAINAGE AREA.—169 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 13, 1915, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge; read by W. J. Sprague.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—One channel, but at extreme high stages stream flows around both abutments; straight 1,000 feet above and curved 100 feet below station. Control not permanent. Zero flow would occur at gage height 1.4 feet as determined in 1915, 1916, 1917, and 1922.

EXTREMES OF STAGE.—Maximum stage recorded during year, 12.55 feet at 7 p. m. May 12; minimum stage, 1.70 feet at 9 a. m. October 1.

1915–1923: Maximum stage recorded, 13.2 feet at 10 a. m. June 17, 1920; minimum stage, 1.28 feet at 7.10 p. m. August 28, 1918.

Highest known flood reached a stage represented by gage height about 16 feet.

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Gage read to hundredths, twice daily. Rating curve not yet defined for high water.

No discharge measurements were made during the year.

Daily gage height, in feet, of Yellow Creek at Hammondsville, Ohio, for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1.72	1.94	2.18	3.12	3.55	4.38	2.90	2.87	3.14	2.83	3.36	2.67
2	1.79	1.98	2.20	3.19	3.62	4.18	3.10	2.82	3.12	2.80	2.88	2.62
3	1.76	1.98	2.19	3.10	3.65	3.98	3.26	2.78	3.07	2.80	2.77	2.66
4	1.79	1.99	2.17	2.85	3.48	3.64	3.56	2.75	3.04	2.70	2.80	2.70
5	1.74	1.96	2.28	2.68	3.34	3.76	3.72	2.72	3.01	2.83	3.38	2.70
6	1.74	2.18	2.32	2.58	3.12	4.03	3.66	2.68	3.07	2.82	2.98	2.98
7	1.82	2.38	2.26	2.64	3.04	4.18	3.50	2.64	3.02	2.82	2.86	2.96
8	1.89	2.38	2.38	2.78	3.11	3.90	3.40	2.72	3.16	2.78	2.77	2.80
9	1.88	2.32	2.55	3.12	3.14	3.56	3.30	3.33	3.06	2.74	2.70	2.70
10	2.28	2.25	2.44	3.04	3.08	4.13	3.21	3.23	3.02	2.78	2.62	2.72
11	2.14	2.09	2.39	2.98	-------	4.70	3.12	3.13	3.00	2.77	2.62	2.67
12	2.09	2.09	2.35	3.05	-------	4.60	3.00	8.96	3.04	2.78	2.66	2.62
13	2.05	2.04	2.32	2.95	-------	4.38	2.96	7.13	3.02	2.77	2.77	2.59
14	2.01	2.08	2.29	3.50	-------	4.03	4.00	5.08	3.00	2.70	2.72	2.57
15	1.97	2.42	2.25	4.18	-------	3.89	5.13	4.73	2.95	2.78	2.70	2.54
16	1.94	2.82	2.20	3.55	-------	3.86	4.40	4.66	2.93	2.66	2.57	2.50
17	1.92	2.45	2.18	2.88	-------	3.70	4.08	4.04	2.97	2.60	2.62	2.50
18	1.98	2.34	2.15	3.28	-------	3.62	3.76	3.70	2.92	2.72	2.62	2.54
19	1.96	2.28	2.13	3.05	4.98	3.46	3.60	3.56	2.88	2.67	2.57	2.66
20	1.90	2.22	2.10	3.02	4.93	3.20	3.50	3.60	2.85	2.60	2.54	3.23
21	1.86	2.19	2.05	4.26	4.63	3.36	3.36	3.73	2.82	2.49	2.50	3.60
22	1.90	2.14	2.08	4.22	4.58	3.56	3.27	3.52	2.78	2.62	2.52	3.10
23	1.98	2.09	2.10	3.68	4.38	3.78	3.20	3.50	2.92	2.57	2.47	2.92
24	2.12	2.09	2.12	3.45	4.23	3.67	3.12	3.50	3.06	2.62	2.52	2.87
25	2.22	2.06	2.20	3.30	4.13	3.76	3.07	3.37	3.58	2.57	2.47	2.82
26	2.08	2.11	2.35	3.15	4.08	3.78	3.02	3.32	3.06	2.57	2.42	2.77
27	1.99	2.14	2.50	3.15	5.38	3.56	2.98	3.27	2.97	2.58	2.56	2.70
28	1.96	2.11	3.00	6.38	4.78	3.33	3.10	3.22	2.94	2.78	2.86	2.64
29	1.96	2.14	3.25	4.82	-------	3.10	3.13	3.20	2.92	2.96	3.03	2.70
30	1.98	2.12	3.10	4.45	-------	3.26	3.00	3.17	2.88	2.83	2.86	2.76
31	1.96	-------	3.14	3.75	-------	3.08	-------	3.17	-------	2.78	2.74	-------

MUSKINGUM RIVER BASIN

TUSCARAWAS RIVER AT CRYSTAL SPRING, OHIO

LOCATION.—In NW. ¼ sec. 30, T. 11 N., R. 9 W., at highway bridge at Crystal Spring, Stark County.

DRAINAGE AREA.—430 square miles (measured on topographic map).

RECORDS AVAILABLE.—October 15, 1921, to September 30, 1923.

GAGE.—Chain gage on highway bridge; read by R. W. Smith.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel straight for 500 feet above and below gage. One channel at all stages. Left bank high; right bank subject to overflow at extremely high water. Bed of stream composed of boulders and gravel. Control for low water is just below gage; control for high water is long stretch of channel below gage. Zero flow would occur at gage height −1.2 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.65 feet at 6 a. m. May 14 (discharge, 1,820 second-feet). Minimum discharge, 60 second-feet, November 5 and December 17–21.

1922–1923: Maximum stage recorded, 9.1 feet at 5 p. m., April 16, 1922 (discharge, 2,320 second-feet); minimum discharge, that of November 5 and December 17–21, 1922.

ICE.—Stage-discharge relation not affected by ice except during severe winters.

DIVERSIONS.—Ohio Canal diverts a small amount of water from Tuscarawas River at Portage Lakes, 3 miles south of Akron. Part of the water flows from the point of diversion into the Cuyahoga River basin and part flows down Tuscarawas River past this gaging station. (See list of miscellaneous measurements of Ohio Canal, p. 229.)

REGULATION.—Flow is slightly regulated at headquarters of this stream.

ACCURACY.—Stage-discharge relation for low water changed gradually from October 11 to November 9 and at medium high water on September 21; not affected by ice. Rating curves well defined above 200 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table; shifting-control method used October 11 to November 9. Records good except for extremely low water, for which they are fair.

Discharge measurements of Tuscarawas River at Crystal Spring, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 10	E. E. R. Dornbach	1.42	79.4	Aug. 24	L. L. Dickson	1.26	67.4
Nov. 10	Lasley Lee	1.28	72.2	Sept. 9	do	1.74	121

Daily discharge, in second-feet, of Tuscarawas River at Crystal Spring, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	68	64	64	93	700	183	158	104	77	98	93	174
2	68	60	72	166	380	183	150	98	77	98	82	110
3	68	64	72	243	370	265	143	88	82	93	183	93
4	68	64	68	212	276	420	158	88	82	110	1,300	93
5	72	60	72	166	232	520	580	82	77	150	1,540	104
6	72	68	72	143	222	420	1,220	77	77	150	850	110
7	72	77	82	116	166	346	1,360	77	122	166	370	88
8	77	77	93	122	150	254	1,190	82	212	166	232	116
9	82	72	98	122	150	183	640	98	158	136	183	158
10	82	68	93	136	143	580	395	122	93	116	136	174
11	77	68	93	150	129	1,000	287	129	93	183	98	222
12	77	64	82	174	122	1,120	202	880	93	174	192	158
13	72	64	77	232	254	1,090	192	1,750	93	136	940	122
14	72	68	72	346	420	940	174	1,820	82	116	700	93
15	72	72	64	910	420	580	212	1,470	104	116	243	82
16	72	77	64	1,060	370	820	254	1,000	143	110	122	77
17	72	77	60	790	232	1,000	254	580	116	104	104	77
18	72	72	60	495	166	940	232	420	93	98	88	72
19	72	72	60	395	158	760	174	322	93	93	82	104
20	72	68	60	420	150	470	158	276	93	98	77	254
21	72	64	60	790	143	298	136	298	93	98	72	700
22	72	64	64	940	143	192	122	276	93	98	77	550
23	72	64	64	760	110	420	122	222	88	93	77	287
24	72	64	64	550	104	730	116	174	88	98	72	243
25	77	64	64	346	98	580	104	143	93	98	64	158
26	77	64	72	265	136	420	98	122	88	93	64	104
27	77	64	77	222	166	310	98	110	88	93	88	72
28	72	64	88	370	222	212	98	104	88	93	322	68
29	72	64	93	580	-------	158	110	98	93	93	580	64
30	68	64	88	760	-------	143	116	93	98	93	298	64
31	64	-------	88	760	-------	136	-------	88	-------	93	192	-------

Monthly discharge, in second-feet, of Tuscarawas River at Crystal Spring, Ohio, for the year ending Sept. 30, 1923

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October	82	64	72.7	May	1,820	77	364
November	77	60	67.2	June	212	77	99
December	98	60	74.2	July	183	93	115
January	1,060	93	414	August	1,540	64	307
February	700	98	226	September	700	64	160
March	1,120	136	506				
April	1,360	98	308	The year	1,820	60	227

TUSCARAWAS RIVER AT NEWCOMERSTOWN, OHIO

LOCATION.—In T. 5 N., R. 3 W., at highway bridge three-fourths mile east of Newcomerstown, Tuscarawas County.

DRAINAGE AREA.—2,430 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 15, 1921, to September 30, 1923.

GAGE.—Chain gage on highway bridge; read by David and Lois Zimmer.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Channel straight for 800 feet above and below gage. One channel at all stages. Right bank high and wooded; left bank wooded, subject to overflow during floods. Bed of stream composed of gravel and small boulders. Control for low water is riffle 800 feet below gage; may shift during floods. Control for high water is long stretch of channel below gage. Zero flow would occur at gage height 0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.8 feet at 6 p. m. May 14 (discharge, 19,400 second-feet); minimum stage, 1.24 feet on July 25 and September 19 (discharge, 309 second-feet).

1921–1923: Maximum stage recorded, that of May 14, 1923; minimum stage, 1.20 feet September 28, 1922 (discharge, 290 second-feet).

ICE.—Stage-discharge relation affected by ice during severe winters.

DIVERSIONS.—A small amount of water is diverted into the Cuyahoga River basin by the Ohio Canal.

REGULATION.—Flow slightly regulated at Portage Lakes.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Tuscarawas River at Newcomerstown, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 9	E. E. R. Dornbach	1.36	377	Aug. 14	L. L. Dickson	2.50	1,310
June 1	do	2.11	1,020				

Daily discharge, in second-feet, of Tuscarawas River at Newcomerstown, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	391	338	391	1,670	3,820	2,070	1,420	980	886	574	509	644
2	338	338	391	2,500	3,820	1,600	1,360	886	1,140	509	842	542
3	338	338	420	2,070	4,360	1,600	1,360	799	1,300	449	574	449
4	338	338	479	1,670	4,360	2,210	1,670	759	933	449	1,300	420
5	338	338	509	1,360	2,500	3,290	3,460	719	842	479	4,540	574
6	338	391	542	1,140	1,670	2,960	6,780	719	980	542	3,460	542
7	338	391	682	980	1,800	2,650	5,450	682	1,540	609	1,930	759
8	338	509	682	1,140	1,670	3,460	4,180	682	1,670	644	1,080	609
9	364	509	1,240	2,650	1,670	3,120	3,460	799	1,360	509	842	509
10	391	449	1,420	2,800	1,420	3,640	2,500	1,240	980	449	682	479
11	509	364	1,030	2,210	1,240	7,550	2,070	1,190	886	420	574	449
12	542	391	759	1,800	1,140	7,550	1,800	4,180	799	574	574	420
13	509	364	682	1,480	2,650	7,750	1,540	14,400	799	542	1,480	391
14	420	338	574	1,360	6,020	6,020	2,070	19,400	719	449	1,300	364
15	391	449	574	6,400	4,360	4,360	4,180	15,200	682	420	799	364
16	364	719	509	7,160	2,500	4,000	4,900	9,990	886	420	719	338
17	364	933	509	4,180	1,930	6,590	5,080	7,750	719	574	574	338
18	391	682	509	2,350	1,600	4,720	3,460	4,900	682	759	479	319
19	391	574	644	2,650	1,540	3,640	2,650	3,460	609	509	479	309
20	338	509	574	2,350	1,300	2,800	2,070	2,800	574	391	420	449
21	338	509	574	3,460	1,240	2,210	1,930	2,800	509	364	391	2,210
22	338	479	479	8,750	1,080	2,350	1,670	3,290	509	338	391	2,500
23	391	509	479	6,780	980	3,820	1,540	2,500	509	328	391	1,540
24	338	420	479	4,540	980	6,970	1,300	1,930	644	319	364	933
25	364	391	479	3,120	799	5,450	1,240	1,670	842	309	338	719
26	391	391	542	2,650	886	4,180	1,080	1,480	1,080	328	338	609
27	420	391	609	2,210	1,540	3,290	1,030	1,360	682	319	391	542
28	391	391	980	3,290	1,540	2,500	1,030	1,190	574	338	391	542
29	364	391	4,000	8,750	-------	2,070	1,080	1,080	542	391	1,300	509
30	364	391	2,960	7,550	-------	1,800	1,190	1,030	574	338	1,420	644
31	314	-------	1,800	5,450	-------	1,800	-------	933	-------	574	933	-------

Monthly discharge of Tuscarawas River at Newcomerstown, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 2,430 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	542	314	379	0.156	0.180
November	933	338	451	.186	.208
December	4,000	391	854	.351	.405
January	8,750	980	3,430	1.41	1.63
February	6,020	799	2,160	.889	.926
March	7,750	1,600	3,810	1.57	1.81
April	6,780	1,030	2,480	1.02	1.14
May	19,400	682	3,570	1.47	1.70
June	1,670	509	848	.349	.389
July	759	309	459	.189	.218
August	4,540	338	961	.395	.455
September	2,500	309	667	.274	.306
The year	19,400	309	1,680	.691	9.37

MUSKINGUM RIVER AT DRESDEN, OHIO

LOCATION.—At suspension highway bridge half a mile east of Dresden, Muskingum County, and half a mile below mouth of Wakatomika Creek.

DRAINAGE AREA.—5,980 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 14, 1921, to September 30, 1923.

GAGE.—Chain gage on highway bridge; read by Howard Snack.

DISCHARGE MEASUREMENTS.—Made from bridge at gage.

CHANNEL AND CONTROL.—Channel straight for a quarter of a mile above and below gage. One channel at all stages. Banks high, not subject to overflow. Bed composed of solid rock, sand, and gravel. Control is concrete dam No. 11, 7 miles below gage. At low water the channel just below the gage partly controls the stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 19.6 feet at 5 a. m. May 14 (discharge, 36,700 second-feet); minimum stage, 3.51 feet at 6.30 a. m. October 7 (discharge, 680 second-feet).

1921–1923: Maximum stage recorded, 21.7 feet at 6.30 a. m. April 16, 1922 (discharge, 44,000 second-feet); minimum stage, 3.45 feet at 6 a. m. September 30, 1922 (discharge, 655 second-feet).

ICE.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—A small amount of water is diverted into the Cuyahoga River basin by the Ohio Canal.

REGULATION.—Occasionally slight regulation at dam 7 miles below gage.

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Muskingum River at Dresden, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 2	Lasley Lee	3.64	754	Aug. 15	L. L. Dickson	7.63	5,060
June 2	E. E. R. Dornbach	5.62	2,630	23	do	4.24	1,130
Aug. 7	F. R. Morgan	8.15	6,050	Sept. 8	do	6.72	4,050

Daily discharge, in second-feet, of Muskingum River at Dresden, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	790	730	850	4,400	11,500	6,570	4,680	3,170	2,910	1,500	1,310	3,430
2	730	730	920	4,400	9,490	5,130	4,120	2,910	2,650	1,400	1,220	1,500
3	730	730	850	5,430	9,870	4,680	3,700	2,520	2,910	1,310	1,700	1,310
4	680	730	990	4,830	10,400	4,540	4,120	2,270	3,170	1,220	1,310	1,140
5	680	730	1,060	3,980	8,920	6,070	5,280	2,150	2,650	1,220	6,230	1,700
6	730	730	1,140	3,300	6,070	7,450	13,000	2,030	2,780	1,310	8,920	4,980
7	680	850	1,220	2,910	4,830	6,740	18,800	1,920	3,430	1,500	6,400	3,560
8	730	850	1,700	2,780	4,540	6,740	13,800	1,810	4,980	1,310	6,740	4,120
9	790	920	1,500	3,840	4,540	8,540	10,800	2,030	5,130	2,520	3,430	3,840
10	850	990	2,390	7,270	4,260	8,540	10,800	2,390	4,120	2,150	2,270	3,560
11	850	920	3,560	6,910	3,840	13,000	7,090	2,780	3,040	1,700	1,700	2,520
12	920	850	2,650	5,430	3,430	16,700	5,750	2,150	2,650	1,400	2,030	1,500
13	990	790	1,700	4,400	3,170	18,500	5,130	27,200	2,390	1,310	3,040	1,220
14	1,060	790	1,400	3,700	10,100	17,400	5,130	36,700	2,520	1,600	4,830	1,140
15	990	850	1,220	4,830	11,700	14,000	6,740	34,700	2,150	1,700	5,430	1,060
16	920	990	1,220	12,800	8,920	10,800	10,600	33,300	2,150	1,500	5,280	990
17	920	1,140	1,140	11,300	6,070	17,200	10,800	23,200	2,270	1,500	4,980	850
18	850	1,810	1,060	7,450	4,830	15,700	9,680	18,000	2,520	1,920	3,300	850
19	850	1,500	1,100	5,910	6,740	11,700	8,540	12,600	2,030	1,810	1,700	920
20	850	1,140	1,140	5,590	7,450	9,490	6,070	9,300	1,810	1,310	1,500	1,060
21	790	1,140	1,180	5,750	4,830	7,630	5,280	8,170	1,600	1,060	1,220	2,030
22	850	1,140	1,230	15,400	3,980	6,400	4,830	7,990	1,400	990	1,140	5,130
23	850	1,140	1,270	16,400	4,400	11,000	4,400	8,730	1,310	920	1,140	5,750
24	850	1,060	1,310	13,000	5,430	18,300	3,980	7,270	1,310	920	990	3,840
25	850	920	1,140	10,200	5,430	17,200	3,700	5,750	1,700	850	990	3,840
26	850	850	1,060	7,810	3,560	14,200	3,300	4,830	1,920	730	990	1,920
27	850	920	1,220	6,400	3,430	11,500	3,040	4,260	2,150	790	990	1,700
28	850	850	1,310	7,450	5,750	8,540	2,910	3,980	1,700	850	1,060	1,400
29	850	850	3,840	17,400	-------	6,910	4,260	3,700	1,500	990	1,500	1,310
30	790	790	6,740	16,900	-------	5,750	3,040	3,430	1,500	1,060	2,910	1,400
31	790	-------	5,910	14,500	-------	4,980	-------	3,170	-------	1,140	2,910	-------

NOTE.—Stage-discharge relation affected by ice jam Dec. 19-23; discharge interpolated.

Monthly discharge of Muskingum River at Dresden, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 5,980 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,060	680	831	0.139	0.160
November	1,810	730	948	.159	.177
December	6,740	850	1,770	.296	.341
January	17,400	2,780	7,830	1.31	1.51
February	11,700	3,170	6,340	1.06	1.10
March	18,500	4,540	10,400	1.74	2.01
April	18,800	2,910	6,780	1.13	1.26
May	36,700	1,810	9,170	1.53	1.76
June	5,130	1,310	2,480	.415	.463
July	2,520	730	1,340	.224	.258
August	8,920	990	2,880	.482	.556
September	5,750	850	2,320	.388	.433
The year	36,700	680	4,420	.739	10.03

MUSKINGUM RIVER AT McCONNELSVILLE, OHIO

LOCATION.—At power plant of McConnelsville-Malta Electric Co. at dam No. 7 at McConnelsville, in Morgan County.

DRAINAGE AREA.—7,410 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1921, to September 30, 1923.

GAGE.—Vertical-staff gage in three sections on upstream side of power plant. Zero of gage is at elevation of crest of dam, 650.31 feet above mean sea level. Prior to July 27, 1922, a chain gage at highway bridge half a mile above dam and at same datum was used. Gage read by Earl Tomson.

DISCHARGE MEASUREMENTS.—Made from bridge half a mile above gage or by boat 800 feet below gage.

CHANNEL AND CONTROL.—Channel straight for a mile above and below gage. One channel at all stages. Bed composed of sand and gravel. Control is dam No. 7 just below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.9 feet at 2 and 6 p. m. May 14 (discharge, 32,600 second-feet); minimum mean daily discharge, 726 second-feet on October 7.

1922–1923: Maximum stage recorded, 11.9 feet at 6.15 a. m. April 16, 1922 (discharge, 56,600 second-feet); minimum mean daily discharge, that of October 7, 1922.

The flood of March, 1913, reached a stage on March 27 of 33.5 feet referred to gage datum.

ICE.—Stage-discharge relation not affected by ice except during unusually severe winters.

DIVERSIONS.—Diversions above station negligible. Water is diverted past the dam at this station by the McConnelsville-Malta Electric Co. and the Elk Eye Milling Co. The discharge measurements and discharge tables show total flow of river at McConnelsville.

REGULATION.—Slight regulation at dam No. 7.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined below 30,000 second-feet. Gage read to hundredths twice daily before and after the Elk Eye Milling Co. is running. Daily discharge ascertained by applying mean daily gage height to rating table to obtain flow over dam, including leakage through canal lock, and adding flow through power house determined from mean head, gate openings, and manufacturer's rating of water wheels. Records good.

COOPERATION.—Gage-height record furnished by McConnelsville-Malta Electric Co.

Discharge measurements of Muskingum River at McConnelsville, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 3	Lasley Lee	0.36	891	Sept. 6	L. L. Dickson	2.43	6,810
Aug. 21	L. L. Dickson	.82	1,660				

Daily discharge, in second-feet, of Muskingum River at McConnelsville, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	782	1,040	1,040	5,840	14,300	7,600	5,410	3,750	3,170	1,740	1,340	2,370
2	743	1,040	1,150	5,200	12,000	6,130	4,820	3,600	3,030	1,770	1,560	1,970
3	858	1,060	1,070	5,860	11,500	5,780	4,540	3,200	3,000	3,340	3,780	2,500
4	789	882	1,040	5,520	11,700	6,070	5,160	2,900	3,460	2,480	3,340	2,500
5	795	862	1,460	4,880	10,000	7,200	7,220	2,760	2,900	2,000	9,100	6,810
6	767	820	1,460	3,990	7,630	8,390	16,400	2,580	3,330	1,840	10,400	6,440
7	726	952	1,590	4,230	5,520	10,000	17,900	2,630	6,110	2,540	7,540	5,460
8	797	916	2,580	5,520	5,520	8,360	15,900	2,500	6,440	2,860	6,100	5,790
9	836	928	4,280	8,030	5,480	9,980	12,200	2,800	6,100	2,750	4,190	4,770
10	1,000	1,040	4,190	8,810	5,160	13,100	10,000	3,060	4,760	2,600	2,600	4,220
11	980	1,020	4,280	8,000	4,780	16,400	7,950	3,350	3,040	2,260	2,360	3,210
12	983	1,130	3,400	6,520	4,290	18,900	6,830	5,150	3,190	2,210	10,900	2,380
13	1,020	1,040	2,320	5,180	11,300	19,300	6,180	24,900	3,040	2,140	7,150	1,790
14	985	896	1,870	4,830	12,700	18,400	10,000	32,000	3,050	2,000	5,430	1,570
15	1,130	1,300	1,660	5,840	12,700	15,000	9,960	32,000	3,050	1,990	5,750	1,310
16	1,110	1,240	1,530	12,700	7,380	19,900	11,700	31,500	2,900	2,460	5,440	1,120
17	1,200	1,380	1,660	11,700	5,940	12,700	11,700	24,400	3,000	2,030	5,120	1,160
18	1,260	1,820	1,540	8,400	4,110	16,900	10,900	18,700	3,040	2,000	3,900	1,190
19	1,090	1,880	1,230	6,880	3,520	13,100	8,740	13,400	2,630	1,990	2,220	1,280
20	1,130	1,450	1,230	6,170	3,660	10,400	7,190	10,800	2,500	1,770	2,000	1,410
21	1,200	1,410	1,320	10,900	3,950	8,760	6,130	9,940	2,000	1,540	1,580	2,800
22	1,200	1,290	1,530	17,400	3,820	11,700	5,710	9,110	1,880	1,440	1,580	5,460
23	1,220	1,240	1,420	17,700	3,080	16,400	5,450	9,530	1,770	1,340	1,370	6,110
24	1,200	1,070	1,460	14,300	2,670	20,200	4,810	8,310	1,950	1,280	1,390	4,510
25	1,230	1,060	1,570	11,800	2,750	20,400	4,510	6,420	3,040	1,150	1,250	3,070
26	1,070	981	1,630	9,200	3,380	15,400	4,260	5,430	2,540	958	1,290	2,420
27	1,070	1,140	1,740	9,220	4,870	12,700	3,900	4,760	2,390	988	1,210	2,020
28	1,100	1,140	3,270	14,500	6,510	9,990	3,750	4,480	2,310	968	1,450	1,880
29	942	1,040	5,520	20,200	-------	7,960	3,850	3,910	2,000	932	2,640	2,190
30	1,060	965	7,640	18,700	-------	6,850	3,600	3,560	1,770	1,060	3,180	2,180
31	1,070	-------	6,850	16,200	-------	6,110	-------	3,590	-------	1,160	3,180	-------

NOTE.—Discharge, May 13–25, determined from gage readings from upper lock gage furnished by the United States Engineer Corps.

Monthly discharge of Muskingum River at McConnelsville, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 7,410 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,260	726	1,010	0.136	0.16
November	1,880	820	1,130	.152	.17
December	7,640	1,040	2,400	.324	.37
January	20,200	3,990	9,490	1.28	1.48
February	14,300	2,670	6,790	.916	.95
March	20,400	5,780	12,300	1.66	1.91
April	17,900	3,600	7,890	1.07	1.19
May	32,000	2,500	9,520	1.28	1.48
June	6,440	1,770	3,110	.420	.47
July	3,340	932	1,860	.251	.29
August	10,900	1,210	3,880	.524	.60
September	6,810	1,120	3,060	.413	.46
The year	32,000	726	5,200	.702	9.53

NIMISHILLEN CREEK AT NORTH INDUSTRY, OHIO

LOCATION.—At highway bridge at North Industry, Stark County.

DRAINAGE AREA.—173 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1921, to September 30, 1923.

GAGE.—Chain gage on highway bridge; read by E. R. Yost and H. E. Deex.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel straight for 300 feet above and below gage. Left bank high and wooded; right bank fairly high and brushy. One channel at all stages. Bed composed of small boulders, gravel, and sand. Control for low water is riffle 200 feet below gage; permanent. Control for high stages is stretch of channel below gage. Zero flow would occur at gage height 0.7 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 8.75 feet at 4.20 p. m. May 12, 1923 (discharge, 2,350 second-feet); minimum stage, 1.20 feet at 9 a. m. August 5, 1922 (discharge, 10 second-feet).

ICE.—Not affected by ice.

DIVERSIONS.—Negligible.

REGULATION.—Some regulation by steel mills and sewage-disposal works at Canton about 4 miles above gage.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined up to 2,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Nimishillen Creek at North Industry, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 14	E. E. R. Dornbach	2.15	165	Aug. 25	L. L. Dickson	1.63	53.4
Nov. 10	Lasley Lee	1.65	54.9	25	do	1.57	50.2
May 30	E. E. R. Dornbach	1.70	73.0	Sept. 10	do	1.58	49.8

Daily discharge, in second-feet, of Nimishillen Creek at North Industry, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	50	87	108	272	236	123	91	78	63	46	152	50
2	47	68	100	139	346	166	70	72	56	49	56	44
3	50	41	59	152	480	212	128	66	52	32	398	39
4	57	47	44	136	188	321	200	74	49	39	970	41
5	54	59	97	108	108	260	625	70	56	36	200	63
6	63	114	85	81	104	188	452	63	56	57	102	66
7	65	78	97	104	102	139	248	68	95	52	104	68
8	63	63	272	154	91	123	177	59	93	39	78	39
9	47	61	284	166	102	154	147	97	72	42	66	34
10	121	63	134	136	104	508	154	93	68	42	63	49
11	224	66	70	100	91	372	117	102	66	200	57	44
12	78	42	106	117	93	685	119	1,670	80	81	106	49
13	56	54	83	102	480	372	114	1,140	70	50	78	47
14	87	50	80	425	236	248	130	835	59	42	59	42
15	50	97	63	1,000	108	200	188	372	321	130	57	52
16	35	81	70	425	89	935	166	452	114	59	52	46
17	65	39	65	236	65	296	134	346	65	47	54	38
18	66	70	65	236	70	248	114	284	63	39	47	41
19	57	57	63	372	74	200	119	236	56	42	39	68
20	56	85	63	236	76	152	114	177	56	38	14	132
21	57	56	66	1,280	85	136	95	212	50	42	47	398
22	47	56	54	565	78	452	89	166	42	44	52	166
23	52	65	106	212	89	398	93	154	119	49	49	57
24	65	65	56	200	56	321	95	110	212	56	47	44
25	68	50	68	166	59	188	95	100	177	44	54	61
26	57	44	68	150	188	177	56	95	68	35	50	61
27	52	50	141	166	425	166	74	78	49	39	47	54
28	66	72	625	625	154	130	95	80	47	41	93	61
29	39	54	296	346	-------	139	76	72	54	38	89	47
30	68	49	147	224	-------	130	46	66	44	39	74	44
31	54	-------	125	200	-------	121	-------	66	-------	44	65	-------

NOTE.—Gage not read Aug. 26 and Sept. 30; discharge interpolated.

Monthly discharge of Nimishillen Creek at North Industry, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 173 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	224	35	65.0	0.376	0.43
November	114	39	62.8	.363	.40
December	625	44	121	.699	.81
January	1,280	81	285	1.65	1.90
February	480	56	156	.902	.94
March	935	121	266	1.54	1.78
April	625	46	147	.850	.95
May	1,670	59	244	1.41	1.63
June	321	42	82.4	.476	.53
July	200	32	52.7	.305	.35
August	970	14	110	.636	.73
September	398	34	68.2	.394	.44
The year	1,670	14	139	.803	10.89

STILLWATER CREEK AT UHRICHSVILLE, OHIO

LOCATION.—At pumping station a mile south of Uhrichsville and Dennison, in Tuscarawas County, and 6 miles above junction with Tuscarawas River.

DRAINAGE AREA.—367 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 20, 1922, to September 30, 1923.

GAGE.—Vertical staff gage in two sections at pumping station; lower section reading 0 to 2.9 feet, on post set in concrete on right bank; upper section reading from 1.0 to 16.0 feet, fastened to concrete intake pier in stream near right bank; read twice daily by J. C. Morrow. Auxiliary gage at dam 8,000 feet below gage is vertical staff in three sections reading from 0 to 14.0 feet.

DISCHARGE MEASUREMENTS.—Made from highway bridge below dam or by wading below dam.

CHANNEL AND CONTROL.—Concrete dam in Uhrichsville 8,000 feet below gage is control at all stages. Channel makes sharp bend to left just below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 7.1 feet at 4 p. m. May 14, 1923 (discharge, 3,100 second-feet); minimum stage, 0.26 foot at 4 p. m. August 18, 1922, (discharge 2.9 second-feet).

ICE.—Stage-discharge relation may be affected by ice during severe winters.

DIVERSIONS.—Municipal water supply for Dennison and Uhrichsville diverted at gage; not included in tables of discharge. This diversion varied from 3.17 second-feet, in July, 1922, to 4.14 second-feet, in February, 1923.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined up to 2,500 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by The Dennison Water Supply Co.

Discharge measurements of Stillwater Creek at Uhrichsville, Ohio, during the years ending Sept. 30, 1922 and 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1922		*Feet*	*Sec.-ft.*	1923		*Feet*	*Sec.-ft.*
July 20	Lee and Sherman	0.75	131	May 30	E. E. R. Dornbach	0.80	149
Aug. 3	E. E. R. Dornbach	.34	8.7	Aug. 14	L. L. Dickson	.52	47.7
Sept. 1	do	.34	8.7	23	do	.37	11.7
				Sept. 9	do	.56	57.1

Daily discharge, in second-feet, of Stillwater Creek at Uhrichsville, Ohio, for the years ending Sept. 30, 1922 and 1923

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1922				1922				1922			
1		7.6	7.6	11		8.7	39	21	60	23	15
2		8.7	292	12		7.6	79	22	31	9.8	15
3		8.7	829	13		6.6	198	23	19	6.6	15
4		8.7	654	14		6.6	106	24	64	7.6	15
5		8.7	697	15		6.6	53	25	49	13	13
6		42	611	16		6.6	35	26	27	67	13
7		15	182	17		4.1	29	27	19	35	11
8		13	79	18		3.3	23	28	14	14	11
9		9.8	46	19		3.7	19	29	13	11	11
10		8.7	31	20	126	60	17	30	9.8	8.7	9.8
								31	8.7	8.7	

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922-23												
1	11	23	25	439	654	439	252	206	114	39	87	35
2	11	25	25	785	611	355	215	162	313	29	49	19
3	13	23	31	654	611	334	227	134	355	19	35	15
4	13	27	29	439	568	439	272	118	178	23	49	31
5	13	29	35	334	397	504	611	114	130	19	219	186
6	13	46	71	272	186	418	1,010	114	122	29	355	114
7	15	83	102	223	272	568	785	106	272	29	150	178
8	17	87	134	313	292	1,100	525	94	334	134	35	90
9	25	94	272	1,010	292	1,010	439	150	231	53	14	53
10	83	60	334	963	219	963	355	292	138	23	27	39
11	102	35	272	654	215	1,520	313	252	102	19	19	31
12	67	25	166	460	178	1,560	252	741	102	14	21	23
13	53	23	130	376	785	1,420	231	2,340	110	15	29	19
14	29	19	87	292	1,560	1,140	418	3,050	94	15	64	19
15	23	57	71	568	1,470	785	1,280	2,740	75	17	60	23
16	19	418	57	611	963	568	1,560	1,940	64	39	29	19
17	19	313	87	397	611	568	1,470	1,190	57	355	21	15
18	19	162	71	313	439	482	918	785	60	355	15	15
19	23	118	118	313	355	397	611	482	39	106	15	19
20	33	134	106	292	313	334	482	376	33	42	23	35
21	31	102	79	654	252	272	376	568	31	25	19	460
22	25	79	71	1,470	252	334	355	963	29	19	19	482
23	27	49	67	1,470	198	741	313	611	21	15	12	223
24	33	46	75	918	162	1,240	272	397	79	14	11	102
25	57	35	118	611	142	1,190	227	292	83	13	11	67
26	79	31	150	568	154	963	194	252	49	12	9	57
27	67	31	166	460	313	654	178	223	29	9	10	39
28	46	31	313	1,190	525	482	182	202	27	11	23	31
29	31	29	1,010	1,700		376	227	182	33	19	57	29
30	31	27	918	1,560		313	272	150	46	23	142	53
31	27		504	1,100		313		126		376	90	

Monthly discharge of Stillwater Creek at Uhrichsville, Ohio, for the years ending Sept. 30, 1922 and 1923

[Drainage area, 367 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1922					
July 20–31	126	8.7	36.7	0.100	0.04
August	67	3.3	14.5	.040	.05
September	829	7.6	139	.379	.42
1922–23					
October	102	11	34.0	.093	.11
November	418	19	75.4	.205	.23
December	1,010	25	184	.501	.58
January	1,700	223	691	1.88	2.17
February	1,560	142	464	1.26	1.31
March	1,560	272	703	1.92	2.21
April	1,560	178	494	1.35	1.51
May	3,050	94	624	1.70	1.96
June	355	21	112	.305	.34
July	376	9	61.6	.168	.19
August	355	9	55.5	.151	.17
September	482	15	84.0	.229	.26
The year	3,050	9	298	.812	11.04

MOHICAN RIVER AT GREER, OHIO

LOCATION.—At highway bridge at Greer (railroad station called Edlam), Knox County.

DRAINAGE AREA.—942 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 10, 1921, to September 30, 1923.

GAGE.—Chain gage on bridge; read by R. P. Hipp.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Channel straight for a quarter of a mile above and half a mile below gage. One channel at all stages. Bed composed of solid rock and gravel. Zero flow would occur at gage height 0.3 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.1 feet at 5 p. m. May 12 (discharge, 8,750 second-feet); minimum stage, 1.40 feet August 25–27 (discharge, 130 second-feet).

1921–1923: Maximum stage recorded, 8.4 feet at 6 p. m. April 15, 1922 (discharge, 9,320 second-feet); minimum stage, that of August 25–27, 1923.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Negligible.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined between 300 and 6,000 second-feet; fairly well defined above and below those limits. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Records good except for extremely low water and for periods of ice effect for which they are fair.

Discharge measurements of Mohican River at Greer, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Apr. 16	E. E. R. Dornbach	2.41	674
Aug. 9	F. R. Morgan	1.66	231

Daily discharge, in second-feet, of Mohican River at Greer, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	144	158	158	622	925	970	431	258	268	175	216	180
2	144	158	158	665	1,620	489	431	250	278	169	309	169
3	144	158	164	542	1,830	542	460	216	268	164	1,410	153
4	144	158	164	431	1,410	880	580	209	224	164	332	169
5	144	153	209	355	1,210	1,310	2,510	216	224	164	1,260	148
6	148	158	216	332	1,020	1,020	3,720	187	233	164	431	153
7	158	175	233	258	580	708	2,510	216	925	164	278	169
8	169	169	278	622	489	580	2,390	216	503	474	224	158
9	175	169	233	622	445	542	2,050	216	299	258	198	158
10	187	164	209	665	355	792	1,110	250	250	180	175	148
11	194	164	233	580	343	2,890	750	665	250	169	169	148
12	187	164	180	489	355	3,580	665	8,750	241	209	278	148
13	187	169		355	1,310	3,020	580	8,560	233	187	241	144
14	180	164		379	1,020	2,160	580	3,860	216	169	194	144
15	175	180		3,860	622	1,830	665	2,630	202	164	175	144
16	169	180		2,270		4,920	665	2,160	202	169	169	139
17	169	180		1,410		3,720	622	1,830	202	169	158	139
18	164	187		1,410		2,270	474	1,310	202	164	148	144
19	164	209		1,310		1,830	431	1,110	194	158	148	144
20	158	202	150	970		1,060	418	835	187	153	144	180
21	158	187		2,630	600	792	405	792	180	144	144	1,110
22	158	169		3,020		1,830	366	750	169	139	139	489
23	158	158		1,410		3,300	332	665	299	139	139	392
24	164	153		1,410		2,510	309	503	216	139	135	299
25	164	153		1,020		2,510	299	431	343	144	130	224
26	164	153		708		1,410	278	392	202	144	130	202
27	164	158		1,520		2,050	258	366	175	144	130	224
28	164	158	2,630	2,050	3,580	503	278	332	187	148	1,720	278
29	158	158	2,270	1,830	-------	622	278	299	209	148	622	202
30	158	158	542	1,410	-------	580	268	289	180	144	503	180
31	158	-------	580	1,020	-------	460	-------	278	-------	135	309	-------

NOTE.—Stage-discharge relation affected by ice Dec. 13–27 and Feb. 16–27; mean discharge estimated from study of observer's notes, weather records, and records of flow at near-by gaging stations.

Monthly discharge of Mohican River at Greer, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 942 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	194	144	164	0.174	0.20
November	209	153	167	.177	.20
December	2,630	----------	345	.366	.42
January	3,860	258	1,170	1.24	1.43
February	3,580	343	868	.921	.96
March	4,920	460	1,670	1.77	2.04
April	3,720	258	837	.889	.99
May	8,750	187	1,260	1.34	1.54
June	925	169	259	.275	.31
July	474	135	173	.184	.21
August	1,720	130	347	.368	.42
September	1,110	139	223	.237	.26
The year	8,750	130	624	.662	8.98

WALHONDING RIVER AT POMERENE, OHIO

LOCATION.—At highway bridge at Pomerene, 2 miles east of Walhonding, Coshocton County, and 4 miles below junction of Mohican and Kokosing rivers. Honey Run enters from left one-third mile below station.

DRAINAGE AREA.—1,490 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 1, 1910, to March 31, 1913 (gage heights and results of discharge measurements only published under name of Mohican River at Pomerene); September 9, 1921, to September 30, 1923.

GAGE.—Chain gage on bridge; read by C. R. Rahn. Chain gage at same location but at different datum used 1910–1913.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel straight for half a mile above and below gage. Bed composed of small boulders, gravel, and sand. Control is riffle 500 feet below gage. Right bank high and wooded; left bank fairly high. Zero flow would occur at gage height −1.3 feet.

EXTREMES OF DISCHARGE.—1921–1923: Maximum stage recorded, 12.2 feet at 6 a. m. May 13, 1923 (discharge, 20,900 second-feet); minimum stage, 1.42 feet at 2.15 p. m. October 4, and 12.40 p. m. October 5, 1922 (discharge 192 second-feet).

The flood of March, 1913, reached a stage represented by 21.6 feet, present gage datum, as determined by leveling to high-water mark noted during flood by present observer.

ICE.—Stage-discharge relation seriously affected by ice; flow estimated from study of observer's notes, weather records, and records of flow at near-by gaging stations.

DIVERSIONS.—Negligible.

REGULATIONS.—None.

ACCURACY.—Stage-discharge relation for low stages changed during high water on May 11; affected by ice. Rating curves well defined below 8,000 second-feet, and extended above that point. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except for periods of ice effect, for which they are fair.

Discharge measurements of Walhonding River at Pomerene, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Apr. 14	E. E. R. Dornbach	2.76	1,260	Aug. 8	F. R. Morgan	1.86	446

Daily discharge, in second-feet, of Walhonding River at Pomerene, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	211	231	235	1,100	1,870	1,420	765	467	489	314	262	352
2	215	240	262	1,260	2,240	1,050	765	444	512	287	279	270
3	211	226	253	1,000	2,790	858	810	412	454	287	270	255
4	192	231	248	905	2,510	1,160	1,000	382	428	300	1,100	240
5	192	240	362	765	1,760	2,240	1,760	375	415	291	4,190	262
6	207	253	389	720	1,420	1,640	5,400	369	489	266	1,100	347
7	211	262	316	582	1,210	1,420	4,360	341	720	287	575	408
8	257	257	348	1,760	952	1,050	2,790	355	1,000	1,320	448	296
9	248	244	633	1,870	905	952	2,370	467	676	616	352	441
10	272	222	475	1,530	952	1,320	1,530	428	489	374	300	287
11	282	248	369	1,160	720	4,360	1,320	436	474	318	296	287
12	272	226	310	1,100	720	4,360	1,100	6,690	504	397	434	233
13	272	235		1,050	1,990	4,870	1,050	19,100	474	474	474	220
14	272	244		858	2,240	3,380	1,210	7,280	434	333	328	220
15	257	277		7,280	1,050	2,370	1,160	4,360	454	314	283	226
16	244	304		4,190		7,280	1,210	4,530	474	434	287	207
17	240	304		2,240		6,500	1,100	3,380	397	397	275	210
18	226	294		1,990		3,380	858	2,240	363	323	248	213
19	222	299		1,870		2,790	810	1,870	333	296	223	223
20	222	304		1,530		1,760	810	1,530	323	262	220	304
21	235	272	200	3,080		1,530	765	1,640	300	251	216	2,510
22	235	257		2,930	1,000	2,110	765	1,420	296	233	233	1,320
23	248	248		2,790		6,120	720	1,210	296	226	226	676
24	266	244		2,240		4,360	633	952	415	240	223	454
25	272	248		1,760		2,930	599	858	374	240	220	352
26	248	231		1,320		2,370	548	810	461	248	207	318
27	231	240		1,210		1,760	516	720	352	226	210	287
28	207	231	1,320	4,870	2,240	1,420	548	633	333	244	223	279
29	244	272	2,510	4,020	-------	1,160	556	608	363	244	1,420	347
30	240	248	1,760	2,790	-------	1,050	524	583	358	240	520	296
31	226	-------	1,000	1,990	-------	952	-------	534	-------	230	408	-------

NOTE.—Stage-discharge relation affected by ice Dec. 13–27 and Feb. 16–27; mean discharge estimated from study of observer's notes, weather records, and records of flow at near-by gaging stations. Gage not read June 15; discharge interpolated.

Monthly discharge of Walhonding River at Pomerene, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 1,490 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	282	192	238	0.160	0.18
November	304	222	254	.170	.19
December	2,510	----------	445	.298	.34
January	7,280	582	2,060	1.38	1.59
February	2,790	720	1,340	.900	.94
March	7,280	858	2,580	1.73	1.99
April	5,400	516	1,280	.859	.96
May	19,100	341	2,110	1.42	1.64
June	1,000	296	448	.301	.34
July	1,320	226	339	.227	.26
August	4,190	207	518	.348	.40
September	2,510	207	411	.276	.31
The year	19,100	----------	1,000	.671	9.14

KOKOSING RIVER NEAR MILLWOOD, OHIO

LOCATION.—On east line of sec. 3, T. 6 N., R. 10 W., at highway bridge 3 miles southeast of Millwood, Knox County. Brush Run enters on right three-eighths mile above station.

DRAINAGE AREA.—472 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 18, 1921, to September 30, 1923.

GAGE.—Chain gage on bridge; read by Mr. and Mrs. Quincy Cullison.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel straight for 600 feet above and below gage. One channel at all stages. Bed composed of solid rock, boulders, and gravel. Control consists of boulders and gravel, 400 feet below gage. Zero flow would occur at gage height −0.4 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 9.9 feet on May 13, 1923; minimum stage, 1.36 feet on August 25, 1923.

1921–1923: Maximum and minimum stages same as given above.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage read to hundredths once daily. Rating curve for high water not yet developed.

Discharge measurements of Kokosing River near Millwood, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Apr. 15	E. E. R. Dornbach	2.66	527
Aug. 8	F. R. Morgan	1.66	122

Daily gage height, in feet, of Kokosing River near Millwood, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1.44	1.46	1.50	2.58	2.96	2.24	2.08	1.84	1.92	1.60	1.48	1.50
2	1.48	1.48	1.54	2.34	3.44	2.24	2.10	1.78	1.90	1.58	1.46	1.48
3	1.44	1.50	1.50	2.24	3.43	2.22	2.12	1.76	1.68	1.64	1.56	1.52
4	1.46	1.50	1.54	2.18	2.94	2.58	2.42	1.78	1.66	1.62	1.54	1.46
5	1.44	1.48	1.74	2.10	2.36	2.84	3.12	1.74	1.66	1.60	3.98	1.54
6	1.44	1.54	1.70	2.00	2.42	2.62	3.88	1.74	2.06	1.58	2.14	1.76
7	1.46	1.58	1.72	1.88	2.44	2.58	3.26	1.70	2.44	1.56	1.90	2.00
8	1.54	1.54	1.86	3.58	2.22	2.24	2.88	1.72	2.46	2.92	1.73	1.68
9	1.56	1.48	1.90	3.26	2.12	2.22	2.62	1.90	2.12	2.04	1.52	1.78
10	1.58	1.46	1.96	2.88	2.04	3.38	2.60	1.82	1.94	1.74	1.50	1.58
11	1.56	1.48	1.80	2.46	2.02	3.78	2.46	1.74	1.92	1.92	1.48	1.50
12	1.54	1.46	1.68	2.44	1.90	4.48	2.34	3.90	1.90	2.10	1.54	1.48
13	1.48	1.48	1.58	2.16	3.63	3.53	2.24	9.90	1.84	2.06	1.78	1.38
14	1.45	1.48	1.60	2.24	2.78	3.14	2.46	4.60	1.82	1.78	1.60	1.40
15	1.44	1.54	1.58	4.73	2.08	2.78	2.60	3.70	1.88	1.64	1.50	1.38
16	1.48	1.58	2.04	3.00	2.42	5.58	2.50	4.05	2.12	2.06	1.46	1.38
17	1.54	1.54	1.58	2.30	2.34	4.43	2.40	3.30	1.86	1.76	1.46	1.40
18	1.48	1.56	1.76	2.44	2.14	3.43	2.30	3.06	1.76	1.62	1.42	1.42
19	1.48	1.60	1.60	2.30	2.28	2.96	2.22	2.80	1.70	1.56	1.46	1.46
20	1.50	1.58	1.62	2.13	2.00	2.58	2.16	2.64	1.68	1.54	1.48	1.52
21	1.48	1.54	1.60	3.63	2.28	2.53	2.10	2.92	1.67	1.50	1.42	2.92
22	1.46	1.50	1.60	3.93	1.94	3.16	2.06	2.66	1.64	1.50	1.44	2.34
23	1.56	1.48	1.58	2.96	2.00	4.73	1.98	2.46	1.60	1.48	1.48	1.90
24	1.54	1.50	1.56	2.72	2.24	3.73	1.92	2.24	1.78	1.52	1.44	1.72
25	1.56	1.52	1.56	2.52	1.94	3.10	1.90	2.22	1.74	1.50	1.36	1.62
26	1.54	1.42	1.58	2.42	1.88	2.78	1.88	2.16	1.66	1.46	1.38	1.56
27	1.48	1.48	1.84	2.36	3.26	2.58	1.84	2.14	1.64	1.46	1.42	1.52
28	1.45	1.48	3.13	5.53	2.62	2.56	1.82	2.06	1.66	1.72	1.46	1.50
29	1.50	1.46	2.96	4.08	-------	2.36	1.94	2.06	1.72	1.52	1.84	1.48
30	1.48	1.46	2.44	3.28	-------	2.34	1.92	2.00	1.64	1.44	1.72	1.44
31	1.46	-------	2.12	2.91	-------	2.32	-------	1.96	-------	1.42	1.52	-------

LICKING RIVER AT TOBOSO, OHIO

LOCATION.—In T. 2 N., R. 10 W., at covered highway bridge at Toboso, Licking County, and 3 miles below mouth of Rocky Fork.

DRAINAGE AREA.—672 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 20, 1921, to September 30, 1923.

GAGE.—Chain gage on bridge; read by A. B. Lebold.

DISCHARGE MEASUREMENTS.—Made from bridge, from cable 2,000 feet above gage, or by wading.

CHANNEL AND CONTROL.—Channel straight for 500 feet above and below gage. One channel at all stages. Banks high. Bed composed of gravel and sand. Control for low water is riffle 500 feet below gage; shifting. Control for higher stages is long stretch of river below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.0 feet at 8.30 a. m. June 7 (discharge, 4,720 second-feet); minimum stage, 2.19 feet, October 4–6 (discharge, 79 second-feet).

1921–1923: Maximum stage recorded, 15.8 feet at 8.30 a. m. April 15, 1922 (discharge, 14,000 second-feet); minimum stage, 2.02 feet on October 13–16, 1921 (discharge, 77 second-feet).

ICE.—Not seriously affected by ice except during severe winters.

DIVERSIONS.—Negligible.

REGULATION.—Some regulation at Buckeye Lake above gage.

ACCURACY.—Stage-discharge relation changed during high water on April 15, 1922, and changed gradually from August 7 to September 7, 1923; not affected by ice. Rating curves well defined. Gage read to hundredths once daily; additional readings made during extremely high water. Daily discharge ascertained by applying daily gage height to rating table; shifting-control method used August 7 to September 7. Records good.

Discharge measurements of Licking River at Toboso, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 3	Lasley Lee	2.20	78.0	Aug. 6	Morgan and Lebold	3.35	570
Nov. 24	E. E. R. Dornbach	2.25	95.6	22	L. L. Dickson	2.38	138
Apr. 5	do	5.26	2,010	Sept. 7	do	3.68	882
5	do	7.26	3,750				

Daily discharge, in second-feet, of Licking River at Toboso, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	86	261	221	374	1,200	517	324	213	184	143	136	122
2	81	184	209	548	1,280	401	324	206	169	130	114	122
3	81	99	99	374	1,200	457	324	198	162	1,680	104	122
4	79	88	95	374	890	646	457	191	162	457	162	184
5	79	81	169	306	517	928	2,280	191	149	261	1,520	152
6	79	90	324	270	486	715	2,730	184	928	198	517	249
7	83	99	296	236	324	750	1,600	176	4,720	176	548	928
8	97	90	374	3,280	324	612	1,040	176	1,360	349	457	558
9	99	88	457	1,840	324	680	680	202	820	228	349	425
10	92	86	374	1,360	287	1,520	548	213	457	184	310	350
11	95	86	202	785	257	2,010	457	198	324	149	187	300
12	95	81	162	580	228	1,520	680	548	315	213	401	193
13	86	88	130	401	3,000	1,520	646	4,500	287	162	306	172
14	83	90	125	324	2,010	1,040	890	1,360	257	143	253	158
15	86	184	120	1,120	820	680	928	820	228	130	169	155
16	86	122	104	715	715	750	785	1,360	548	143	140	152
17	306	109	117	374	548	2,370	612	1,120	401	149	127	152
18	324	104	97	374	428	1,360	486	855	261	130	133	152
19	324	117	109	324	548	965	428	680	221	122	127	179
20	319	109	107	274	306	612	374	548	198	114	191	205
21	315	104	97	2,910	225	548	324	1,200	176	114	149	820
22	315	99	99	2,460	236	750	324	612	162	114	143	585
23	324	95	99	1,280	209	3,280	306	428	156	109	125	296
24	278	95	102	855	194	2,910	278	349	206	120	120	241
25	253	90	109	715	194	1,680	261	292	236	136	117	209
26	244	221	114	612	221	1,040	244	261	176	130	117	190
27	274	228	127	646	965	750	236	244	156	122	114	172
28	274	232	715	4,080	890	612	244	228	149	117	130	945
29	270	149	928	3,090	-------	486	244	209	156	114	122	585
30	249	221	457	1,760	-------	486	236	198	149	107	130	640
31	257	-------	315	1,200	-------	401	-------	184	-------	104	125	-------

Monthly discharge, in second-feet, of Licking River at Toboso, Ohio, for the year ending Sept. 30, 1923

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October	324	79	184	May	4,500	176	585
November	261	81	126	June	4,720	149	462
December	928	95	228	July	1,680	104	211
January	4,080	236	1,090	August	1,520	104	246
February	3,000	194	672	September	945	122	324
March	3,280	401	1,060				
April	2,730	236	643	The year	4,720	79	486

HOCKING RIVER BASIN

HOCKING RIVER AT ATHENS, OHIO

LOCATION.—At highway bridge on Mill Street, three-fourths mile east of business section of Athens, in Athens County. Margaret Creek enters on right 3½ miles above station.

DRAINAGE AREA.—944 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 3, 1915, to September 30, 1923.

GAGE.—Chain gage on downstream side of highway bridge; installed July 26, 1922. Prior to that date a staff gage in two sections (lower, inclined; upper, vertical) at downstream end of right abutment. Elevation of zero of gage is 615.59 feet above mean sea level. Gage read by Miss Marjorie France.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Channel straight for about 700 feet above and below gage. Right bank high. On left bank paved highway to bridge is overflowed at gage height 17 feet. Bed of stream rocky. Control for low water is riffle at ruins of old timber milldam 200 feet below gage. Control for high water is stretch of channel below gage. Zero flow would occur at gage height 1.9 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.5 feet on January 22 (discharge, 7,280 second-feet); minimum stage, 2.76 feet on July 23 (discharge, 75 second-feet).

1915–1923: Maximum stage recorded, 21.8 feet at 7 a. m. April 16, 1922 (discharge, from extension of rating curve, 20,500 second-feet); minimum stage, 2.68 feet (corrected gage height) on August 22, October 3–6, 1918, and September 21, 1919 (discharge, 65 second-feet).

Maximum known stage occurred in January, 1907, gage height, 26.7 feet as determined by levels to high-water mark in house on Mill Street (discharge not determined).

ICE.—Stage-discharge relation may be slightly affected by ice during severe winters. The large amount of sewage carried by the stream at this point prevents backwater from ice during ordinary winters.

DIVERSIONS.—Negligible.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined up to 12,000 second-feet; extended above that point. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Engineer Corps.

Discharge measurements of Hocking River at Athens, Ohio, during the year ending Sept. 30, 1923

[Made by L. L. Dickson]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Aug. 20	3.16	191	Sept. 5	4.25	794

Daily discharge, in second-feet, of Hocking River at Athens, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	106	132	144	705	4,120	1,100	615	530	259	168	227	448
2	122	132	146	615	5,660	960	530	395	293	141	141	227
3	119	127	158	585	3,640	960	530	370	243	122	135	231
4	101	124	155	558	2,150	1,030	735	345	211	155	395	2,640
5	109	122	311	475	1,240	960	2,290	345	195	135	395	798
6	109	132	585	420	895	1,870	4,040	316	231	146	1,940	1,240
7	111	124	475	395	798	5,750	2,150	293	345	284	675	1,310
8	138	135	1,030	1,730	798	3,960	1,310	316	316	195	448	1,100
9	171	127	895	2,010	735	2,360	1,030	345	271	207	395	895
10	211	129	645	1,240	735	2,220	895	475	215	168	251	502
11	227	119	530	830	645	4,600	735	420	219	129	615	345
12	192	119	502	675	585	4,760	675	1,520	370	345	3,640	223
13	152	124	345	558	3,080	3,640	675	2,850	370	2,850	3,000	211
14	138	135	267	448	4,200	1,730	5,930	1,730	271	293	705	203
15	129	168	227	1,170	2,010	1,240	4,520	895	302	185	420	185
16	124	302	275	960	765	1,030	2,360	2,080	316	155	320	161
17	195	235	475	585	960	2,570	1,100	1,380	280	132	263	161
18	211	227	705	502	345	1,450	1,100	1,100	211	111	235	158
19	199	243	395	530	420	960	895	735	181	109	203	395
20	155	227	448	475	615	1,030	830	1,660	192	99	164	830
21	146	235	311	2,430	530	830	705	3,640	188	97	141	960
22	144	207	267	6,920	558	1,030	675	1,380	188	94	199	960
23	146	235	259	2,920	502	6,470	615	1,030	135	77	104	370
24	141	195	259	1,450	395	6,920	558	645	370	101	132	320
25	158	161	280	1,450	395	2,430	475	530	502	168	122	280
26	161	158	267	1,240	502	1,590	448	475	181	175	119	231
27	144	152	267	1,940	1,590	1,310	395	420	161	116	101	195
28	135	141	448	5,930	1,590	1,100	420	395	219	181	141	231
29	127	155	1,240	6,290	-------	798	675	395	345	146	211	1,030
30	129	141	765	2,500	-------	765	585	320	231	144	895	475
31	129	-------	585	1,520	-------	798	-------	271	-------	585	960	-------

Monthly discharge of Hocking River at Athens, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 944 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	227	101	148	0.157	0.18
November	302	119	165	.175	.20
December	1,240	144	441	.467	.54
January	6,920	395	1,610	1.71	1.97
February	5,660	345	1,440	1.53	1.59
March	6,920	765	2,200	2.33	2.69
April	5,930	395	1,280	1.36	1.52
May	3,640	271	890	.943	1.09
June	502	135	260	.275	.31
July	2,850	77	258	.273	.31
August	3,640	101	571	.605	.70
September	2,640	158	577	.611	.68
The year	6,920	77	819	.868	11.78

KANAWHA RIVER BASIN

NEW RIVER AT EGGLESTON, VA.

LOCATION.—At highway bridge at Eggleston, Giles County.

DRAINAGE AREA.—2,920 square miles.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1923.

GAGE.—Chain gage attached to downstream side of bridge; read by J. A. Bishop.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Stream bed composed of rock covered with silt. Primary control is rock ledge about 1¼ miles below gage; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.4 feet at 8 a. m. June 13 (discharge, 26,400 second-feet); minimum stage, 2.98 feet at 8 a. m. October 29 and November 18 (discharge, 1,170 second-feet).

1914–1923: Maximum stage recorded, 39.5 feet July 16, 1916 (discharge about 152,000 second-feet); minimum stage, 2.37 feet August 29, 1917 (discharge, 652 second-feet).

The flood of 1878 reached a stage of about 40 feet on present gage.

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice. Rating curve well defined between 1,200 and 45,000 second-feet; extended beyond these limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods of ice effect. Records good.

The following discharge measurement was made by J. J. Dirzulaitis:

September 9, 1923: Gage height, 4.47 feet; discharge, 3,510 second-feet.

Daily discharge, in second-feet, of New River at Eggleston, Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,340	1,470	1,280	3,380	7,760	4,380	4,380	4,820	4,600	1,900	1,540	1,280
2	1,280	1,400	1,400	8,900	11,400	4,170	4,170	3,960	4,380	1,820	1,610	1,340
3	1,280	1,470	1,470	7,220	17,600	3,760	3,960	3,960	3,760	1,970	2,280	1,340
4	1,280	1,470	1,540	8,610	16,000	3,760	3,960	2,280	3,760	2,280	3,760	1,220
5	1,280	1,470	1,750	4,820	11,800	3,960	3,760	2,120	3,570	3,000	5,490	1,340
6	1,280	1,470	1,750	4,600	10,800	4,600	3,960	2,120	3,380	3,760	5,040	1,610
7	1,400	1,280	2,120	4,380	8,610	6,700	4,170	3,000	3,570	3,760	2,450	1,750
8	1,750	1,400	1,970	4,170	6,700	11,400	4,820	3,760	3,760	2,810	1,970	2,630
9	3,570	1,470	1,970	3,570	6,450	8,900	4,380	3,960	3,570	2,450	1,900	3,380
10	8,610	1,400	1,750	3,380	5,960	7,760	4,170	4,170	3,570	2,280	1,970	2,810
11	14,500	1,400	1,900	3,380	6,450	5,960	3,570	3,190	3,760	3,760	3,960	1,900
12	14,900	1,540	2,280	3,380	7,760	6,450	3,190	2,810	10,100	3,380	5,040	1,900
13	9,200	1,470	2,280	3,190	8,900	7,760	3,570	2,630	25,600	2,450	5,040	2,280
14	3,000	1,220	3,000	2,630	9,810	9,200	4,600	2,450	18,400	1,970	5,260	1,680
15	1,750	1,280	3,190	2,810	11,400	7,490	4,820	3,000	9,810	1,680	4,600	1,540
16	1,610	1,280	3,760	3,000	8,610	8,040	4,600	3,760	7,760	2,450	3,380	1,340
17	1,540	1,400	6,700	3,000	6,200	18,800	4,820	4,170	5,260	3,570	1,820	1,400
18	1,610	1,540	7,760	1,900	5,960	16,400	4,600	5,040	5,040	3,380	1,610	1,340
19	1,610	1,750	7,490	1,970	6,100	12,100	4,600	5,490	4,600	4,170	1,540	1,470
20	1,610	1,680	7,220	2,280		10,400	4,600	5,040	4,820	3,190	1,400	1,680
21	1,540	1,610	6,450	2,810	5,960	8,900	3,760	5,040	3,000	2,280	1,680	2,120
22	1,400	1,610	4,820	3,380	5,720	7,490	2,810	4,600	3,380	1,970	1,680	2,120
23	1,400	1,470	3,760	3,760	5,490	7,220	3,000	3,190	3,760	1,900	1,750	2,120
24	1,400	1,400	1,970	3,760	5,040	6,960	2,280	4,380	4,380	1,750	1,680	1,970
25	1,340	1,400	1,970	3,570	4,600	6,450	2,280	5,040	4,170	1,610	1,970	1,970
26	1,280	1,470	1,750	3,380	5,040	6,200	2,450	5,490	5,260	1,470	2,120	1,900
27	1,470	1,400	2,120	3,570	5,490	5,960	2,630	4,820	5,040	1,400	2,630	1,750
28	1,280	1,470	2,630	7,490	5,490	5,490	3,380	3,380	3,760	1,470	1,400	1,900
29	1,170	1,400	3,190	11,100	-------	5,260	3,760	4,600	2,810	1,540	1,220	1,970
30	1,280	1,220	3,000	9,810	-------	5,040	4,170	4,820	2,280	1,540	1,280	2,810
31	1,280	-------	3,000	8,900	-------	4,600	-------	4,820	-------	1,610	1,220	-------

NOTE.—Discharge estimated because of ice Feb. 18 and 19 from study of weather records and observer's notes. Gage height for morning of May 28 increased 1 foot as study of weather records and gage-height records of New River at Radford and Narrows, Va., indicated gage was read too low.

Monthly discharge of New River at Eggleston, Va., for the year ending Sept. 30, 1923

[Drainage area, 2,920 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	14,900	1,170	2,880	0.986	1.14
November	1,750	1,220	1,440	.493	.55
December	7,760	1,280	3,140	1.08	1.24
January	11,100	1,900	4,580	1.57	1.81
February	17,600	4,600	7,970	2.73	2.84
March	18,800	3,760	7,470	2.56	2.95
April	4,820	2,280	3,840	1.32	1.47
May	5,490	2,120	3,930	1.35	1.56
June	25,600	2,280	5,700	1.95	2.18
July	4,170	1,400	2,410	.825	.95
August	5,490	1,220	2,590	.887	1.02
September	3,380	1,220	1,860	.637	.71
The year	25,600	1,170	3,960	1.36	18.42

GREENBRIER RIVER AT ALDERSON, W. VA.

LOCATION.—At reinforced-concrete arch highway bridge at Alderson, Monroe County, half a mile above mouth of Muddy Creek.

DRAINAGE AREA.—1,340 square miles.

RECORDS AVAILABLE.—July 30, 1895, to June 30, 1906; May 10, 1907, to September 30, 1923.

GAGE.—Chain gage attached to downstream side of bridge near center of second span from left side of river; read by W. C. England.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—The channel and control are composed of coarse gravel and are practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 9.58 feet at 5 p. m. on February 2 (discharge, 19,500 second-feet); minimum stage, 1.93 feet at 7 a. m. December 1 (discharge, 103 second-feet).

1895–1923: Maximum stage recorded, 22.0 feet during night of March 13, 1918 (discharge, roughly 60,000 second-feet); minimum discharge, 46 second-feet September 30 to October 6, October 17, 24, 27–31, and November 7, 10, and 11, 1904 (gage height, 1.40 feet).

ICE.—Stage-discharge relation occasionally affected by ice for short periods during severe winters.

ACCURACY.—Stage-discharge relation fairly permanent; not affected by ice during year. Rating curve fairly well defined between 100 and 25,000 second-feet and extended beyond these limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage-height applied to rating table. Records good except for extreme low stages, which are fair.

The following discharge measurement was made by J. J. Dirzulaitis:
April 4, 1923: Gage height, 2.98 feet; discharge, 1,190 second-feet.

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	117	137	106	2,280	4,830	1,130	1,360	1,060	732	344	2,920	195
2	117	130	123	11,200	17,600	1,360	1,060	980	704	314	2,800	171
3	117	123	117	5,700	14,500	1,130	760	980	718	279	1,280	167
4	117	123	137	3,690	9,180	1,200	1,060	980	1,130	279	1,580	205
5	111	123	413	2,480	6,570	1,360	1,360	830	830	266	3,040	293
6	111	123	2,090	2,000	4,540	1,500	2,480	760	648	238	2,280	537
7	117	120	2,000	1,660	3,040	14,800	4,250	760	550	205	1,740	830
8	151	117	3,690	1,820	2,480	10,600	3,420	788	474	232	1,060	816
9	171	117	3,690	1,820	2,180	5,410	2,690	830	321	266	980	1,280
10	232	117	3,690	1,740	2,000	3,690	2,090	816	307	328	2,690	905
11	314	117	3,290	1,500	1,910	3,420	1,660	905	344	273	5,990	690
12	260	120	2,180	1,360	1,820	3,970	1,500	980	524	221	5,120	511
13	210	117	1,580	1,360	2,090	3,970	3,420	1,360	1,360	200	11,500	461
14	200	111	1,360	1,200	7,730	5,410	8,310	1,280	4,250	176	4,540	537
15	180	123	1,580	1,360	5,990	3,690	10,900	1,200	3,160	162	2,280	511
16	167	137	6,280	1,740	3,420	2,920	8,310	1,280	2,280	154	1,660	425
17	167	126	7,440	2,800	2,920	10,600	5,410	1,500	1,740	151	1,200	249
18	158	117	12,100	2,090	2,380	8,020	3,690	1,740	1,200	147	980	190
19	154	137	6,570	1,580	1,820	5,700	2,690	1,580	905	144	830	190
20	151	151	3,420	1,740	1,360	4,830	2,090	1,430	830	140	732	243
21	144	151	2,280	2,000	1,360	3,690	1,740	1,280	980	126	620	227
22	144	176	1,910	2,690	1,280	2,920	1,580	1,200	816	114	425	260
23	144	151	1,580	3,420	1,200	2,920	1,280	1,130	704	111	353	353
24	140	151	1,360	3,160	830	6,860	1,200	2,380	1,060	114	336	524
25	144	158	1,130	2,580	718	6,570	1,130	2,800	550	117	293	662
26	130	144	980	2,180	648	4,540	980	1,910	321	130	266	564
27	137	137	788	2,280	1,060	3,690	905	1,740	321	195	266	486
28	144	130	802	9,470	830	2,580	1,060	1,500	307	634	273	402
29	137	123	1,060	14,800	-------	1,910	1,580	1,130	321	402	238	344
30	130	114	1,280	8,020	-------	1,660	1,200	980	344	328	200	293
31	126	-------	1,060	4,830	-------	1,500	-------	905	-------	802	190	-------

Monthly discharge of Greenbrier River at Alderson, W. Va., for the year ending Sept. 30, 1923

[Drainage area, 1,340 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	314	111	156	0.116	0.13
November	176	111	131	.0978	.11
December	12,100	106	2,450	1.83	2.11
January	14,800	1,200	3,440	2.57	2.96
February	17,600	648	3,800	2.84	2.96
March	14,800	1,130	4,310	3.22	3.71
April	10,900	760	2,710	2.02	2.25
May	2,800	760	1,260	.940	1.08
June	4,250	307	958	.715	.80
July	802	111	245	.183	.21
August	11,500	190	1,890	1.41	1.63
September	1,280	167	451	.337	.38
The year	17,600	106	1,810	1.35	18.33

RACCOON CREEK BASIN

RACCOON CREEK AT ADAMSVILLE, OHIO

LOCATION.—On line between secs. 25 and 26, T. 6 N., R. 16 W., just above highway bridge at Adamsville, Gallia County, 1¼ miles east of Rio Grande and 4 miles southwest of Bidwell. Indian Creek enters on right 1¼ miles above station.

DRAINAGE AREA.—537 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 25, 1915, to September 30, 1923.

GAGE.—Vertical and inclined staff on left bank 200 feet above bridge; read by Irene and Cora Call.

DISCHARGE MEASUREMENTS.—Made from highway bridge near gage or by wading.

CHANNEL AND CONTROL.—Straight for about 600 feet above and below bridge. Bed of stream composed of sand and gravel. Control for low water is ruins of old milldam 1,000 feet below bridge; control for high water is long stretch of channel below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.2 feet at 7 a. m. April 16 (discharge, 4,850 second-feet); minimum stage, 1.90 feet at 7 a. m. September 4 (discharge, 30 second-feet).

1915–1923: Maximum stage recorded, 21.10 feet at 5 p. m. April 21, 1920 (discharge, 7,920 second-feet); minimum stage, 1.50 feet August 5–8, 1922 (discharge, 4 second-feet).

High-water marks indicate maximum stage about 24.5 feet previous to installation of gage.

ICE.—Stage-discharge relation not affected by ice except during severe winters.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Engineer Corps.

No discharge measurements were made at this station during the year.

Daily discharge, in second-feet, of Raccoon Creek at Adamsville, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	36	49	64	302	3,380	1,100	391	530	175	269	58	77
2	36	48	59	302	3,650	860	346	391	156	156	50	68
3	36	45	59	302	3,700	775	302	324	129	195	45	48
4	34	45	56	280	3,060	675	324	269	115	175	117	31
5	32	45	120	258	1,870	602	725	237	110	120	156	37
6	35	45	166	216	950	1,690	1,070	216	103	74	106	45
7	40	48	195	195	675	3,110	1,270	195	120	64	90	64
8	48	49	437	860	578	3,420	950	175	156	175	414	112
9	53	49	675	1,010	554	2,980	650	226	156	79	554	166
10	87	50	775	1,160	554	2,310	530	414	106	74	1,300	175
11	79	53	725	775	530	1,870	437	414	138	74	226	156
12	73	56	460	483	437	3,060	368	506	302	68	324	129
13	65	56	226	368	2,520	3,160	775	650	226	68	830	71
14	56	74	156	346	2,150	2,750	3,850	1,410	166	71	890	58
15	53	84	156	391	1,690	1,830	4,750	1,070	156	175	324	49
16	53	95	226	414	950	1,660	4,750	890	120	166	175	43
17	50	117	258	368	626	1,830	3,600	830	120	147	166	56
18	49	138	302	346	626	1,660	1,760	1,070	302	95	175	74
19	49	138	346	346	602	1,200	1,010	700	195	64	166	59
20	48	156	368	391	437	860	775	602	147	49	117	48
21	46	156	391	1,550	346	675	626	2,150	175	48	100	103
22	45	129	346	2,230	324	860	554	2,480	120	45	206	206
23	45	117	248	2,310	302	1,480	460	2,230	120	50	166	346
24	42	101	156	1,990	280	2,310	368	1,410	90	56	120	156
25	43	95	138	1,480	248	2,070	302	725	74	50	110	120
26	49	92	138	1,200	258	1,410	302	530	71	48	166	84
27	52	89	129	1,410	675	1,010	258	414	120	97	106	70
28	53	81	391	2,270	1,010	775	346	346	106	324	147	62
29	53	73	530	2,620	-------	626	830	302	138	77	302	56
30	52	68	460	2,230	-------	530	675	269	302	85	216	45
31	49	-------	368	1,760	-------	437	-------	206	-------	68	106	-------

Monthly discharge of Raccoon Creek at Adamsville, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 537 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	87	32	49.7	0.092	0.11
November	156	45	81.4	.152	.17
December	775	56	294	.547	.63
January	2,620	195	973	1.81	2.09
February	3,700	248	1,180	2.20	2.29
March	3,420	437	1,600	2.98	3.44
April	4,750	258	1,110	2.07	2.31
May	2,480	175	716	1.33	1.53
June	302	71	150	.279	.31
July	324	45	107	.199	.23
August	1,300	45	259	.482	.56
September	346	31	93.8	.175	.20
The year	4,750	31	548	1.02	13.87

49245—26†—WSP 563——5

SCIOTO RIVER BASIN

SCIOTO RIVER NEAR DUBLIN, OHIO

LOCATION.—A quarter of a mile north of line between Delaware and Franklin counties, three-fourths mile below O'Shaughnessy dam, and 3 miles north of Dublin.

DRAINAGE AREA.—988 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 1, 1921, to September 30, 1923.

GAGE.—April 1 to August 25, 1921, staff gage in several sections on left bank at site of O'Shaughnessy dam. Beginning August 26, 1921, vertical staff in three sections attached to large trees on left bank three-fourths mile below dam. Gage read by engineers of city of Columbus.

DISCHARGE MEASUREMENTS.—Made from highway bridge 1 mile above gage or by wading.

CHANNEL AND CONTROL.—Channel slightly curved at gage. Right bank high; left bank fairly high. Control is riffle composed of large boulders and flat rocks 100 feet below gage; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.6 feet at 7.30 p. m. May 13 (discharge, 10,800 second feet); minimum discharge, 23 second-feet November 3.

1921–1923: Maximum stage recorded, 9.6 feet on April 15, 1922, and May 13, 1923 (discharge, 10,800 second-feet); minimum discharge, 9 second-feet August 29, 1921.

The flood of March, 1913, reached a stage on March 25 of 24.6 feet referred to gage datum.

ICE.—Stage-discharge relation not seriously affected by ice except during severe winters.

DIVERSIONS.—Negligible.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed gradually October 7–19; not affected by ice. Rating curves well defined. Gage read to hundredths once daily except Sundays. Daily discharge ascertained by applying daily gage height to rating table; shifting-control method used October 7–19. Records good.

COOPERATION.—Gage-height record furnished by city of Columbus, Bureau of Water Works Extension.

Discharge measurements of Scioto River near Dublin, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 20	E. E. R. Dornbach	3.08	24.5	June 29	Perrin and Dornbach	3.49	82.2
Nov. 13	do	3.16	28.2	Aug. 29	F. R. Morgan	3.40	56.6
Jan. 23	do	5.90	2,170	Sept. 24	Perrin, Wall, and Lee	3.99	236
Apr. 25	do	3.83	200				

Daily discharge, in second-feet, of Scioto River near Dublin, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	28	24	29	1,480	1,620	1,500	294	123	153	75	35	96
2	30	24	29	1,620	2,100	935	253	115	136	81	47	78
3	33	23	30	1,320	2,560	683	230	103	126	132	56	59
4	33	24	30	935	1,830	1,250	279	91	115	124	171	41
5	32	31	46	830	1,100	1,820	830	81	101	115	173	35
6	32	38	49	526	683	1,500	2,720	79	112	96	175	35
7	32	27	52	703	471	1,210	2,720	77	359	167	139	35
8	34	24	53	880	379	880	1,940	75	732	380	175	329
9	37	24	69	1,440	433	683	1,160	84	479	598	156	238
10	32	25	69	1,380	379	1,820	732	89	343	353	101	146
11	33	25	69	935	583	2,440	551	84	207	187	92	84
12	33	28	61	732	786	3,060	433	683	171	115	84	58
13	33	30	27	419	990	3,240	365	9,910	142	118	75	44
14	32	31	44	1,260	1,620	2,400	365	9,090	129	98	54	35
15	30	38	44	2,100	880	1,690	458	6,990	115	84	103	35
16	28	36	25	2,720	935	5,290	551	7,500	426	69	75	31
17	29	42	25	2,100	732	4,620	471	5,760	304	67	52	27
18	27	47	25	1,500	518	3,510	399	4,200	183	52	41	25
19	25	47	28	935	305	2,400	323	2,400	132	43	36	33
20	24	47	28	683	335	1,210	279	1,800	112	37	31	36
21	24	41	28	2,340	225	780	253	1,210	112	31	29	118
22	25	37	29	4,000	207	1,380	230	990	73	30	30	413
23	25	35	32	2,250	195	4,620	207	683	77	30	29	354
24	25	33	34	1,820	150	3,800	187	471	74	33	29	295
25	24	32	36	1,040	176	2,810	167	385	71	59	29	164
26	24	31	38	683	203	1,820	150	323	67	52	28	106
27	24	30	42	990	1,960	1,160	144	293	53	52	28	79
28	24	28	683	2,500	1,820	880	139	263	44	50	77	73
29	24	24	1,820	4,000	-------	509	136	203	71	45	63	123
30	24	26	1,210	2,560	-------	433	132	185	69	40	167	116
31	24	-------	1,350	1,820	-------	335	-------	167	-------	37	136	-------

NOTE.—Gage not read on Sundays; discharge interpolated.

Monthly discharge of Scioto River near Dublin, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 988 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	37	24	28.5	0.029	0.03
November	47	23	31.7	.032	.04
December	1,820	25	198	.200	.23
January	4,000	419	1,560	1.58	1.82
February	2,560	150	865	.876	.91
March	5,290	335	1,940	1.96	2.26
April	2,720	132	570	.577	.64
May	9,910	75	1,760	1.78	2.05
June	732	44	176	.178	.20
July	593	30	111	.112	.13
August	175	28	81.2	.082	.09
September	413	25	111	.112	.12
The year	9,910	23	621	.629	8.52

SCIOTO RIVER AT COLUMBUS, OHIO

LOCATION.—At city of Columbus sewage-treatment works, Franklin County, 0.4 mile below highway bridge on Frank Road, and 5 miles below mouth of Olentangy River.

DRAINAGE AREA.—1,620 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 1, 1921, to September 30, 1923. Gage-height record obtained by city of Columbus since May 11, 1906.

GAGE.—Vertical staff in two sections attached to large tree on right bank at sewage treatment works; read by employees of the city. Zero of gage is 680.40 feet above mean sea-level.

DISCHARGE MEASUREMENTS.—Made from bridge four-tenths mile above gage or by wading. Discharge from sewage-treatment works included in discharge measurements and tables of discharge.

CHANNEL AND CONTROL.—Channel straight for 1,000 feet above and 500 feet below gage. Banks fairly high, wooded. Left bank is overflowed during floods. Control is riffle of small boulders and gravel half a mile below gage. Zero flow would occur at gage height 4.55 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 19.0 feet at 6 p. m. May 13 (discharge, 17,400 second-feet); minimum stage, 5.55 feet November 11, 14, 26, December 1, 2, 4, 25, 26, and 27 (discharge, 60 second-feet).

1921–1923: Maximum stage recorded, 20.3 feet at 8 a. m. April 15, 1922 (discharge, 19,900 second-feet); minimum stage, 5.5 feet on twenty-nine days, July to October, 1921 (discharge, 54 second-feet).

The flood of March, 1913, reached a stage on March 25 of 25.9 feet referred to gage datum.

ICE.—None.

DIVERSIONS.—Water is diverted above station for municipal water supply of Columbus. Other diversions negligible.

REGULATION.—Flow regulated for municipal water supply of Columbus. Slight fluctuation caused by intermittent discharge from sewage-treatment works at gage negligible.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Gage read to half-tenths once daily. Additional readings made during high water. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by city of Columbus, Sewage Treatment Works.

Discharge measurements of Scioto River at Columbus, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 21	E. E. R. Dornbach	5.69	82.7	Jan. 30	E. E. R. Dornbach	10.52	3,770
Nov. 13	do	5.70	79.1	Mar. 23	do	14.28	8,650
20	do	5.71	83.1	July 18	Morgan and Lee	6.00	181
Jan. 22	do	13.14	6,900	Aug. 30	F. R. Morgan	5.96	151
25	do	8.37	1,590				

Daily discharge, in second-feet, of Scioto River at Columbus, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	82	66	60	2,670	2,670	2,470	665	271	360	194	104	231
2	66	66	60	2,670	2,990	1,610	558	251	314	177	104	194
3	66	66	66	2,070	3,790	1,190	506	231	271	194	104	130
4	66	66	60	1,520	3,430	1,040	610	212	271	194	271	117
5	66	66	82	1,270	2,070	2,470	1,350	194	271	271	271	610
6	66	117	74	970	1,190	2,370	5,310	194	231	231	360	130
7	66	82	74	750	970	1,880	4,270	177	456	360	506	104
8	93	66	93	1,350	780	1,350	2,990	160	2,470	780	314	194
9	66	66	93	1,880	780	1,270	1,970	271	1,110	610	314	360
10	82	66	104	2,880	720	2,370	1,270	271	900	665	360	314
11	66	60	160	1,970	558	4,660	1,110	194	558	506	314	194
12	66	66	130	1,350	506	5,180	840	314	456	360	194	130
13	66	74	104	840	1,270	5,310	780	16,000	408	231	231	117
14	66	60	82	750	2,990	3,550	780	14,900	337	337	194	104
15	74	104	74	231	1,700	2,470	840	10,400	314	314	160	82
16	66	66	74	5,720	840	8,890	970	10,200	1,880	314	145	93
17	74	66	74	3,790	750	8,410	900	7,770	558	194	145	82
18	74	104	74	2,170	665	4,660	840	5,310	408	160	117	82
19	66	82	74	1,790	558	3,100	665	3,320	314	130	104	104
20	66	80	74	1,190	506	1,880	584	2,270	251	130	93	104
21	76	66	74	1,430	456	1,190	532	1,790	194	130	93	82
22	66	66	66	7,470	360	2,070	506	1,520	160	130	104	82
23	82	66	66	4,400	360	8,890	456	1,190	145	104	82	82
24	66	66	66	2,880	271	6,280	408	900	160	160	74	610
25	66	66	60	1,700	314	4,400	360	750	558	117	74	408
26	66	60	60	1,190	360	2,670	314	610	408	130	66	231
27	66	66	60	1,110	1,790	1,700	292	558	314	130	82	231
28	66	66	160	1,190	2,990	1,270	337	532	271	130	130	900
29	66	66	2,370	7,930	-------	1,040	314	506	271	117	82	314
30	66	74	2,170	3,910	-------	900	292	432	231	130	148	231
31	66	-------	1,350	2,990	-------	720	-------	360	-------	117	194	-------

Monthly discharge, in second-feet, of Scioto River at Columbus, Ohio, for the year ending Sept. 30, 1923

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October	93	66	69.5	May	16,000	160	2,650
November	117	60	71.7	June	2,470	145	495
December	2,370	60	264	July	780	104	250
January	7,930	231	2,390	August	506	66	179
February	3,790	271	1,310	September	900	82	222
March	8,890	720	3,140				
April	5,310	292	1,050	The year	16,000	60	1,010

SCIOTO RIVER AT CHILLICOTHE, OHIO

LOCATION.—At highway bridge on Bridge Street, at north end of Chillicothe, Ross County.

DRAINAGE AREA.—3,850 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 1, 1913, to September 30, 1914; April 1, 1921, to September 30, 1923. Gage-height record obtained since June 5, 1907, by United States Weather Bureau.

GAGE.—Mott gage on highway bridge prior to February 2, 1923; chain gage installed on that date. Gage datum lowered 2.00 feet January 18, 1922. Read by Horace Fodrea. Zero of gage is 594.02 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from bridge by wading.

CHANNEL AND CONTROL.—Channel straight for a quarter of a mile above and three-fourths mile below gage. Right bank high; left bank fairly high. Control is long stretch of channel below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.9 feet at 7.30 a. m. May 15 (discharge, 20,900 second-feet); minimum stage, 1.30 feet at 7.30 a. m. October 18 (discharge, 236 second-feet).

1921–1923: Maximum stage recorded, 20.0 feet at 2 p. m. April 16, 1922 (discharge, 48,100 second-feet); minimum stage, that of October 18, 1922.

Maximum known stage occurred March 26, 1913, gage height 39.8 feet present datum (discharge estimated at 260,000 second-feet by engineers of Franklin County Conservatory District).

ICE.—Stage-discharge relation not seriously affected by ice.

REGULATION.—Flow slightly regulated for municipal water supply above Columbus.

DIVERSIONS.—Water is diverted for municipal water supply of Columbus. Other diversions negligible.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Scioto River at Chillicothe, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec. ft.*
Oct. 19	E. E. R. Dornbach	1.52	310
July 19	Morgan and Lee	1.94	576
Sept. 24	Morgan and Dornbach	3.00	1,250

Daily discharge, in second-feet, of Scioto River at Chillicothe, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	292	312	312		9,460	5,860	2,110	1,070	1,030	759	452	562
2	312	312	312		9,260	3,980	1,910	989	949	689	427	505
3	312	312	292		8,260	3,200	1,810	872	909	656	402	505
4	312	292	292		7,880	2,980	1,810	909	834	2,870	834	623
5	292	272	292	3,900	6,020	3,640	2,870	834	796	1,610	1,710	909
6	272	292	334		3,640	4,920	6,820	796	759	1,160	1,910	909
7	292	292	402		2,650	5,540	11,200	759	3,860	834	1,810	1,240
8	292	272	452	2,320	2,430	4,640	7,520	759	4,920	1,910	1,910	1,330
9	312	312	534	6,820	2,320	3,860	5,220	724	3,860	2,760	1,240	909
10	334	334	1,240	6,820	2,210	3,750	3,860	872	2,320	1,710	949	689
11	334	334	623	5,220	1,910	7,700	3,090	872	1,710	1,420	3,200	689
12	254	334	592	3,420	1,710	9,660	2,540	949	1,520	1,160	1,910	562
13	292	334	592	2,650	5,220	10,500	2,320	1,240	1,330	949	1,710	452
14	272	312	505	1,910	9,460	9,660	3,310	14,900	1,160	796	1,610	402
15	312	334	478	1,910	6,820	6,180	3,750	20,900	1,070	724	1,330	355
16	292	427	452	4,360	3,310	5,220	3,420	16,400	1,240	796	909	355
17	292	402	452	6,180	2,980	15,500	3,090	15,200	2,870	656	759	312
18	236	378		3,860	2,540	19,900	2,650	12,700	1,710	623	623	312
19	312	402		3,090	2,110	9,060	2,320	7,700	1,240	534	562	355
20	254	378		2,760	2,110	6,020	2,110	5,220	1,160	534	452	759
21	254	378		2,430	1,710	4,100	1,910	3,860	909	478	452	1,070
22	312	378		8,860	1,520	3,420	1,710	3,420	796	427	505	1,330
23	292	355		13,500	1,330	10,500	1,610	2,980	724	402	402	759
24	312	334	1,400	6,500	1,280	17,900	1,420	2,430	834	452	402	1,330
25	312	345		4,640	1,240	14,700	1,330	2,010	759	505	402	1,160
26	272	334		3,530	1,160	8,060	1,240	1,710	1,330	534	355	834
27	292	334		3,310	2,760	5,380	1,160	1,520	1,420	592	355	689
28	272	312		5,380	5,220	3,980	1,160	1,520	989	623	355	989
29	292	312		14,400	-------	3,310	1,160	1,330	1,160	478	452	3,980
30	272	312		17,300	-------	2,760	1,160	1,240	949	562	689	1,710
31	272	-------		8,460	-------	2,430	--------	1,160	-------	562	623	-------

NOTE.—Gage not read Dec. 18 to Jan. 7; mean discharge for Dec. 18–31 and Feb. 1–7 estimated by comparison with combined flow of Scioto River at Columbus, Big-Walnut Creek at Rees Station, and Darby Creek at Darbyville.

Monthly discharge of Scioto River at Chillicothe, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 3,850 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	334	236	291	0.076	0.09
November	427	272	335	.087	.10
December	292	295	.232	.27	
January	17,300	1,910	5,380	1.40	1.61
February	9,460	1,160	3,880	1.01	1.05
March	19,900	2,430	7,040	1.83	2.11
April	11,200	1,160	2,920	.758	.85
May	20,900	724	4,120	1.07	1.23
June	4,920	724	1,500	.390	.44
July	2,870	402	928	.241	.28
August	3,200	355	958	.249	.29
September	3,980	312	886	.230	.26
The year	20,900	236	2,430	.631	8.58

OLENTANGY RIVER AT DELAWARE, OHIO

LOCATION.—At William Street Bridge in Delaware, Delaware County. Delaware Run enters on right 250 feet below station.

DRAINAGE AREA.—415 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1921, to September 30, 1923.

GAGE.—Chain gage on highway bridge; read by D. H. Leas. Zero of gage is 848.58 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from Winter Street Bridge or by wading.

CHANNEL AND CONTROL.—Channel straight for a quarter of a mile above and below gage. Banks high. Control for extremely low water is riffle just below gage. Control for higher stages is riffle about a quarter of a mile below gage. Zero flow would occur at gage height −1.3 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.1 feet at 8 a. m. May 13 (discharge, 14,000 second-feet); minimum stage, −0.23 foot at noon October 6 (discharge, 5.1 second-feet).

1921–1923: Maximum stage recorded, 11.3 feet at 5.30 p. m. May 20, 1922 (discharge, 15,000 second-feet); minimum stage, that of October 6 1922.

Maximum known stage, 25.5 feet on March 25, 1913, referred to present gage.

ICE.—Stage-discharge relation affected by ice during severe winters.

REGULATION.—None.

ACCURACY.—Stage-discharge relation for low stages changed during high water on May 13; possibly slightly affected by ice, Daily discharge ascertained by applying daily gage height to rating table. Records good except for December, January, and February when, on account of uncertainty as to effect of ice, they are only fair.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Olentangy River at Delaware, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 20	E. E. R. Dornbach	−0.04	10.3	Feb. 26	Dornbach and Lee	0.89	100
Nov. 15	do	.14	19.6	July 21	Morgan and Lee	.17	20.5
Jan. 23	do	2.76	842	Aug. 13	F. R. Morgan	.24	20.7

Daily discharge, in second-feet, of Olentangy River at Delaware, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.8	8.3	16	785	730	422	115	72	57	68	49	72
2	7.8	7.8	14	785	1,080	242	136	66	52	57	22	25
3	7.2	9.1	14	422	1,340	256	131	61	44	62	14	20
4	6.1	9.9	16	400	730	840	167	58	37	42	52	17
5	5.3	9.0	24	320	1,080	785	1,480	53	40	44	18	15
6	5.1	11	26	229	1,080	545	2,540	53	570	62	13	40
7	5.3	9.1	44	216	676	400	1,410	53	785	40	62	68
8	5.6	9.9	48	960	649	286	570	53	900	34	104	57
9	6.7	9.9	127	1,270	242	256	378	45	470	133	40	31
10	7.8	11	92	1,080	229	676	286	61	186	159	25	36
11	7.8	12	75	470	149	1,340	242	63	159	82	19	25
12	9.9	12	63	358	96	1,410	204	3,430	128	49	32	20
13	12	13	50	216	785	1,410	191	11,600	99	302	22	15
14	12	14	39	338	676	785	229	3,330	79	186	22	11
15	12	19	29	3,140	179	422	256	1,550	68	82	16	9.6
16	12	19	26	2,140	302	2,780	242	2,140	128	60	13	9.6
17	11	24	26	840	302	2,460	216	1,340	68	54	10	8.2
18	11	50	24	900	286	900	179	785	62	36	8.2	7.5
19	9.9	33	23	1,020	270	622	162	520	47	26	8.9	10
20	10	28	19	256	216	338	149	378	38	22	8.9	19
21	11	26	17	2,620	179	286	136	422	32	18	7.1	68
22	9.9	24	17	2,460	153	596	123	302	31	15	8.9	228
23	11	20	18	1,140	119	3,140	115	228	25	13	7.1	200
24	12	19	21	520	103	1,980	103	172	228	75	6.3	118
25	11	18	24	358	96	730	89	149	286	20	5.9	62
26	11	16	24	270	107	520	85	123	159	15	5.5	40
27	9.9	14	28	286	1,140	338	85	133	123	12	5.9	29
28	9.1	12	1,140	2,620	840	256	82	108	79	13	86	75
29	9.9	13	1,690	1,900	------	216	82	90	65	13	68	47
30	11	14	785	900	------	191	82	60	54	12	95	24
31	9.9	------	785	570	------	162	------	65	------	11	149	------

Monthly discharge of Olentangy River at Delaware, Ohio for the year ending Sept. 30, 1923

[Drainage area, 415 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	12	5.1	9.29	0.022	0.03
November	50	7.8	16.5	.040	.04
December	1,690	14	172	.414	.48
January	3,140	216	961	2.32	2.68
February	1,340	96	494	1.19	1.24
March	3,140	162	825	1.99	2.29
April	2,540	82	342	.824	.92
May	11,600	45	889	2.14	2.47
June	900	25	170	.410	.46
July	302	11	58.6	.141	.16
August	149	5.5	32.4	.078	.09
September	228	7.5	46.9	.113	.13
The year	11,600	5.1	336	.810	10.99

BIG WALNUT CREEK AT REES STATION, OHIO

LOCATION.—At Scioto Valley Railway & Power Co.'s bridge at Rees Station, Franklin County, 3 miles below junction of Big Walnut, Alum, and Blacklick creeks.

DRAINAGE AREA.—544 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 18, 1921, to September 30, 1923.

GAGE.—Chain gage on bridge for low water; staff gage on bridge pier for higher stages; read by employees of the power company. Zero of gage is 700.20 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from highway bridge three-eighths mil below gage or by wading.

CHANNEL AND CONTROL.—Channel slightly curved at gage. Banks high. Control is riffle of gravel and small boulders 500 feet below gage. Zero flow would occur at gage height −0.9 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.9 feet at noon on May 13 (discharge 6,640 second-feet); minimum stage, −0.56 foot at noon October 4 (discharge, 12 second-feet).

1921–1923: Maximum stage recorded, 14.6 feet at 12.45 p. m. April 15, 1922 (discharge, 16,600 second-feet); minimum stage, that of October 4, 1922.

The flood of March, 1913, reached a stage on March 25 of 18.5 feet referred to gage datum.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Negligible.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve revised slightly so as to average the measurements and is well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by Scioto Valley Railway & Power Co.

Discharge measurements of Big Walnut Creek at Rees Station, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 14	E. E. R. Dornbach	−0.33	33.6	Jan. 29	E. E. R. Dornbach	4.42	2,330
Jan. 22	do	5.80	3,350	30	do	2.68	1,180
25	do	1.18	406	Mar. 23	do	7.12	4,620
29	do	5.84	3,380	Aug. 31	F. R. Morgan	−0.15	84.8

Daily discharge, in second-feet, of Big Walnut Creek at Rees Station, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	22	30	41	335	1,180	450	191	158	67	82	37	75
2	25	34	41	620	1,180	216	180	139	82	75	180	59
3	25	34	41	390	1,240	390	180	118	78	3,110	158	67
4	12	34	44	390	810	620	191	106	63	710	191	67
5	20	30	59	319	272	1,010	860	102	67	620	168	243
6	22	37	75	230	272	620	2,870	118	4,600	191	204	90
7	22	37	126	204	230	665	910	122	3,900	168	1,060	130
8	41	41	147	2,140	216	510	710	78	1,060	1,300	410	122
9	34	37	243	1,930	204	575	430	102	575	370	191	98
10	30	37	204	1,300	158	1,420	352	114	352	168	139	71
11	27	41	168	490	139	1,720	288	110	272	122	98	59
12	25	37	122	470	102	1,360	243	390	230	87	102	56
13	20	41	102	450	1,540	1,360	230	6,640	216	67	665	52
14	25	41	110	272	1,240	760	352	1,480	204	56	430	41
15	22	67	102	710	216	620	410	760	168	52	243	41
16	27	48	86	810	216	5,030	410	2,630	1,300	63	126	41
17	44	48	59	216	216	3,030	370	1,360	530	67	82	191
18	34	52	52	319	204	1,010	335	710	288	48	63	191
19	37	59	48	230	180	620	303	470	168	41	56	168
20	34	63	48	230	158	450	258	352	168	41	44	180
21	30	56	44	2,000	130	335	230	168	110	41	86	168
22	27	56	44	3,360	118	760	230	370	110	37	90	390
23	34	48	44	665	114	4,600	216	272	126	34	52	335
24	37	30	48	552	90	1,480	204	191	134	52	44	168
25	37	37	48	430	106	860	191	158	168	191	37	106
26	34	37	52	335	139	575	191	147	490	168	30	143
27	30	37	63	620	810	430	168	134	230	75	27	158
28	27	34	216	5,030	910	352	216	102	134	59	44	1,660
29	27	37	1,720	2,870	-------	303	191	90	118	67	44	490
30	30	30	410	1,180	-------	258	180	82	114	63	130	216
31	27	-------	410	710	-------	230	-------	78	-------	52	78	-------

Monthly discharge of Big Walnut Creek at Rees Station, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 544 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	44	12	28.6	0.053	0.06
November	67	30	41.7	.077	.09
December	1,720	41	162	.298	.34
January	5,030	204	962	1.77	2.04
February	1,540	90	442	.812	.85
March	5,030	216	1,050	1.93	2.22
April	2,870	168	403	.741	.83
May	6,640	78	576	1.06	1.22
June	4,600	63	537	.987	1.10
July	3,110	34	267	.491	.57
August	1,060	27	171	.314	.36
September	1,660	41	196	.360	.40
The year	6,640	12	404	.743	10.08

DARBY CREEK AT DARBYVILLE, OHIO

LOCATION.—At highway bridge three-eighths mile northeast of Darbyville, Pickaway County.

DRAINAGE AREA.—533 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 21, 1921, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge used prior to October 18, 1922; vertical staff gage on downstream end of right bridge pier used thereafter; read by J. M. Waples. Zero of both gages is 713.64 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Channel straight for 1,000 feet above and below gage. Banks high and wooded. Control for low water is a riffle 100 feet below gage; control for higher stages is long stretch of channel below gage. Zero flow would occur at gage height 0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.3 feet at 5 p. m. March 23 (discharge, 2,880 second-feet); minimum stage, 1.70 feet October 3, 5, and 7 (discharge, 12 second-feet).

1921–1923: Maximum stage recorded, 9.7 feet at 8 a. m. April 16, 1922 (discharge, 7,670 second-feet); minimum stage, 1.70 feet September 30, October 3, 5, and 7, 1922 (discharge, 12 second-feet).

ICE.—Stage-discharge relation affected by ice for short periods.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water in April and September; affected by ice February 2–4. Rating curves well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Darby Creek at Darbyville, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 18	Lasley Lee	1.79	23.6	July 18	Morgan and Lee	1.97	62.0
24	E. E. R. Dornbach	1.84	30.3	Aug. 31	F. R. Morgan	1.78	43.5
June 27	Dornbach and Perrin	2.28	118				

Daily discharge, in second-feet, of Darby Creek at Darbyville, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	13	25	29	52	1,470	395	216	128	112	84	39	37
2	15	22	30	605	1,280	314	216	137	101	74	34	36
3	12	25	29	278	1,110	296	216	109	91	84	41	32
4	15	25	30	215	800	353	279	105	91	65	48	65
5	12	25	38	202	374	395	335	101	87	71	139	49
6	15	28	44	163	334	490	970	98	98	68	137	74
7	12	33	49	140	314	465	835	105	128	71	128	56
8	18	32	52	490	278	374	540	105	101	109	94	53
9	18	30	58	875	245	395	375	103	120	120	68	37
10	20	33	56	765	188	605	297	110	101	94	1,270	32
11	20	35	60	490	188	1,670	262	120	128	65	262	29
12	18	34	61	353	278	1,280	246	146	112	65	176	27
13	17	35	52	215	1,280	1,190	246	1,870	101	68	216	26
14	18	37	45	215	1,280	665	375	970	99	87	101	24
15	20	38	38	215	314	545	335	595	98	71	74	23
16	21	38	33	490	395	800	770	1,870	99	53	65	23
17	22	41	33	262	575	2,500	279	835	91	51	60	23
18	20	49	52	202	334	1,570	246	540	128	68	56	22
19	21	41	30	245	215	800	216	465	103	62	53	24
20	21	44	33	163	230	518	202	355	98	48	43	29
21	25	42	30	395	188	278	189	440	87	43	36	29
22	22	38	28	1,970	176	990	189	262	71	39	34	27
23	28	51	28	875	163	2,880	189	216	68	36	32	32
24	28	49	28	665	163	1,430	155	189	315	262	30	37
25	22	48	35	418	152	835	148	176	216	68	29	36
26	20	35	35	296	418	595	137	164	128	81	29	41
27	22	33	38	296	765	465	135	155	118	62	30	37
28	18	32	45	1,870	575	395	141	150	540	48	36	137
29	17	30	730	1,280	-------	315	141	141	116	41	41	56
30	18	29	440	1,190	-------	279	137	128	71	39	39	36
31	22	-------	262	1,470	-------	246	-------	120	-------	37	39	-------

Monthly discharge of Darby Creek at Darbyville, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 533 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	28	12	19.0	0.036	0.04
November	51	22	35.2	.066	.07
December	730	28	82.3	.154	.18
January	1,970	52	560	1.05	1.21
February	1,470	152	503	.944	.98
March	2,880	246	785	1.47	1.70
April	970	135	300	.563	.63
May	1,870	98	355	.666	.77
June	540	68	127	.238	.27
July	262	36	72.1	.135	.16
August	1,270	29	112	.210	.24
September	137	22	39.6	.074	.08
The year	2,880	12	249	.467	6.33

PAINT CREEK AT BAINBRIDGE, OHIO

LOCATION.—At highway bridge half a mile northwest of Bainbridge, Ross County. Buckskin Creek enters on right 500 feet above gage.

DRAINAGE AREA.—773 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 6, 1921, to September 30, 1923.

GAGE.—Chain gage for low water on highway bridge; vertical staff for higher stages on left abutment; read by E. C. and G. P. Moore. Zero of gage is 700.81 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from railroad bridge 1,000 feet above gage, from highway bridge at gage, or by wading. The flow of Buckskin Creek is measured and added to measurements made at railroad bridge.

CHANNEL AND CONTROL.—Channel straight for a quarter of a mile above and half a mile below gage. Banks wooded; right bank high; left bank fairly high, subject to overflow during floods. Control for low water is rock ledge at gage. Control for higher stages is stretch of channel below gage.

EXTREMES OF STAGE.—Maximum stage recorded during year, 10.8 feet at 1 p. m. March 22; minimum stage, 2.12 feet at 8.30 a. m. October 6.

1922–1923: Maximum stage, 20.0 feet on December 24, 1921 (determined by leveling to high-water mark); minimum stage, 2.12 feet on September 18, 19, 25, 26, 28, 29, and October 6, 1922.

ICE.—Stage-discharge relation not affected by ice except during severe winters.

REGULATION.—None.

DIVERSIONS.—Negligible.

ACCURACY.—Gage read to hundredths twice daily. Rating curve for high water not yet developed.

Discharge measurements of Paint Creek at Bainbridge, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Apr. 14	Lasley Lee	7.22	5,320
July 19	Morgan and Lee	2.30	46.0
Sept. 25	Morgan and Dornbach	2.30	49.2

Daily gage height, in feet, of Paint Creek at Bainbridge, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.15	2.19	2.23	2.36	6.01	3.55	3.04	2.97	2.58	2.42	2.21	2.24
2	2.17	2.19	2.21	2.33	5.34	3.33	3.02	2.92	2.56	2.40	2.23	2.20
3	2.15	2.19	2.23	2.33	4.94	3.29	3.07	2.87	2.55	2.35	2.42	2.32
4	2.15	2.17	2.22	2.85	3.98	3.29	3.22	2.81	2.55	2.37	2.60	2.53
5	2.15	2.19	2.27	2.34	3.51	3.31	6.60	2.75	2.51	2.33	2.47	3.23
6	2.13	2.17	2.23	2.33	3.33	4.51	4.66	2.69	2.56	2.35	2.33	2.83
7	2.17	2.19	2.38	2.34	3.21	4.78	3.36	2.64	2.63	2.41	2.32	2.81
8	2.17	2.21	2.72	3.77	3.35	4.01	3.56	2.58	2.58	2.55	2.26	2.63
9	2.21	2.19	2.57	3.49	3.26	3.54	3.38	2.56	2.57	2.42	2.23	2.40
10	2.21	2.19	2.46	3.22	2.96	3.81	3.20	2.54	2.61	2.35	2.21	2.27
11	2.26	2.17	2.36	2.99	2.81	3.94	3.05	2.96	2.67	2.37	2.72	2.23
12	2.25	2.19	2.32	2.89	2.75	5.40	2.90	3.22	2.68	2.72	2.40	2.23
13	2.21	2.21	2.33	2.81	6.30	4.48	3.11	3.23	2.75	2.71	3.05	2.24
14	2.19	2.21	2.33	2.79	5.60	4.24	7.00	3.29	2.91	2.47	2.41	2.15
15	2.17	2.24	2.33	2.84	3.78	4.03	4.78	4.51	2.92	2.37	2.34	2.13
16	2.18	2.27	2.31	2.75	3.48	6.60	4.01	4.44	2.84	2.30	2.41	2.13
17	2.20	2.23	2.31	2.64	3.48	5.10	3.61	4.38	2.75	2.30	2.35	2.15
18	2.21	2.21	2.29	2.65	3.39	4.41	3.44	3.96	2.73	2.31	2.33	2.17
19	2.18	2.19	2.27	2.67	3.26	3.76	3.39	3.54	2.87	2.30	2.26	2.21
20	2.17	2.23	2.29	2.67	3.23	3.54	3.34	3.28	2.80	2.28	2.21	2.51
21	2.17	2.21	2.25	5.70	3.25	3.38	3.24	3.19	2.68	2.20	2.19	2.50
22	2.19	2.19	2.27	4.78	3.27	8.40	3.11	3.14	2.59	2.21	3.35	2.33
23	2.21	2.19	2.25	4.01	2.87	5.80	2.98	3.04	2.53	2.82	2.73	2.27
24	2.19	2.21	2.25	3.54	2.75	4.96	2.88	2.96	2.62	2.60	2.34	2.23
25	2.19	2.23	2.27	3.45	2.79	4.44	2.87	2.87	2.74	2.38	2.29	2.27
26	2.19	2.21	2.30	3.38	2.87	3.91	2.89	2.79	2.84	2.29	2.20	2.23
27	2.21	2.21	2.32	4.44	2.91	3.66	2.90	2.73	2.91	2.25	2.15	2.19
28	2.17	2.21	2.43	5.26	3.66	3.44	3.15	2.73	2.89	2.25	2.33	2.27
29	2.19	2.21	2.35	4.71	-------	3.33	3.05	2.67	2.70	2.23	2.27	2.19
30	2.17	2.21	2.35	4.16	-------	3.25	2.98	2.61	2.52	2.23	2.31	2.19
31	2.19	-------	2.45	3.78	-------	3.18	-------	2.59	-------	2.19	2.29	-------

MIAMI RIVER BASIN

MIAMI RIVER AT SIDNEY, OHIO

LOCATION.—At North Street Bridge at Sidney, Shelby County, 500 feet below Cleveland, Cincinnati, Chicago & St. Louis Railway bridge.

DRAINAGE AREA.—545 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 1, 1914, to September 30, 1923.

GAGE.—Vertical staff in two sections; lower section attached to upstream wing and upper section to downstream wing of right abutment of bridge; read by Thaleon Blake. Gage datum changed on September 18, 1919, from 926.46 to 924.74 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from bridge 1,000 feet below gage or by wading.

CHANNEL AND CONTROL.—Channel straight for 500 feet above and below gage. Right bank high and wooded, left bank low and brushy. Roadway along left bank is high. Bed of stream composed of gravel and small boulders. Control is riffle three-eighths mile below gage; shifts during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.4 feet at 6.30 a. m. May 13 and 15 (discharge, 5,080 second-feet); minimum stage, 0.60 foot at 7 a. m. August 26 (discharge, 33 second-feet).

1914–1923: Maximum stage recorded, 12.8 feet at noon April 21, 1920 (discharge, 15,500 second-feet); minimum stage, −1.5 feet September 18 and 19, 1917 (discharge, 9 second-feet).

The flood of March, 1913, the highest known to have occurred at this station, reached a stage on March 25 represented by 19.6 feet on the gage, present datum (discharge estimated by engineers of the Miami Conservancy District at 44,000 second-feet).

ICE.—Stage-discharge relation affected by ice during severe winters.

REGULATION.—The flow is practically unregulated.

DIVERSIONS.—Water to feed the Miami & Erie Canal is diverted from the river at Port Jefferson. The amount diverted through Sidney around the gage may be a large proportion of the low-water flow. Flow in the canal feeder is not included in tables of daily discharge. See miscellaneous discharge measurements of canal feeder on page 229.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Gage read to hundredths once daily at low water; additional readings made at extremely high water. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Miami River at Sidney, Ohio, during the year ending Sept. 30, 1923

[Made by F. R. Morgan]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Aug. 1	1.00	74.0	Aug. 22	0.86	39.5

Daily discharge, in second-feet, of Miami River at Sidney, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	59	39	50	1,450	940	555	405	102	250	79	41	90
2	55	46	55	1,090	990	405	370	90	225	69	41	50
3	42	45	54	850	990	225	335	79	182	67	79	41
4	42	46	54	675	850	475	475	79	130	64	115	64
5	43	46	115	475	675	555	675	90	102	59	102	50
6	42	46	79	370	475	515	990	102	84	54	84	79
7	44	50	90	335	440	440	895	102	440	69	69	69
8	115	54	102	895	440	335	805	102	555	115	63	59
9	108	50	96	715	405	275	760	102	172	102	59	49
10	102	46	90	635	405	335	675	96	115	79	50	163
11	102	46	90	555	335	335	555	90	102	69	50	163
12	102	45	84	475	335	760	440	1,590	96	50	61	154
13	84	52	79	370	1,090	635	335	5,080	90	50	59	163
14	62	59	79	440	895	555	335	3,080	90	41	50	163
15	48	69	79	1,730	555	515	335	5,080	102	41	41	163
16	46	79	79	1,450	555	1,800	305	4,770	305	69	50	146
17	43	74	102	805	475	2,340	275	3,500	225	79	45	130
18	47	68	102	405	475	1,090	225	2,880	182	69	50	225
19	49	63	90	405	475	805	203	2,520	182	69	38	64
20	45	58	90	335	475	675	163	1,870	163	59	41	59
21	40	61	90	1,450	275	555	146	990	163	50	41	115
22	46	67	90	1,730	182	1,800	130	805	115	41	50	102
23	44	57	79	990	163	2,700	130	555	79	50	50	69
24	50	55	59	595	146	1,800	115	555	69	59	50	79
25	45	52	59	405	115	1,380	115	405	59	67	41	59
26	43	48	59	370	115	1,040	102	305	59	61	33	65
27	43	52	59	475	990	715	102	305	50	55	41	54
28	43	59	1,090	2,340	805	555	102	290	50	48	90	45
29	43	55	895	2,020	-------	515	102	290	102	36	163	62
30	44	46	675	1,320	-------	475	102	405	90	38	130	50
31	44	-------	405	895	-------	440	-------	335	-------	41	79	-------

Monthly discharge, in second-feet, of Miami River at Sidney, Ohio, for the year ending Sept. 30, 1923

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October	115	40	56.9	May	5,080	79	1,180
November	79	39	54.4	June	555	50	154
December	1,090	50	168	July	115	36	61.3
January	2,340	335	873	August	163	33	63.1
February	1,090	115	538	September	225	41	94.8
March	2,700	225	826				
April	990	102	357	The year	5,080	33	370

MIAMI RIVER AT TAYLORSVILLE, OHIO

LOCATION.—At outlet works of Taylorsville dam of Miami Conservancy District, three-fourths mile north of Taylorsville, 1½ miles south of Tadmor, and 8 miles north of Dayton, Montgomery County.

DRAINAGE AREA.—1,160 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1922, to September 30, 1923, at present site; January 1, 1914, to September 30, 1917, at former station at Tadmor where drainage area is 1,150 square miles (revised measurement on topographic maps).

GAGE.—Painted and chiseled on concrete slope on downstream end of right retaining wall below outlet works of dam; read by H. B. Cromes. Add 700 feet to gage heights as published to refer them to mean sea level.

DISCHARGE MEASUREMENTS.—Made by wading half a mile below gage, or from highway bridge 2 miles below gage.

CHANNEL AND CONTROL.—Channel fairly straight for 2 miles below gage. Control is a boulder and gravel bar 1,000 feet below gage. Zero flow would occur at gage height 61.1 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 69.6 feet at 9 a. m. May 16 (discharge, 11,900 second-feet); minimum stage, 61.75 feet on October 27 and 28 (discharge, 55 second-feet).

1922–1923: Maximum stage recorded, 71.6 feet at 3 p. m. April 15, 1922 (discharge, 17,300 second-feet); minimum stage on October 27 and 28, 1922.

The flood of March, 1913, reached a stage of 25.4 feet at the former gaging station at Tadmor, 1½ miles above this station (discharge estimated by engineers of Miami Conservancy District at 127,000 second-feet).

ICE.—Stage-discharge relation not affected by ice except during severe winters.

DIVERSIONS.—Negligible.

REGULATION.—Flow at high stages automatically regulated at the retarding basins on Miami River just above station and on Loramie Creek at Lockington.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Gage read once daily to tenths, occasionally to half-tenths. Daily discharge ascertained by applying daily gage height to rating table. Records good except for low water, for which they are fair.

COOPERATION.—Gage-height record and part of discharge measurements furnished by Miami Conservancy District.

Discharge measurements of Miami River at Taylorsville, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 13	Kohlmann, Evans, and Scholl	62.20	180	July 14	Kohlmann and Scholl	62.10	174
				27	Morgan and Lee	62.00	116
Jan. 29	do	66.27	4,280	Aug. 23	F. R. Morgan	61.90	86.8
Mar. 23	do	64.72	2,290				

NOTE.—Measurements prior to July 27 made by employees of Miami Conservancy District.

Daily discharge, in second-feet, of Miami River at Taylorsville, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	64	76	131	3,290	2,230	1,160	792	350	560	260	102	180
2	64	88	131	2,360	2,230	792	755	305	505	218	146	400
3	64	88	116	1,870	2,230	755	755	305	478	199	260	180
4	64	88	131	1,540	1,870	755	652	260	350	180	400	116
5	64	88	163	1,250	1,120	1,540	1,870	239	282	180	450	116
6	64	88	163	985	1,030	1,340	3,150	260	260	180	305	102
7	64	88	163	792	905	1,160	2,490	260	505	218	218	102
8	180	88	260	1,160	830	985	1,650	260	620	218	180	102
9	180	76	400	1,540	945	868	1,340	260	478	305	146	102
10	260	76	328	1,650	792	1,160	1,070	260	400	218	146	102
11	260	76	218	1,250	755	2,750	905	239	305	180	116	218
12	218	76	218	1,030	560	1,990	720	425	260	163	116	260
13	218	76	180	905	1,760	3,010	652	7,840	305	146	146	239
14	218	146	180	720	1,540	2,230	755	6,900	260	146	146	239
15	116	146	146	2,360	1,160	1,760	755	4,330	328	163	218	260
16	116	146	131	2,620	985	3,570	755	11,900	305	146	116	260
17	116	146	116	1,650	905	5,220	755	7,600	478	260	102	260
18	109	180	76	1,160	620	2,880	620	4,350	350	218	88	260
19	102	146	64	1,030	560	1,990	620	3,290	282	146	88	146
20	95	146	116	945	560	1,070	590	2,110	260	116	76	146
21	88	116	116	1,250	450	1,070	532	1,650	505	116	76	199
22	64	116	131	4,010	400	1,160	478	1,440	620	102	88	425
23	64	116	131	2,230	305	3,290	450	1,120	478	88	88	260
24	64	102	146	1,540	305	4,010	450	945	218	218	88	180
25	64	102	116	1,340	305	2,750	425	830	218	218	64	146
26	64	102	116	1,070	350	1,990	375	792	199	146	64	146
27	55	116	131	905	1,160	1,340	375	755	180	116	102	146
28	55	116	1,160	3,430	1,650	1,120	350	652	180	116	146	305
29	76	102	2,230	4,170	-------	985	350	620	305	116	305	180
30	76	102	1,540	2,490	-------	830	350	620	218	102	400	116
31	76	-------	1,070	1,990	-------	755	-------	560	-------	88	218	-------

NOTE.—Gage readings in error Oct. 18–20, and May 26; discharge interpolated.

Monthly discharge of Miami River at Taylorsville, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 1,160 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	260	55	109	0.094	0.11
November	180	76	107	.092	.10
December	2,230	64	333	.287	.33
January	4,170	720	1,760	1.52	1.75
February	2,230	305	1,020	.879	.92
March	5,220	755	1,820	1.57	1.81
April	3,150	350	860	.741	.83
May	11,900	239	2,010	1.73	1.99
June	620	180	356	.307	.34
July	305	88	171	.147	.17
August	450	64	168	.145	.17
September	425	102	196	.169	.19
The year	11,900	55	743	.641	8.71

MIAMI RIVER AT DAYTON, OHIO

LOCATION.—At Main Street Bridge at Dayton, Montgomery County, half a mile below mouth of Mad River and four-fifths mile above mouth of Wolf Creek.

DRAINAGE AREA.—2,510 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 18, 1905, to December 31, 1909; April 1, 1913, to September 30, 1923.

GAGE.—Vertical staff attached to downstream end of first pier from left bank read by employee of United States Weather Bureau. Gage was lowered 2.73 feet on December 6, 1922, making elevation of zero of gage 721.00 feet above mean sea level. All gage heights beginning October 1, 1921, refer to new datum.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Channel straight for half a mile above and below gage. Banks high. Bed of stream composed of gravel and small boulders. Control for low water is riffle three-eighths mile below gage; control for high stages is long stretch of channel below gage. Zero flow would occur at gage height −1.4 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year; 7.8 feet May 16 (discharge, 16,400 second-feet); minimum stage, 0.5 foot August 24 (discharge, 245 second-feet).

1913–1923: Maximum stage recorded, 16.0 feet (old datum) on April 21, 1920 (discharge at Millers Ford 3½ miles below gage estimated by engineers of Miami Conservancy district at 59,800 second-feet); minimum stage, 0.4 foot August 9, 1914 (discharge, 215 second-feet).

Maximum known stage occurred on March 26, 1913, gage height, 29.0 feet (old datum), at Main Street Bridge (discharge estimated by engineers of Miami Conservancy District at 250,000 second-feet).

ICE.—Stage-discharge relation affected by ice during severe winters.

DIVERSIONS.—The Miami & Erie Canal diverts water around gaging station; amount of water diverted not included in tables of discharge. See miscellaneous discharge measurements of canal, page 229.

REGULATION.—Flow at high water automatically regulated at the four retarding basins of the Miami Conservancy District above this station.

ACCURACY.—Stage-discharge relation permament; not affected by ice. Rating curve well defined. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except for October and November, for which they are fair.

COOPERATION.—Gage-height record furnished by United States Weather Bureau. Part of the discharge measurements furnished by Miami Conservancy District.

Discharge measurements of Miami River at Dayton, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 15	Kohlmann[a] and Scholl[a]	1.20	422	July 11	Evans, Scholl, and Peacock[a]	1.00	540
Jan. 27	Kohlmann, Evans,[a] and Scholl	2.80	2,170	26	Morgan, Lee, and Evans	.64	334
Mar. 23	do	6.25	10,800	Aug. 24	F. R. Morgan	.48	235
May 17	Kohlmann and Scholl	6.90	13,300				

[a] Employees of Miami Conservancy District.

Daily discharge, in second-feet, of Miami River at Dayton, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	525	395	525	4,460	4,240	3,290	1,570	765	1,130	905	370	640
2	498	395	470	4,920	4,690	2,970	1,380	765	1,050	835	370	835
3	470	395	580	2,970	4,690	1,470	1,380	765	975	700	420	700
4	498	395	470	2,670	3,830	1,570	1,290	765	835	700	1,890	640
5	470	370	580	2,260	2,260	2,820	1,780	765	765	700	1,130	580
6	470	370	640	1,670	1,890	2,970	5,160	835	700	640	975	470
7	498	370	525	1,470	1,780	2,130	4,240	765	905	700	835	525
8	470	348	835	1,890	1,670	1,890	3,130	765	1,210	700	700	470
9	610	348	905	3,130	1,570	1,670	2,390	835	905	835	580	325
10	580	348	905	3,290	1,470	2,010	2,130	835	905	835	525	285
11	700	325	700	2,530	1,380	5,410	1,670	835	975	470	470	285
12	610	325	640	1,890	1,290	4,030	1,570	975	835	640	470	370
13	580	325	525	1,380	4,030	5,940	1,470	10,500	765	640	700	370
14	552	370	525	1,210	4,460	4,460	1,570	9,760	765	640	525	370
15	525	552	640	1,130	4,000	3,290	1,780	7,090	975	580	580	370
16	525	525	580	4,240	3,530	6,220	1,670	16,400	835	580	525	470
17	525	525	700	2,530	3,070	10,100	1,470	12,900	765	765	470	420
18	525	580	580	2,130	2,600	6,790	1,470	8,030	765	700	470	370
19	525	700	580	1,890	2,140	4,240	1,380	4,920	765	580	370	370
20	498	580	580	1,470	1,670	2,820	1,290	3,640	765	525	370	370
21	498	525	580	2,530	1,210	2,260	1,130	2,820	765	470	370	470
22	525	470	580	8,360	1,130	2,130	1,130	2,260	765	470	370	640
23	552	470	580	1,380	975	10,500	1,130	1,890	765	470	370	580
24	470	470	470	2,970	905	7,710	1,050	1,670	700	420	245	525
25	470	470	470	2,390	1,050	4,690	975	1,470	640	580	370	420
26	445	580	525	2,130	975	3,290	975	1,290	640	285	325	370
27	445	525	525	1,890	2,970	2,670	975	1,290	640	285	420	325
28	445	525	1,780	6,220	3,830	2,260	905	1,210	700	285	470	325
29	420	420	4,690	9,760	-------	1,890	835	1,130	700	370	765	420
30	420	525	2,970	5,160	-------	1,670	835	1,130	1,050	285	835	420
31	395	-------	2,010	3,640	-------	1,670	-------	1,130	-------	285	700	-------

NOTE.—River frozen at gage Feb. 15–20; discharge interpolated.

Monthly discharge, in second-feet, of Miami River at Dayton, Ohio, for the year ending Sept. 30, 1923

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October	700	395	508	May	16,400	765	3,230
November	700	325	451	June	1,210	640	832
December	4,690	470	892	July	905	285	577
January	9,760	1,130	3,080	August	1,890	245	580
February	4,690	905	2,480	September	835	285	458
March	10,500	1,470	3,770				
April	5,160	835	1,660	The year	16,400	245	1,540

MIAMI RIVER AT VENICE, OHIO

LOCATION.—At highway bridge three-fourths mile southeast of Venice, 400 feet downstream from boundary line between Hamilton and Butler counties. Indian Creek enters from right 1½ miles above station.

DRAINAGE AREA.—3,780 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 14, 1915, to September 30, 1923.

GAGE.—Chain gage on bridge installed August 24, 1922, at same datum as original chain gage which was used to June 26, 1920; zero of gage 520.22 feet above mean sea level. From July 1, 1920, to August 23, 1922, a Mott gage at different datum was used; all readings from this gage have been reduced to original datum. Gage read by H. B. Matson.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Channel straight for 2,000 feet above and below gage. Left bank high, wooded; right bank fairly high, lined with trees. All water flows under bridge up to a stage of about 25 feet. Bed of stream composed of gravel. Control for low water is riffle at gage; control for higher stages is long stretch of channel below gage. Zero flow would occur at gage height −0.5 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.8 feet at 7 a. m. March 16 (discharge, 20,600 second-feet); minimum stage, 1.24 feet at 7 p. m. August 26 (discharge, 291 second-feet).

1915–1923: Maximum stage recorded, 24.2 feet on April 22, 1920 (discharge, 55,600 second-feet); minimum stage, that of August 26, 1923.

The flood of March, 1913, the highest known to have occurred at this station, reached a stage on March 26 of 38.0 feet referred to gage datum (discharge estimated at 370,000 second-feet).

ICE.—Stage-discharge relation not affected by ice except during unusually severe winters.

DIVERSIONS.—The Miami and Erie Canal diverts water from this drainage basin above the station. Miscellaneous discharge measurements are made of the canal at Lindenwald, near Hamilton, near the point where it leaves the basin. Amount of water diverted not included in tables of discharge.

REGULATION.—The flow at low stages is regulated for power purposes at Hamilton At extremely low stages a diurnal fluctuation of from 0.1 to 0.4 foot is recorded at Venice. The flow at high water is automatically regulated at the five retarding basins of the Miami Conservancy District above this station.

ACCURACY.—Stage-discharge relation for low water changed during high water on April 15, 1922; not affected by ice. Rating curves well defined. Gage read to hundredths once daily prior to August 31, 1922, twice daily thereafter. Daily discharge ascertained by applying daily mean gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by Miami Conservancy District.

Discharge measurements of Miami River at Venice, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
July 25	Morgan and Lee	1.51	434
Aug. 27	F. R. Morgan	1.48	411

Daily discharge, in second-feet, of Miami River at Venice, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	530	681	586	6,960	12,500	4,080	2,340	1,230	1,500	980	530	648
2	648	616	616	8,090	10,300	2,980	2,100	1,230	1,320	1,140	502	530
3	648	530	530	5,550	8,880	2,850	2,220	1,140	1,140	788	476	648
4	557	451	681	4,550	6,420	2,720	2,590	1,140	1,230	751	586	2,460
5	557	403	980	3,510	5,040	3,650	4,230	1,060	1,140	716	1,680	1,230
6	586	451	1,140	3,110	4,230	6,240	6,960	825	1,060	900	1,500	751
7	586	451	1,590	2,850	3,930	5,890	6,780	900	1,320	751	1,230	900
8	502	476	2,850	6,600	3,510	5,380	4,710	980	1,320	1,410	1,060	681
9	681	502	2,590	6,240	3,110	4,230	4,230	1,060	1,320	1,230	751	530
10	788	557	1,680	6,240	2,720	4,080	3,650	1,060	1,060	900	681	616
11	980	502	1,500	4,390	2,340	6,600	3,110	1,140	1,230	900	557	586
12	980	403	1,230	3,790	2,340	7,900	2,590	1,320	2,340	825	427	530
13	825	502	980	2,980	10,700	8,680	2,720	5,550	1,500	900	788	530
14	751	586	900	2,220	4,550	6,600	3,930	10,700	1,140	825	751	530
15	681	586	980	2,850	3,930	5,720	3,370	10,700	1,590	716	716	502
16	788	716	900	5,890	3,510	18,800	2,850	15,300	1,500	716	648	451
17	751	616	900	4,230	2,980	16,000	2,720	14,300	1,230	586	616	502
18	716	681	825	3,510	2,220	11,000	2,460	10,300	1,230	616	616	557
19	648	980	788	2,980	2,220	7,520	2,220	7,330	1,060	616	451	557
20	648	1,060	716	3,110	2,460	6,060	1,990	5,720	980	648	557	825
21	648	825	681	11,400	2,100	4,230	1,880	4,710	900	616	586	1,500
22	557	716	681	10,100	1,880	5,040	1,680	3,930	825	451	1,320	825
23	716	681	825	7,710	1,780	11,200	1,680	3,790	751	616	586	681
24	681	681	648	5,380	1,500	10,300	1,590	3,110	616	557	557	681
25	586	648	716	4,390	1,410	8,090	1,500	2,340	788	502	502	681
26	616	502	681	3,790	2,460	6,240	1,500	2,220	825	502	336	616
27	586	681	1,680	4,870	4,870	4,710	1,410	1,880	788	557	557	616
28	557	681	11,400	14,100	5,550	4,390	1,320	1,880	900	476	1,230	586
29	530	648	7,710	12,900	-------	3,650	1,230	1,780	900	358	751	586
30	557	616	5,720	8,090	-------	3,110	1,320	1,590	980	557	716	530
31	648	-------	4,870	7,330	-------	2,720	-------	1,500	-------	557	716	-------

Monthly discharge, in second-feet, of Miami River at Venice, Ohio, for the year ending Sept. 30, 1923

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October	980	502	662	May	15,300	825	3,930
November	1,060	403	614	June	2,340	616	1,150
December	11,400	530	1,890	July	1,410	358	731
January	14,100	2,220	5,800	August	1,680	336	741
February	12,500	1,410	4,270	September	2,460	451	729
March	18,800	2,720	6,470				
April	6,960	1,230	2,760	The year	18,800	336	2,480

LORAMIE CREEK AT LOCKINGTON, OHIO

LOCATION.—In NE. ¼ sec. 30, T. 7 N., R. 6 E., at highway bridge just below Lockington dam of Miami Conservancy District, half a mile northwest of Lockington, Shelby County, and 1¾ miles above junction with Miami River.

DRAINAGE AREA.—261 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1915, to September 30, 1923.

GAGE.—Vertical staff attached to bridge pier; read by T. L. Mitchell. Zero of gage 875.99 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Channel straight for 1,000 feet above and 200 feet below gage. Banks high, riprapped. Control is a small island and riffle of boulders 200 feet below gage. Zero flow would occur at gage height −0.3 foot, as determined September 15, 1922.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.0 feet at 5.30 p. m. May 15 (discharge, 3,750 second-feet); minimum stage, 0.10 foot August 23–26, September 8–17 and 27–30 (discharge, 8 second-feet).

1915–1923: Maximum stage recorded, 10.4 feet at 4.30 a. m. May 7, 1916 (discharge, 10,400 second-feet); minimum stage, 1.0 foot at 7 a. m. November 18, 1915 (discharge, 5 second-feet).

Maximum known stage, 15.6 feet, March 25, 1913 (discharge estimated by engineers of the Miami Conservancy District at 25,600 second-feet).

ICE.—Stage-discharge relation seriously affected by ice only during unusually severe winters.

DIVERSIONS.—None.

REGULATION.—There is a small amount of regulation due to storage of water in Loramie reservoir, which controls about 30 per cent of the total drainage area of Loramie Creek. At high stages the flow is automatically regulated by the Loramie retarding basin of the Miami Conservancy District.

ACCURACY.—Stage-discharge relation for extremely low water changed on August 4; not affected by ice. Rating curves well defined up to 7,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for low water, for which they are fair.

COOPERATION.—Gage-height record furnished by Miami Conservancy District.

Discharge measurements of Loramie Creek at Lockington, Ohio, during the year ending Sept. 30, 1923

[Made by F. R. Morgan]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Aug. 1	0.37	8.5	Aug. 22	0.15	8.9

Daily discharge, in second-feet, of Loramie Creek at Lockington, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	12	10	13	820	478	134	43	25	28	32	10	320
2	12	10	13	345	395	114	43	22	28	20	10	104
3	12	10	13	450	450	74	35	22	22	16	12	63
4	12	10	13	210	272	565	43	22	20	13	81	19
5	12	10	15	146	250	320	658	20	20	13	32	11
6	12	10	15	114	134	192	690	20	20	13	27	10
7	12	10	17	104	104	152	478	20	20	22	23	10
8	12	10	32	250	88	123	272	20	18	35	18	8
9	12	10	43	286	62	175	160	22	17	28	18	8
10	13	10	39	250	62	885	134	22	17	20	19	8
11	13	10	27	146	62	565	62	22	17	16	17	8
12	17	10	22	81	123	1,240	52	2,410	17	15	16	8
13	17	13	22	88	595	595	43	2,000	17	13	18	8
14	17	13	22	146	230	422	104	1,160	17	13	18	8
15	17	13	22	950	104	230	88	2,860	15	13	16	8
16	17	13	22	505	104	1,400	104	1,910	15	20	16	8
17	17	13	22	320	74	820	104	1,090	15	29	16	8
18	16	13	22	192	48	535	88	885	15	17	16	12
19	13	13	22	175	48	370	57	625	15	13	14	12
20	11	13	22	123	48	192	52	345	15	13	13	16
21	10	13	22	1,560	41	114	43	230	15	13	13	88
22	10	13	22	625	41	1,400	35	134	13	12	10	35
23	10	13	22	272	41	1,090	29	74	13	10	8	23
24	10	13	20	250	41	658	28	43	13	10	8	19
25	10	13	17	160	41	450	28	35	13	10	8	13
26	10	13	17	123	104	272	28	39	13	10	8	10
27	10	13	20	295	625	134	28	43	13	10	9	8
28	10	12	788	1,400	210	104	28	35	17	10	19	8
29	10	12	395	505	-------	96	28	35	52	10	33	8
30	10	12	146	395	-------	57	28	35	43	10	33	8
31	10	-------	123	320	-------	43	-------	28	-------	10	74	-------

Monthly discharge, in second-feet, of Loramie Creek at Lockington, Ohio, for the year ending Sept. 30, 1923

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October	17	10	12.5	May	2,860	20	460
November	13	10	11.7	June	52	13	19.1
December	788	13	65.5	July	35	10	15.8
January	1,560	81	374	August	81	8	20.4
February	595		174	September	320	8	29.2
March	1,400	43	436				
April	690	28	120	The year	2,860	8	146

STILLWATER RIVER AT PLEASANT HILL, OHIO

LOCATION.—In SE. ¼ sec. 18, T. 7 N., R. 5 E., at highway bridge three-fourths mile northwest of Pleasant Hill, Miami County, and 4 miles below mouth of Greenville Creek.

DRAINAGE AREA.—502 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1923.

GAGE.—Vertical staff in two sections; lower section reading from 0 to 10.3 feet attached to bridge pier; upper section attached to downstream wing of left abutment. Zero of gage 846.55 feet above mean sea level. Gage read by R. L. Anewalt.

DISCHARGE MEASUREMENTS.—Made from the bridge or by wading.

CHANNEL AND CONTROL.—Channel straight above and below bridge. Control composed of rock and gravel, practically permanent. During floods the water overflows the levee on left bank and inundates a wide strip of bottom land. Zero flow would occur at gage height, 0.5 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.0 feet at 8 a. m. May 15 and 16 (discharge, 4,220 second-feet); minimum stage, 1.15 feet at 8 a. m. November 12 (discharge, 12 second-feet).

1916–1923: Maximum stage recorded, 13.7 feet at 6 p. m. April 20, 1920 (discharge, 10,900 second-feet); minimum stage, 1.0 foot October 17, 1920, July 12, 22, and August 30, 1921 (discharge, 4 second-feet).

Maximum known stage occurred on March 25, 1913, gage height 17.5 feet (discharge estimated by engineers of Miami Conservancy District at 51,400 second-feet).

ICE.—Stage-discharge relation affected by ice during severe winters; flow estimated from study of observer's notes, weather records, and records of flow of near-by gaging stations.

DIVERSIONS.—None.

REGULATION.—Negligible.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Gage read once daily to tenths, occasionally to hundredths. Daily discharge ascertained by applying daily gage height to rating table. Records good except for low water for which they are fair.

COOPERATION.—Gage-height record furnished by United States Weather Bureau and Miami Conservancy District.

Discharge measurements of Stillwater River at Pleasant Hill, Ohio, during the year ending Sept. 30, 1923

[Made by F. R. Morgan]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
July 31	1.71	65.7	Aug. 22	1.62	52.3

Daily discharge, in second-feet, of Stillwater River at Pleasant Hill, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	29	31	46	2,840	735	351	141	161	233	422	22	141
2	31	33	64	1,160	785	233	106	106	141	351	37	207
3	29	31	31	685	1,160	233	183	123	106	141	52	207
4	29	31	64	685	785	590	161	91	123	106	590	123
5	31	26	64	590	460	900	685	106	106	106	422	123
6	29	26	58	351	351	785	785	106	106	123	590	106
7	29	31	58	319	289	590	785	91	207	106	106	91
8	26	19	77	635	289	351	685	106	141	545	141	91
9	31	22	70	635	289	351	635	123	106	351	141	77
10	29	19	77	735	233	1,520	351	91	64	161	77	77
11	54	19	77	735	183	1,440	319	106	106	123	64	64
12	35	12	70	685	183	2,030	289	422	123	106	91	64
13	31	15	64	233	1,600	1,600	289	3,220	91	91	91	52
14	29	22	52	319	1,600	1,090	260	1,160	64	77	233	41
15	26	31	52	319	351	590	233	4,220	91	77	161	41
16	31	26	52	685	233	2,210	233	4,220	106	91	106	31
17	31	26	41	590	233	2,210	207	3,220	77	207	106	64
18	33	31	41	500	233	1,440	183	1,300	77	141	106	41
19	36	26	41	233	183	1,160	141	785	77	106	77	31
20	31	26	52	233	183	590	260	590	41	77	77	106
21	31	26	52	2,210	106	386	233	545	41	64	64	141
22	31	31	52	2,210	106	1,440	183	351	77	64	59	123
23	41	41	58	785	106	3,020	106	289	64	52	52	141
24	36	36	52	635	106	2,300	141	207	77	77	52	123
25	36	41	52	351	106	900	123	207	260	41	41	91
26	31	31	52	319	123	590	123	161	123	52	52	91
27	31	31	52	422	1,230	500	141	141	161	52	106	64
28	29	41	785	2,840	590	422	123	183	233	77	161	64
29	26	46	351	2,750	-------	319	106	161	545	77	141	64
30	26	52	123	960	-------	319	141	319	500	64	233	52
31	31	-------	386	735	-------	233	-------	351	-------	36	141	-------

Monthly discharge of Stillwater River at Pleasant Hill, Ohio, for the year ending Sept. 30, 1923

[Drainage area, 502 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	54	26	31.6	0.063	0.07
November	52	12	29.3	.058	.06
December	785	31	102	.203	.23
January	2,840	233	883	1.76	2.03
February	1,600	106	458	.912	.95
March	3,020	233	990	1.97	2.27
April	785	106	278	.554	.62
May	4,220	91	750	1.49	1.72
June	545	41	142	.283	.32
July	545	36	134	.267	.31
August	590	22	142	.283	.33
September	207	31	91.1	.181	.20
The year	4,220	12	337	.671	9.11

MAD RIVER NEAR SPRINGFIELD, OHIO

LOCATION.—In NW. ¼ sec. 10, R. 9, T. 4, 800 feet below Cleveland, Cincinnati, Chicago & St. Louis Railway bridge and 1 mile west of Springfield, Clark County. Buck Creek enters from left one-third mile above station.

DRAINAGE AREA.—460 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1904, to March 31, 1906; February 1, 1914, to September 30, 1923.

GAGE.—Vertical staff in three sections 800 feet below railway bridge; read by Daniel Crabtree and Sampson Carter. Zero of gage is 887.81 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from highway bridge 1½ miles below gage or by wading below gage.

CHANNEL AND CONTROL.—Channel slightly curved at gage. Right bank high; left bank fairly high. Control for low water is riffle one-eighth mile below gage, fairly permanent. Control for higher stages is long stretch of channel below gage. Zero flow would occur at gage height — 2.8 feet.

EXTREMES OF STAGE.—Maximum stage recorded during year, 6.5 feet on January 28 and March 16 (discharge, 3,280 second-feet); minimum stage, 1.0 foot August 24 and September 3, 9–12, and 14–17 (discharge, 134 second-feet).

1914–1923: Maximum stage recorded, 10.8 feet at 7 a. m. August 22, 1920 (discharge, 13,100 second-feet); minimum stage, 1.0 foot several days in August, 1918, August and September, 1923 (discharge, 134 second-feet).

The flood of March, 1913, reached a stage on March 25 of 19.2 feet referred to gage datum (discharge at railway bridge a mile below gage estimated by engineers of Miami Conservancy District at 55,400 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice.

REGULATION.—None.

DIVERSIONS.—The small amount of water diverted past gage by old mill race is included in the rating of the station.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Gage read once daily to hundredths to December 31, to tenths thereafter. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Mad River near Springfield, Ohio, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Apr. 5	Lasley Lee	2.60	655	July 28	Morgan and Lee	1.20	174
May 15	do	4.18	1,510	Aug. 2	F. R. Morgan	1.24	180

Daily discharge, in second-feet, of Mad River near Springfield, Ohio, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	209	196	250	660	940	418	382	280	280	196	250	172
2	209	184	196	495	795	382	382	280	250	196	172	152
3	209	184	196	456	575	418	346	280	250	196	196	134
4	209	172	196	382	495	535	418	250	250	196	615	280
5	209	196	329	346	418	495	615	250	250	196	312	172
6	184	209	250	280	382	456	750	250	250	196	250	152
7	222	196	250	312	346	418	535	250	575	196	280	172
8	184	184	329	705	346	382	456	250	346	196	196	152
9	196	196	312	575	382	382	418	280	280	172	196	134
10	196	196	280	495	346	660	418	250	250	172	172	134
11	196	184	250	795	346	575	418	250	250	172	196	134
12	196	184	250	750	280	660	382	990	280	280	196	134
13	196	196	222	575	1,580	615	346	1,040	250	196	312	152
14	196	209	222	418	660	615	418	615	250	172	196	134
15	196	346	222	575	312	535	418	1,520	312	196	172	134
16	196	250	196	382	312	3,280	382	1,280	456	312	172	134
17	222	222	196	280	280	940	382	750	312	222	172	134
18	196	346	196	280	312	705	346	615	250	196	152	152
19	196	250	184	280	280	615	346	495	222	172	152	172
20	196	222	184	280	312	418	346	456	222	172	152	172
21	196	222	196	1,640	280	456	312	418	222	172	152	456
22	196	209	196	840	312	660	312	382	222	172	152	250
23	196	222	196	495	280	1,100	280	346	196	152	152	196
24	196	209	196	456	280	705	312	312	312	312	134	172
25	196	250	196	418	280	615	312	346	280	196	152	172
26	196	209	196	382	346	535	280	312	250	172	152	172
27	196	184	222	575	1,340	495	312	312	196	172	250	172
28	184	196	1,400	3,280	1,280	456	312	312	280	172	250	172
29	196	196	840	990	-------	418	312	280	280	196	250	172
30	172	222	660	705	-------	418	280	280	250	196	172	172
31	196	-------	456	615	-------	382	-------	280	-------	172	172	-------

NOTE.—Gage not read Sept. 25–30; discharge interpolated.

Monthly discharge of Mad River near Springfield, Ohio; for the year ending Sept. 30, 1923

[Drainage area, 460 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	222	172	198	0.430	0.50
November	346	172	215	.467	.52
December	1,400	184	305	.663	.76
January	3,280	280	636	1.38	1.59
February	1,580	280	503	1.09	1.14
March	3,280	382	637	1.38	1.59
April	750	280	384	.835	.93
May	1,520	250	458	.996	1.15
June	575	196	276	.600	.67
July	312	152	196	.426	.49
August	615	134	210	.457	.53
September	456	134	174	.378	.42
The year	3,280	134	349	.759	10.29

TWIN CREEK NEAR GERMANTOWN, OHIO

LOCATION.—In NE. ¼ sec. 14, T. 3. N., R. 4 E., at covered highway bridge 1 mile west of Germantown, Montgomery County, and 2 miles above mouth of Little Twin Creek.

DRAINAGE AREA.—276 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 12, 1914, to September 30, 1923.

GAGE.—Vertical staff in two sections on right abutment of bridge; read by Thomas Stettler. Zero of gage is 712.73 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from highway bridges near gage, from cable 1 mile above gage, or by wading.

CHANNEL AND CONTROL.—Channel straight for a quarter mile above and below gage. Banks fairly high. Control for low water is riffle half a mile below gage, shifts at flood stages. Control for high stages is long stretch of channel below gage. Zero flow would occur at gage height −0.4 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September, 30, 1923, 7.2 feet March 16 (discharge, 4,270 second-feet); minimum stage, 0.16 foot October 7 (discharge, 11 second-feet).

1914–1923: Maximum stage recorded, 11.0 feet April 21, 1920 (discharge, 8,480 second-feet); minimum stage, 0.1 foot October 24, 1921 (discharge, 9 second-feet).

The flood of March–April, 1913, reached a stage on March 25 of 18.3 feet, referred to gage datum (discharge estimated by engineers of Miami Conservancy District at 66,000 second-feet).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Flow at high stages automatically regulated at Germantown retarding basin of the Miami Conservancy District, 1¼ miles above station, after November, 1920.

DIVERSIONS.—None.

ACCURACY.—Stage-discharge relation shifts at flood stages. Rating curves used October 1, 1915, to June 3, 1916, June 4, 1916, to March 13, 1917, March 14, 1917, to September 30, 1919, well defined. Curve used October 1, 1919, to April 20, 1920, is fairly well defined, and curve used April 21 to September 30, 1923, is well defined. Gage read to tenths once daily with additional readings during floods, to September 30, 1921. Gage not read October 1 to December 10, 1921, after which it was read to hundredths once daily. Daily discharge ascertained by applying daily and mean daily gage height to rating table, except as explained in footnote to table of daily discharge. Records good except when gage was not read, for which they are fair.

COOPERATION.—Gage-height record and part of discharge measurements furnished by Miami Conservancy District.

Discharge measurements of Twin Creek near Germantown, Ohio, during the years ending September 30, 1918–1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1917		*Feet*	*Sec.-ft.*	1921		*Feet*	*Sec.-ft.*
Oct. 8	G. N. Burrell	0.80	14.1	Mar. 9	G. N. Burrell	7.30	5,150
1918				29	H. W. Wesle	7.48	6,150
Mar. 4	H. W. Wesle	2.66	444	May 19	do	1.62	152
May 17	do	2.30	308	June 11	do	.40	23.6
June 18	G. N. Burrell	1.20	32.4	Nov. 10	Lasley Lee	1.38	99.7
Sept. 18	F. E. Davis	2.40	400	1922			
Nov. 26	do	1.40	69.5	July 21	Dornbach and Bennett	1.20	80.2
1919				Sept. 2	Kohlmann and party	.30	23.5
Mar. 6	H. W. Wesle	1.48	106	Dec. 14	do	1.00	72.2
Aug. 18	do	.80	22.3	1923			
18	do	.80	22.3	Jan. 26	do	1.91	260
Sept. 30	do	.55	11.0	Mar. 24	do	2.64	600
Nov. 25	do	1.60	119	Apr. 5	do	2.85	672
1920				5	do	3.48	1,010
Sept. 3	do	.65	27.5	July 25	Morgan and Lee	.46	23.8
				Aug. 25	F. R. Morgan	.28	14.5

NOTE.—All measurements except those made by Lee, Dornbach, and Morgan were made by employees of Miami Conservancy District.

Daily discharge, in second-feet, of Twin Creek near Germantown, Ohio, for the years ending Sept. 30, 1916–1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1915–16												
1	340	99	118	2,450	2,280	224	420	194	140	77	38	25
2	340	82	118	5,150	970	194	340	167	118	77	61	61
3	224	82	118	1,480	610	194	300	167	5,510	77	48	31
4	194	82	99	720	420	194	300	194	730	77	38	25
5	167	82	99	560	380	167	260	194	378	61	48	25
6	118	69	99	660	340	167	260	167	204	61	77	25
7	99	69	82	460	300	1,720	224	194	3,710	61	61	25
8	99	69	82	380	224	900	194	900	1,400	61	61	38
9	99	69	82	224	260	420	224	420	730	48	422	31
10	82	69	82	260	224	380	224	300	670	48	117	25
11	82	69	82	610	224	300	224	224	670	48	77	25
12	82	69	82	4,610	420	260	224	167	422	48	61	25
13	82	69	82	5,960	660	224	194	167	290	48	61	25
14	82	69	82	1,040	460	260	194	167	204	48	48	19
15	194	69	69	460	340	260	194	167	169	48	48	19
16	167	69	69	420	340	260	167	140	141	48	48	19
17	118	69	224	340	380	224	167	140	246	48	38	19
18	140	69	1,960	260	460	224	167	118	378	48	38	19
19	1,320	1,880	610	194	380	194	167	118	204	48	38	19
20	660	1,110	340	224	340	194	167	118	141	48	38	19
21	420	560	260	900	340	224	460	118	141	48	48	19
22	300	340	224	2,720	300	340	610	118	560	169	48	19
23	224	260	194	840	340	720	380	140	290	77	38	19
24	194	224	224	560	460	460	300	118	169	61	31	14
25	167	167	340	420	420	380	224	118	141	61	31	14
26	140	167	970	380	340	340	224	118	117	48	31	14
27	118	194	510	420	260	2,450	300	99	96	48	31	14
28	118	140	460	1,180	224	3,080	300	118	96	48	31	48
29	99	140	460	3,800	224	970	260	140	96	38	25	61
30	99	140	2,040	4,160	-------	610	194	194	77	38	25	31
31	99	-------	1,180	5,420	-------	510	-------	167	-------	38	25	-------
1916–17												
1	31	19	31	246	800	117	206	240	530	178	58	49
2	25	19	25	204	290	96	1,310	400	320	178	49	58
3	25	19	25	204	246	96	920	240	440	178	41	126
4	25	19	25	246	117	77	485	530	280	126	41	70
5	19	19	38	3,620	96	77	400	1,380	2,320	104	41	49
6	19	19	38	3,170	96	61	1,240	630	1,680	104	41	41
7	19	19	38	1,160	96	77	630	485	800	104	41	34
8	19	19	38	560	96	117	400	360	440	178	41	41
9	19	19	48	422	96	334	320	280	320	126	41	41
10	19	25	48	422	96	378	280	280	740	104	34	41
11	19	25	48	290	48	334	240	240	400	104	34	41
12	19	25	48	169	48	2,540	240	240	280	104	34	34
13	19	25	38	141	61	2,720	240	206	240	85	34	34
14	19	25	25	96	48	4,070	206	178	206	1,040	34	34
15	19	25	31	96	48	1,380	178	178	206	206	34	28
16	19	25	31	96	61	740	178	150	178	150	34	28
17	19	25	31	77	61	630	178	150	150	178	28	28
18	19	25	25	77	61	440	150	150	150	206	28	23
19	25	25	25	77	61	320	240	126	150	150	28	23
20	25	25	25	61	169	280	206	126	126	126	28	23
21	38	19	31	117	96	280	206	126	126	104	28	23
22	48	19	25	2,900	77	530	178	126	126	85	680	23
23	38	25	25	1,160	422	485	150	150	104	70	360	23
24	31	38	25	466	1,240	1,680	150	240	104	70	126	23
25	31	38	25	246	204	680	178	178	104	70	126	23
26	31	31	25	141	141	440	178	150	104	580	70	23
27	25	31	610	141	141	360	178	1,040	104	240	49	23
28	25	25	940	141	141	280	178	920	320	126	41	23
29	25	31	290	169	-------	240	206	1,310	485	85	41	23
30	25	31	204	940	-------	206	178	580	485	70	49	23
31	19	-------	204	610	-------	206	-------	530	-------	58	58	-------

Daily discharge, in second-feet, of Twin Creek near Germantown, Ohio, for the years ending Sept. 30, 1916–1923—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1917–18												
1	23	178	34	34	41	920	85	400	85	104	41	240
2	23	126	34	34	41	680	206	280	85	85	34	150
3	23	104	34	34	41	400	630	206	85	49	34	104
4	23	85	34	34	34	320	440	206	85	49	28	85
5	23	70	34	34	34	920	240	178	70	41	28	85
6	23	58	34	485	34	530	178	150	70	41	28	178
7	23	58	34	2,000	41	360	178	126	104	34	23	126
8	23	58	34	1,100	58	280	150	206	104	34	23	85
9	23	49	34	360	580	280	126	178	85	34	23	70
10	23	49	34	280	2,080	320	104	150	70	34	23	58
11	23	49	28	206	1,680	280	104	126	630	34	41	49
12	23	49	28	178	3,710	240	104	2,080	150	34	34	150
13	23	49	28	150	3,620	680	126	5,060	104	34	70	400
14	23	41	28	126	1,310	1,920	126	1,600	70	34	49	178
15	23	41	28	126	1,520	680	104	740	70	34	485	126
16	23	41	28	85	580	860	85	440	58	34	70	150
17	23	41	28	70	360	280	104	360	58	34	34	980
18	23	41	28	58	320	240	530	280	49	41	126	980
19	150	34	34	49	580	206	240	240	49	34	70	980
20	126	34	34	58	2,080	178	178	240	41	34	41	740
21	58	34	41	58	530	178	206	206	41	28	41	320
22	49	34	85	58	320	150	206	206	41	28	41	240
23	49	34	85	49	240	150	178	178	34	860	34	178
24	41	34	85	49	240	150	178	178	34	178	28	150
25	41	34	178	49	800	126	150	150	34	280	23	126
26	41	34	178	49	2,320	126	1,310	150	58	150	85	104
27	34	34	178	49	630	104	1,840	150	49	104	150	85
28	34	34	178	49	400	104	860	126	49	70	360	85
29	34	34	178	49	-------	104	1,760	126	58	58	1,100	70
30	1,040	34	49	49	-------	85	740	104	49	49	530	70
31	280	-------	41	49	-------	85	-------	104	-------	49	860	-------
1918–19												
1	70	70	178	1,840	104	85	320	280	126	41	178	41
2	58	70	150	2,320	85	104	280	360	126	41	85	34
3	58	58	126	980	85	104	280	320	104	34	49	34
4	58	49	126	280	104	85	280	240	104	34	49	41
5	49	41	104	206	85	85	280	206	104	34	49	28
6	49	41	104	206	85	104	240	178	85	34	41	23
7	49	41	104	206	85	85	240	206	85	58	34	18
8	49	41	85	150	85	70	280	440	150	41	34	18
9	49	41	85	150	70	1,450	280	1,380	104	34	34	18
10	41	41	680	150	70	1,040	400	1,920	104	34	28	18
11	41	41	630	150	70	530	485	920	85	280	28	18
12	41	41	400	104	70	360	360	530	126	85	28	18
13	41	41	1,310	104	70	240	280	400	70	680	28	18
14	41	41	1,380	104	104	206	280	360	70	400	23	13
15	41	41	1,170	104	104	1,040	280	320	70	126	23	13
16	41	41	740	104	104	5,870	2,900	280	58	126	23	13
17	41	41	400	104	85	5,690	1,040	360	150	104	28	13
18	41	58	320	104	85	3,260	860	320	126	70	28	13
19	41	85	280	85	70	1,600	530	280	70	58	23	13
20	41	150	240	85	70	630	440	280	58	680	23	13
21	41	126	206	85	70	680	400	320	49	1,520	34	18
22	49	104	400	85	85	530	360	280	49	400	41	18
23	41	85	530	104	104	440	320	280	49	240	28	13
24	41	85	400	280	104	400	280	320	49	150	23	18
25	41	70	360	240	104	360	240	485	49	70	126	18
26	49	70	320	206	85	360	206	360	49	58	104	18
27	49	85	280	178	70	1,600	178	320	49	49	41	18
28	58	104	240	150	70	800	178	280	49	49	28	13
29	126	580	206	126	-------	485	178	206	41	41	23	13
30	104	^280	206	126	-------	400	178	178	41	41	23	13
31	85	-------	178	104	-------	360	-------	150	-------	126	58	-------

Daily discharge, in second-feet, of Twin Creek near Germantown, Ohio, for the years ending Sept. 30, 1916–1923—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	13	2,540	980	70	150	58	126	355	107	107	31	43
2	13	2,360	485	70	630	85	104	315	107	66	77	37
3	13	980	360	70	1,690	126	104	275	180	590	57	31
4	13	530	320	49	530	206	104	240	107	590	43	31
5	18	400	280	49	320	630	178	210	107	275	37	31
6	18	320	240	49	320	320	206	180	90	152	37	37
7	13	400	1,040	49	320	206	150	152	90	930	31	37
8	13	530	530	360	178	206	240	152	90	400	21	31
9	13	360	440	440	206	104	206	152	77	400	37	31
10	13	320	630	85	1,690	70	178	128	180	210	2,620	43
11	41	1,100	485	85	1,380	320	126	128	77	128	490	50
12	49	740	360	49	920	3,700	126	240	66	107	180	43
13	41	400	440	58	440	1,240	485	1,610	66	90	128	37
14	41	320	440	58	680	485	360	1,310	90	128	315	31
15	34	240	485	58	320	400	280	445	77	490	90	31
16	28	240	280	58	280	3,200	400	355	66	275	355	31
17	28	206	206	70	126	1,770	3,300	275	37	128	540	26
18	28	178	178	58	280	1,170	1,170	445	50	90	240	26
19	28	178	150	58	178	1,040	680	355	50	77	128	16
20	28	150	104	49	104	630	5,000	275	240	77	355	16
21	23	126	150	320	1,100	400	6,620	275	50	66	90	31
22	23	104	126	85	1,380	360	2,090	275	50	66	107	26
23	23	104	126	85	980	360	1,050	152	50	128	400	21
24	23	104	104	150	440	240	750	128	66	66	240	16
25	23	104	85	85	280	240	590	128	107	43	152	16
26	41	240	70	85	206	206	490	128	107	43	90	16
27	85	1,040	58	104	150	206	490	128	77	43	43	21
28	1,100	530	85	320	150	178	445	128	66	37	66	21
29	485	1,610	70	150	85	630	400	107	57	37	57	43
30	360	3,300	70	150	------	240	400	107	57	37	50	31
31	630	------	70	440	------	150	------	107	------	37	43	------
1920–21												
1	26	43	152	990	810	152	750	400	57	43	90	16
2	21	50	355	930	590	180	590	355	57	37	490	16
3	16	400	275	640	540	210	490	355	50	31	2,440	21
4	16	152	240	445	870	180	400	355	50	31	695	210
5	21	90	1,170	355	2,260	180	400	355	50	26	400	275
6	16	66	810	355	1,530	240	355	315	43	26	210	152
7	21	50	490	275	1,310	2,090	315	275	43	26	128	275
8	16	43	355	1,380	2,170	990	275	240	43	26	240	90
9	16	43	315	750	870	4,070	3,470	210	50	26	90	50
10	21	43	240	490	640	2,620	1,310	180	43	21	66	37
11	21	37	210	400	810	930	640	180	43	21	50	50
12	21	37	180	315	750	640	490	540	43	21	50	31
13	16	31	180	210	750	1,050	445	640	43	43	43	26
14	16	31	400	240	1,530	695	355	490	37	37	37	26
15	16	31	640	210	810	590	355	315	37	26	37	26
16	16	26	400	128	590	1,530	315	275	31	21	37	21
17	12	31	315	128	540	640	2,170	210	31	21	31	21
18	12	31	240	107	400	490	1,310	180	31	21	275	21
19	16	31	152	90	355	400	695	152	31	21	57	21
20	16	31	107	90	275	355	540	128	31	21	43	21
21	21	43	128	107	355	445	445	128	31	21	37	21
22	16	490	128	240	240	540	445	107	31	16	31	21
23	16	1,530	750	490	240	445	1,610	107	37	16	26	21
24	9	750	445	445	210	355	810	90	37	16	26	21
25	16	590	210	315	210	2,090	540	90	90	16	26	21
26	21	445	180	210	180	1,850	810	90	445	16	26	21
27	21	315	210	152	180	3,870	1,610	90	152	77	21	21
28	445	240	180	152	152	4,470	930	77	77	77	21	16
29	152	210	107	152	------	4,970	590	77	57	43	21	16
30	90	152	128	1,770	------	1,610	490	66	66	400	21	21
31	57	------	128	2,260	------	750	------	66	------	180	16	------

Daily discharge, in second-feet, of Twin Creek near Germantown, Ohio, for the years ending Sept. 30, 1916–1923—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1921–22												
1				240	240	295	2,440	180	180	142	29	21
2				180	3,870	240	930	163	158	107	28	16
3				201	590	180	640	275	133	73	23	3,870
4				204	335	174	515	468	120	57	22	490
5				2,010	240	140	445	315	107	47	19	169
			450									
6				640	275	225	400	240	111	42	17	77
7				400	275	400	355	204	90	37	37	50
8				315	160	400	1,530	169	77	335	169	38
9				295	152	275	2,090	142	75	85	70	30
10				240	142	240	1,690	138	70	73	56	26
11			295	240	210	870	3,870	240	62	50	36	24
12			275	198	400	468	2,090	169	57	39	30	23
13			97	158	315	355	810	158	56	540	26	23
14			240	130	192	615	4,570	169	54	210	23	21
15		600	201	155	177	5,520	6,070	147	51	107	21	19
	35											
16			174	124	104	1,450	4,670	124	49	66	19	18
17			186	87	75	750	870	120	46	54	18	18
18			1,930	135	105	565	3,770	422	42	50	17	17
19			668	315	295	445	1,050	445	38	315	16	14
20			468	258	400	1,770	640	355	36	163	16	355
21			378	240	225	750	590	275	37	80	16	38
22			315	142	201	540	400	210	35	57	15	24
23			295	80	355	445	355	163	31	51	14	21
24			5,410	72	590	400	315	133	29	57	20	19
25			3,270	62	335	355	275	120	28	41	33	15
26			810	66	258	315	315	422	26	35	100	15
27			565	80	275	355	275	3,470	26	33	50	14
28			445	78	355	1,050	275	640	27	26	36	14
29			400	73	-------	870	210	400	540	25	26	14
30			315	70	-------	1,610	186	295	275	23	23	14
31		-------	275	166	-------	2,890	-------	225	-------	24	24	-------
1922–23												
1	14	14	23	1,690	2,710	158	128	70	62	38	22	27
2	13	14	27	640	1,110	147	128	66	56	37	18	47
3	13	14	27	468	1,050	147	128	62	51	33	16	33
4	13	14	24	422	445	225	152	59	47	30	275	27
5	12	14	180	315	315	422	490	56	44	29	70	43
6	11	14	142	275	240	335	870	54	42	28	42	29
7	11	14	90	240	210	490	490	50	133	750	29	295
8	12	15	355	1,530	210	400	275	50	57	990	27	77
9	13	14	355	870	210	400	258	57	47	258	22	42
10	16	14	210	615	158	490	225	62	42	111	20	33
11	61	14	138	355	147	640	192	57	41	66	18	29
12	32	14	107	295	120	640	163	93	275	49	275	22
13	25	16	73	198	2,260	540	163	355	138	41	111	21
14	22	16	62	198	590	490	422	240	66	32	53	18
15	21	25	64	335	169	422	355	225	210	29	41	17
16	19	43	42	315	445	4,270	295	1,450	186	25	30	16
17	20	30	49	192	210	1,380	225	695	93	24	22	16
18	23	29	54	240	174	590	204	445	66	23	20	16
19	21	93	25	198	100	490	174	315	53	22	19	57
20	20	61	41	147	133	315	152	240	43	19	16	31
21	19	47	36	1,770	85	295	138	210	36	18	14	138
22	19	38	39	1,170	104	315	120	163	36	17	31	38
23	17	31	37	468	90	1,110	107	133	33	16	25	26
24	16	28	37	378	53	590	100	111	32	19	18	24
25	17	26	36	315	90	422	93	93	29	18	15	22
26	15	23	46	240	104	355	87	90	37	17	14	21
27	14	23	50	335	540	275	85	85	35	16	1,380	17
28	14	23	3,770	3,370	240	240	90	174	37	16	174	16
29	14	22	1,050	1,050	-------	192	87	93	39	23	85	15
30	14	20	540	565	-------	180	77	87	43	21	44	14
31	14	-------	445	468	-------	158	-------	64	-------	14	31	-------

NOTE.—Gage not read Dec. 27, 28, 1916, Jan. 4–7, 21–23, Feb. 23, 24, Mar. 12–15, 23, 24, Apr. 2, 3, May 4–6, 28–30, June 5–7, Aug. 22, 23, 1917, Jan. 6–8, Feb. 9–14, 19–21, 25–27, Mar. 1, 2, 13–15, Apr. 26–30, May 12–14, Aug. 29, 30, Dec. 13–15, 1918, Jan. 1, 2, Mar. 9–11, 15–19, 27, 28, Apr. 10, 11, 16–19, May 8–11, July 13, 14, 20–22, 1919; discharge estimated. No gage-height record Oct. 1 to Dec. 10, 1921; mean discharge for periods indicated by braces estimated by comparison with record of flow of Miami River.

Monthly discharge of Twin Creek near Germantown, Ohio, for the years ending Sept. 30, 1916–1923

[Drainage area, 276 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1915–16					
October	1,320	82	215	0.779	0.90
November	1,880	69	222	.804	.90
December	2,040	69	369	1.34	1.54
January	5,960	194	1,520	5.51	6.35
February	2,280	224	446	1.62	1.75
March	3,080	167	550	1.99	2.29
April	610	167	262	.949	1.06
May	900	99	189	.685	.79
June	5,510	77	608	2.20	2.46
July	169	38	58.1	.211	.24
August	422	25	59.0	.214	.25
September	61	14	25.7	.093	.10
The year	5,960	14	378	1.37	18.63
1916–17					
October	48	19	24.5	.089	.10
November	38	19	24.5	.089	.10
December	940	25	99.5	.361	.42
January	3,620	61	596	2.16	2.49
February	1,240	48	184	.667	.69
March	4,070	61	654	2.37	2.73
April	1,310	150	334	1.21	1.35
May	1,380	126	384	1.39	1.60
June	2,320	104	401	1.45	1.62
July	1,040	58	171	.620	.71
August	680	28	76.5	.277	.32
September	126	23	35.9	.130	.14
The year	4,070	19	250	.906	12.27
1917–18					
October	1,040	23	77.1	.279	.32
November	178	34	53.2	.193	.22
December	178	28	61.5	.223	.26
January	2,000	34	195	.707	.82
February	3,710	34	865	3.13	3.26
March	1,920	85	385	1.39	1.60
April	1,840	85	382	1.38	1.54
May	5,060	104	481	1.74	2.01
June	630	34	85.6	.310	.35
July	860	28	87.3	.316	.36
August	1,100	23	147	.533	.61
September	980	49	245	.888	.99
The year	5,060	23	251	.909	12.34
1918–19					
October	126	41	52.4	.190	.22
November	580	41	88.7	.321	.36
December	1,380	85	385	1.39	1.60
January	2,320	85	297	1.08	1.24
February	104	70	85.1	.308	.32
March	5,870	70	937	3.39	3.91
April	2,900	178	428	1.55	1.73
May	1,920	150	412	1.49	1.72
June	150	41	81.6	.296	.33
July	1,520	34	185	.670	.77
August	178	23	44.0	.159	.18
September	41	13	19.3	.070	.08
The year	5,870	13	254	.920	12.46

Monthly discharge of Twin Creek near Germantown, Ohio, for the years ending Sept. 30, 1916–1923—Continued

Month	Discharge in second-feet.				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1919–20					
October	1,100	13	107	0.388	0.45
November	3,300	104	658	2.38	2.66
December	1,040	58	305	1.11	1.28
January	440	49	125	.453	.52
February	1,690	85	535	1.94	2.09
March	3,700	58	619	2.24	2.58
April	6,620	104	895	3.24	3.62
May	1,610	107	299	1.08	1.24
June	240	37	88.0	.319	.36
July	930	37	191	.692	.80
August	2,620	21	231	.837	.96
September	50	16	30.0	.109	.12
The year	6,620	13	338	1.22	16.68
1920–21					
October	445	9	39.2	.142	.16
November	1,530	26	202	.732	.82
December	1,170	107	317	1.15	1.33
January	2,260	90	478	1.73	1.99
February	2,260	152	720	2.61	2.72
March	4,970	152	1,280	4.64	5.35
April	3,470	275	798	2.89	3.22
May	640	66	230	.833	.96
June	445	31	62.2	.225	.25
July	400	16	45.9	.166	.19
August	2,440	16	186	.674	.78
September	275	16	53.5	.194	.22
The year	4,970	9	366	1.33	17.99
1921–22					
October			35.0	.127	.15
November			600	2.17	2.42
December	5,410	97	694	2.51	2.89
January	2,010	62	247	.895	1.03
February	3,870	75	398	1.44	1.50
March	5,520	140	805	2.92	3.37
April	6,070	186	1,420	5.14	5.74
May	3,470	120	355	1.29	1.49
June	540	26	88.9	.322	.36
July	540	23	98.2	.356	.41
August	169	14	33.8	.122	.14
September	3,870	14	184	.667	.74
The year	6,070		412	1.49	20.24
1922–23					
October	61	11	18.2	.066	.08
November	93	14	25.4	.092	.10
December	3,770	23	264	.957	1.10
January	3,370	147	634	2.30	2.65
February	2,710	53	440	1.59	1.66
March	4,270	147	552	2.00	2.31
April	870	77	216	.783	.87
May	1,450	50	194	.703	.81
June	275	29	70.3	.255	.28
July	990	14	91.3	.331	.38
August	1,380	14	96.0	.348	.40
September	295	14	40.9	.148	.17
The year	4,270	11	220	.797	10.81

WABASH RIVER BASIN

EMBARRASS RIVER AT STE. MARIE, ILL.

LOCATION.—In sec. 30, T. 6 N., R. 14 W. second principal meridian, at highway bridge at north end of Main Street, Ste. Marie, Jasper County, 2½ miles upstream from mouth of North Fork.

DRAINAGE AREA.—1,540 square miles.

RECORDS AVAILABLE.—October 20, 1909, to December 31, 1912; August 24, 1914, to September 30, 1923.

GAGE.—Chain gage attached to bridge; read by F. C. Armstrong.

DISCHARGE MEASUREMENTS.—Made from downstream side of highway bridge or by wading.

CHANNEL AND CONTROL.—Measuring section is at a pool. Low-water control is about 400 feet below gage; coarse gravel, likely to shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.3 feet March 18 (discharge, 14,700 second-feet); minimum discharge, 16 second-feet on October 1 and 4.

1909–1912 and 1914–1923: Maximum stage recorded, 21.8 feet April 18, 1922 (discharge, 22,600 second-feet); minimum stage, 1.1 feet September 5–9, 1914, and October 19, 1914 (discharge, 1.0 second-foot).

Flood of spring of 1908 reached a height of 22.5 feet referred to present gage.

ACCURACY.—Stage-discharge relation changed during high water of March and after May 31; probably also changed at high stages by an unknown amount by straightening of channel and building of levees some distance below the gage during the spring of 1923; affected by ice for short period during winter. Rating curves used October 1 to March 20 well defined below and fairly well defined above 80 second-feet; curves used after March 20 fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Discharge measurements of Embarrass River at Ste. Marie, Ill., during the year ending Sept. 30, 1923

[Made by H. E. Grosbach]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 24	2.27	19.3	Sept. 17	2.27	64.5
May 24	5.27	721			

Daily discharge, in second-feet, of Embarrass River at Ste. Marie, Ill., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	16	18	21	232	1,480	216	890	544	1,100	160	210	160
2	17	18	24	232	1,480	216	815	498	902	160	150	220
3	17	18	28	232	1,060	250	790	475	738	160	68	250
4	16	18	31	184	366	1,260	765	452	610	160	86	150
5	17	17	60	152	232	1,780	1,320	408	535	160	99	122
6	18	17	31	152	268	1,820	2,620	386	468	190	220	114
7	22	18	49	428	250	3,900	2,020	365	424	210	131	99
8	35	18	930	250	250	2,100	2,020	365	380	220	685	99
9	67	18	563	184	250	1,230	1,940	344	360	902	3,800	92
10	44	18	250	184	250	1,060	1,840	324	320	402	1,650	86
11	40	17	168	168	216	1,370	1,470	324	300	300	1,040	86
12	37	17	107	152	232	4,100	1,200	324	424	250	1,230	160
13	26	17	68	122	1,440	5,700	1,560	324	1,040	340	1,070	106
14	18	17	80	168	1,300	6,140	3,700	324	424	280	738	92
15	36	18	68	268	428	4,000	3,600	3,150	340	210	512	74
16	32	19	66	326	286	8,320	2,020	5,090	280	140	424	63
17	32	20	60	406	268	13,200	1,770	5,600	260	122	360	68
18	26	22	55	346	386	14,700	1,590	3,060	260	106	300	63
19	23	19	55	268	346	8,100	1,410	1,680	300	92	260	200
20	22	19	50	216	326	6,540	1,200	1,380	250	92	200	1,410
21	20	19	45	232	268	5,800	1,090	1,110	210	86	170	560
22	19	19	41	268	250	5,160	1,000	918	190	79	280	380
23	18	19	38	250	216	4,530	946	765	170	74	170	280
24	22	19	38	184	200	2,660	946	665	160	68	140	230
25	20	19	41	160	200	2,080	790	592	150	63	122	190
26	18	19	50	144	200	1,800	690	568	140	63	114	160
27	18	19	107	144	200	1,530	665	592	150	58	114	140
28	18	20	428	346	216	1,380	640	715	140	56	685	122
29	18	21	386	366	-------	1,230	640	1,000	140	54	610	140
30	17	21	268	406	-------	1,090	692	1,110	140	54	280	114
31	17	-------	232	720	-------	974	-------	1,290	-------	54	180	-------

Monthly discharge of Embarrass River at Ste. Marie, Ill., for the year ending Sept. 30, 1923

[Drainage area, 1,540 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	67	16	24.7	0.016	0.02
November	22	17	18.6	.012	.01
December	930	21	143	.093	.11
January	720	122	254	.165	.19
February	1,480	200	459	.298	.31
March	14,700	216	3,090	2.40	2.77
April	3,700	592	1,420	.922	1.03
May	5,600	324	1,120	.727	.84
June	1,100	140	377	.245	.27
July	902	54	173	.112	.13
August	3,800	68	519	.337	.39
September	1,410	63	201	.131	.15
The year	14,700	16	704	.457	6.22

LITTLE WABASH RIVER AT WILCOX, ILL.

LOCATION.—In SW. ¼ sec. 3, T. 2 N., R. 8 E., at highway bridge at Wilcox, Clay County, 6 miles southeast of Clay City and a quarter of a mile below mouth of Big Muddy Creek.

DRAINAGE AREA.—1,130 square miles.

RECORDS AVAILABLE.—August 22, 1914, to September 30, 1923.

GAGE.—Chain gage attached to bridge; read by Mrs. Kate Holman.

DISCHARGE MEASUREMENTS.—At ordinary stages made from downstream side of bridge, which is at a pool; during high water made also from bridge across drainage ditch and overflow section about half a mile east of the highway bridge.

49245—26†—WSP 563——7

CHANNEL AND CONTROL.—Bed composed of heavy clay, low-water control is about 100 feet below bridge; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 22.15 feet March 17 (discharge, 7,170 second-feet); minimum stage, 1.68 feet November 2 (discharge, 2.8 second-feet).

1914–1923: Maximum stage prevailed August 22, 1915 (gage inaccessible, discharge estimated at 14,000 second-feet); minimum stage, that of November 2, 1922, as given above.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 10 and 1,000 second-feet; fairly well defined between 1,000 and 8,000 second-feet, and extended above 8,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except for very high stages.

Discharge measurements of Little Wabash River at Wilcox, Ill., during the year ending Sept. 30, 1923

[Made by H. E. Grosbach]

Date		Gage height	Discharge	Date		Gage height	Discharge
		Feet.	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Mar. 12		15.09	*2,560	Sept. 18		2.76	42.2

* Discharge corrected for rising stage, 2,260 second-feet.

Daily discharge, in second-feet, of Little Wabash River at Wilcox, Ill., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3.2	3.4	9	684	962	301	204	182	535	353	100	171
2	3.0	2.8	9	1,220	2,660	264	182	160	505	-------	599	95
3	3.6	3.6	8	829	2,900	252	182	138	314	-------	327	85
4	3.0	4.6	15	353	1,800	520	171	122	204	-------	138	76
5	3.6	4.6	28	193	632	1,800	774	105	-------	-------	632	756
6	42	5.6	26	149	301	2,140	1,820	95	-------	-------	1,770	216
7	18	4.6	31	105	193	3,280	1,840	90	-------	-------	2,350	171
8	39	4.4	149	85	138	3,640	1,280	85	-------	-------	2,530	105
9	18	3.8	567	216	122	3,400	684	76	-------	-------	2,200	95
10	13	3.8	756	138	95	2,320	405	72	-------	-------	1,620	85
11	11	3.8	379	116	95	829	301	68	-------	551	1,700	80
12	11	4.0	171	105	76	1,620	240	64	-------	264	1,160	75
13	10	4.6	85	85	599	3,460	301	61	-------	182	433	68
14	8.6	6.2	61	76	2,290	3,910	2,470	61	2,000	288	240	85
15	7.6	3.8	42	122	2,230	3,910	3,770	2,560	2,120	649	160	95
16	7.6	3.6	42	240	1,640	4,540	4,050	4,190	1,740	288	160	80
17	6.6	6.2	28	447	702	7,170	3,840	4,930	520	160	105	60
18	6.6	7.6	42	276	392	6,770	3,700	4,770	252	-------	149	45
19	5.6	7.6	24	160	327	5,600	2,350	4,330	-------	-------	171	34
20	5.0	6.6	24	105	216	5,110	829	4,050	-------	-------	127	34
21	4.6	5.6	19	204	193	4,610	405	3,400	-------	105	85	702
22	4.6	5.6	14	216	149	3,770	366	1,440	-------	-------	85	551
23	5.6	5.2	14	366	100	2,620	340	461	95	100	792	228
24	4.6	8.6	13	240	76	2,700	419	301	95	-------	943	204
25	4.2	8.6	12	149	85	1,800	433	228	-------	90	353	122
26	4.4	7.6	11	110	90	867	392	204	-------	-------	149	85
27	3.6	7.0	48	171	122	520	301	182	76	-------	95	64
28	3.6	7.6	132	301	276	392	252	204	461	80	85	58
29	3.6	8.4	924	535	-------	327	216	216	1,320	31	85	51
30	3.6	7.6	1,320	447	-------	276	204	228	1,060	-------	632	216
31	3.6	-------	774	288	-------	228	-------	340	-------	-------	353	-------

NOTE.—Discharge estimated Dec. 18–25 on account of ice from gage heights and observer's notes. Low-water readings not obtained June 5 to Sept. 17 on account of sand bar under gage. Discharge estimated Aug. 1, 21, 22, 28, 29, Sept. 11, 12, 14, 16, and 17.

Monthly discharge of Little Wabash River at Wilcox, Ill., for the year ending Sept. 30, 1923

[Drainage area, 1,130 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	42	3.0	8.77	0.008	0.009
November	8.6	2.8	5.57	.005	.006
December	1,320	8	186	.165	.19
January	1,220	76	282	.250	.29
February	2,900	76	695	.615	.69
March	7,170	228	2,550	2.26	2.61
April	4,050	171	1,090	.965	1.08
May	4,930	61	1,080	.956	1.10
August	2,530	85	656	.581	.67
September	756	34	160	.142	.16

SALINE RIVER BASIN

MIDDLE FORK OF SALINE RIVER NEAR HARRISBURG, ILL.

LOCATION.—In sec. 13, T. 9 S., R. 6 E., on highway bridge 2 miles east of Harrisburg, Saline County, 5 miles above junction with South Fork.

DRAINAGE AREA.—198 square miles (measured on topographic maps and United States Geological Survey map, scale 1: 500,000).

RECORDS AVAILABLE.—October 25, 1922, to September 30, 1923.

GAGE.—Chain gage attached to downstream side of old bridge was used until May 21, 1923, when the gage was placed on the new highway bridge which had been completed in 1923; datum unchanged. Gage read by Henry McGuire.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Control is clay and mud, probably shifting. Banks wooded above low-water stages; right bank is overflowed during extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage occurred February 2–4 when water was over old bridge; minimum stage. 0.50 foot October 28 (discharge, 0.6 second-foot).

ACCURACY.—Stage-discharge relation permanent during year. Rating curve fairly well defined below 1,000 second-feet and extended above that point. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair for stages below 1,500 second-feet; poor for higher stages.

Discharge measurements of Middle Fork of Saline River near Harrisburg, Ill., during the year ending Sept. 30, 1923

[Made by H. E. Grosbach]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-feet*		*Feet*	*Sec.-feet*
Oct. 25	0.71	1.1	Sept. 19	3.48	100
Mar. 14	10.74	402	20	11.56	824
May 21	3.12	49.3			

Daily discharge, in second-feet, of Middle Fork of Saline River near Harrisburg, Ill., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		1.1	1.0	475	2,670	120	43	22	110	5.7	4.3	2.0
2		1.6	.7	90		95	36	16	63	3.0	2.8	218
3		1.6	.7	52		80	67	16	40	2.4	1.9	36
4		1.6	183	32		71	475	409	15	1.2	1.6	32
5		1.6	18	26	2,060	49	1,720		12	4.6	1,010	19
6		1.1	4.6	24	1,320	499	1,750		13	11	1,030	21
7		1.1	2.7	22	868	836	791		18	4.2	868	144
8		1.1	2.0	22	623	162	475		13	2.5	718	63
9		2.1	1.4	14	662	85	71		8.8	2.0	704	7.5
10		1.6	1.4	10	662	67	59		21	1.6	67	4.0
11		1.6	1.4	10	623	190	46		80	1.2	19	5.6
12		1.1	1.0	8	623	1,820	40		584	5.8	13	4.1
13		.8	1.0	8	1,360	1,470	1,160		523	20	7.8	2.9
14		2.1	1.4	258	900	511	2,470		67	4.7	4.2	3.5
15		2.1	1.4	105	377	475	1,720		32	3.5	2.0	1.9
16		1.5	1.4	37	110	2,790	704		34	559	274	1.2
17		1.5	2.0	18	46	2,470	156		25	1,290	1,010	2.4
18		4.8	1.4	22	31	1,360	75		31	1,120	1,720	4.9
19		2.1	1.4	16	23	690	55		13	85	1,440	387
20		2.1	1.0	37	19	442	52		7.8	12	571	868
21		1.5	1.0	1,920	15	292	46	49	7.1	5.5	138	337
22		1.0	1.0	2,060	13	431	40	34	5.6	4.4	1,140	21
23		.8	1.4	1,220	13	377	30	24	4.3	4.6	1,050	14
24		.8	1.4	623	17	301	32	19	3.3	4.0	319	4.2
25	1.1	1.0	1.4	292	19	266	26	132	5.8	3.0	23	3.4
26	.8	1.0	1.4	1,780	584	242	16	71	26	1.8	16	7.5
27	.8	1.4	776	1,340	649	242	30	46	14	3.2	12	6.0
28	.6	1.4	836	1,780	183	183	85	110	100	2.4	9.2	4.6
29	1.1	1.0	623	918		144	59	132	23	1.7	7.1	2.4
30	1.1	1.0	499	704		110	30	75	12	3.4	4.1	5.0
31	.8		732	571		63		584		3.0	2.4	

Monthly discharge of Middle Fork of Saline River near Harrisburg, Ill., for the year ending Sept. 30, 1923

[Drainage area, 198 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October 25-31	1.1	0.6	0.90	0.005	0.001
November	4.8	.8	1.50	.008	.009
December	836	.7	119	.601	.69
January	2,060	8	468	2.36	2.72
February 5-28	2,060	13	492	2.48	2.21
March	2,790	49	546	2.76	3.18
April	2,470	16	412	2.08	2.32
June	584	3.3	63.7	.322	.36
July	1,290	1.2	102	.515	.59
August	1,720	1.6	393	1.98	2.28
September	868	1.2	74.4	.376	.42

CUMBERLAND RIVER BASIN

CUMBERLAND RIVER AT BARBOURVILLE, KY.

LOCATION.—At main highway bridge at Barbourville, Knox County, three blocks south of courthouse. Richland Creek enters a quarter of a mile below gage.

DRAINAGE AREA.—982 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1922, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge; read by J. L. Blair.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel straight 700 feet above and 500 feet below gage. Banks high and subject to overflow only during extreme floods. Bed composed of rock. Control for low stages is rock ledge 20 feet below gage; permanent. A constriction in the channel a short distance downstream is the control above gage height 4.5 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 30.6 feet at 7 a. m. February 4 (discharge, 18,600 second-feet); minimum stage, 0.15 foot October 5, 6, and 21–23 (discharge, 18 second-feet).

ACCURACY.—Stage-discharge relation permanent; not affected by ice during year. Rating curve well defined below 4,000 second-feet and fairly well defined between 4,000 and 13,000 second-feet; extended above 13,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records below 4,000 second-feet, good; above that point, fair.

Discharge measurements of Cumberland River at Barbourville, Ky., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 1	King and Livingston	0.19	17.5	Feb. 16	P. P. Livingston	4.27	3,330
Nov. 30	Hanson and Livingston	.43	43.0	June 19	do	1.40	488
30	do	.43	45.2	July 27	Livingston and Clawson	.82	166
Dec. 23	do	1.86	755				

Daily discharge, in second-feet, of Cumberland River at Barbourville, Ky., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	20	20	44	910	7,400	3,300	840	3,000	780	398	205	68
2	20	25	60	2,860	5,310	2,320	720	1,960	600	425	271	58
3	20	25	288	2,320	15,200	1,740	630	1,450	510	425	245	50
4	20	25	540	1,850	18,000	1,360	690	1,200	370	359	215	50
5	18	25	1,740	1,360	11,500	1,120	1,120	1,200	425	271	225	44
6	18	25	2,320	1,200	4,950	1,850	1,450	1,640	398	750	200	48
7	20	25	1,050	980	3,840	14,300	1,120	1,740	398	1,200	235	75
8	28	25	1,540	910	2,450	11,500	1,640	1,850	354	1,540	205	245
9	40	25	2,080	840	2,580	5,250	1,360	3,430	315	1,540	240	271
10	35	25	1,960	980	2,580	2,860	1,120	3,540	298	910	720	205
11	38	25	1,120	810	2,720	3,780	910	2,450	425	720	540	200
12	35	25	840	690	2,580	8,280	840	1,850	1,200	425	398	160
13	30	25	630	630	9,890	9,400	780	1,640	3,540	570	1,360	128
14	25	25	480	540	15,800	4,920	2,720	2,580	3,430	370	980	99
15	20	35	6,250	1,050	8,280	2,080	5,340	2,200	1,640	271	750	72
16	20	50	7,800	1,850	3,630	4,520	4,490	2,860	980	690	452	54
17	20	85	5,700	1,850	1,850	7,100	2,860	2,450	910	1,360	320	48
18	20	72	9,470	1,280	1,640	4,820	2,080	1,960	660	810	250	48
19	20	85	4,520	1,050	1,360	3,840	1,540	1,360	510	480	220	44
20	20	80	1,960	980	1,120	3,300	1,280	1,280	398	315	180	40
21	18	72	1,120	1,280	910	2,450	980	1,640	354	235	148	62
22	18	80	910	4,580	810	2,080	840	1,280	288	180	132	68
23	19	80	720	6,750	690	5,220	780	4,340	255	148	170	62
24	25	65	570	6,250	600	10,300	750	8,460	332	271	136	68
25	28	56	510	5,250	570	6,500	660	4,800	510	250	140	58
26	30	44	425	4,280	600	4,430	570	2,860	600	165	124	62
27	32	40	370	3,430	1,450	2,720	540	1,960	690	148	102	54
28	30	40	398	9,820	3,710	1,850	810	1,360	1,120	132	88	54
29	25	40	600	10,100	------	1,450	4,860	1,120	690	124	113	50
30	22	42	630	4,840	------	980	4,640	1,050	510	165	116	44
31	20	------	690	6,020	------	910	------	980	------	170	92	------

NOTE.—Gage not read Mar. 31; discharge interpolated.

Monthly discharge of Cumberland River at Barbourville, Ky., for the year ending Sept. 30, 1923

[Drainage area, 982 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	40	18	24.3	0.025	0.03
November	85	20	43.7	.044	.05
December	9,470	44	1,850	1.88	2.17
January	10,100	540	2,820	2.87	3.31
February	18,000	570	4,720	4.81	5.01
March	14,300	910	4,400	4.48	5.16
April	5,340	540	1,630	1.66	1.85
May	8,460	980	2,310	2.35	2.71
June	3,540	255	783	.797	.89
July	1,540	124	510	.519	.60
August	1,360	88	309	.315	.36
September	271	40	86.3	.088	.10
The year	18,000	18	1,610	1.64	22.24

CUMBERLAND RIVER AT CUMBERLAND FALLS, KY.

LOCATION.—At Cumberland Falls post office, Whitley County, 400 feet above falls, 13 miles east of Cumberland Falls railroad station, McCreary County.

DRAINAGE AREA.—2,010 square miles (revised measurement on topographic maps).

RECORDS AVAILABLE.—August 15, 1907, to December 10, 1911; April 1, 1915, to September 30, 1923.

GAGE.—Staff in three sections, inclined and vertical, on right bank 400 feet above brink of falls, established April 3, 1915, and reconstructed July 22, 1923; read by Miss Alice Brunson and Mrs. Arthur Hansford.

DISCHARGE MEASUREMENTS.—Made from cable 600 feet above gage or by wading. A reference gage on left bank near cable is used to determine depths when soundings at cable can not be made.

CHANNEL AND CONTROL.—Solid rock; permanent. At high and medium stages the edge of the falls serves as control, there being a vertical drop of 68 feet at this point. During extreme low stages the river, just above the falls, flows in several small channels or crevices.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.4 feet at 5 p. m. February 3 and 8 a. m. February 4 (discharge, 30,900 second-feet); minimum stage recorded, 1.09 feet October 6 and November 13, 14 (discharge, 34 second-feet).

1907–1911; 1915–1923: Maximum stage recorded, 12.5 feet at 7.30 a. m. January 28, 1918 (discharge, 59,600 second-feet); minimum stage, 1.04 feet September 29, 1919 (revised discharge, 22 second-feet).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Low-water flow may be affected to a small extent by operation of power plant at Williamsburg, about 25 miles upstream.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined below 500 second-feet and well defined between 500 and 35,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except those below 500 second-feet, which are fair.

Discharge measurements of Cumberland River at Cumberland Falls, Ky., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 5	King and Livingston	1.09	33.4	Sept. 28	J. P. Clawson	1.26	109
July 19	Livingston and Clawson	2.35	1,650	29	do	1.22	113
Sept. 27	J. P. Clawson	1.26	109				

Daily discharge, in second-feet, of Cumberland River at Cumberland Falls, Ky., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	49	49	98	1,460	16,800	5,080	1,890	7,260	3,570	920	860	187
2	49	46	116	1,780	14,000	4,450	1,670	4,450	2,800	728	658	195
3	43	43	330	4,150	29,500	4,760	1,560	3,300	1,890	591	526	187
4	40	40	500	3,570	29,500	2,800	1,560	2,800	1,360	500	526	171
5	37	37	2,330	2,800	25,600	2,330	2,110	2,330	1,180	526	742	157
6	34	37	3,570	2,330	15,600	3,300	4,450	2,110	1,180	714	1,000	129
7	49	37	3,570	2,110	9,000	26,200	4,150	2,440	1,090	1,780	1,000	116
8	273	37	3,850	1,890	5,410	26,200	3,570	2,680	920	4,150	845	187
9	129	37	6,100	1,780	4,760	19,800	3,300	2,800	875	3,850	672	350
10	93	37	4,760	1,560	4,760	10,400	2,680	4,150	815	2,560	552	467
11	73	37	3,850	1,460	4,450	8,110	2,220	4,150	800	1,560	644	456
12	65	37	2,680	1,360	4,150	19,800	2,000	3,050	1,360	1,090	845	370
13	69	34	2,110	1,270	15,600	23,000	1,890	2,560	2,220	920	1,890	310
14	78	34	1,670	1,180	23,000	15,600	6,100	2,800	3,850	815	2,560	273
15	78	49	10,400	1,360	23,000	7,680	9,000	3,050	3,570	770	2,220	239
16	73	53	14,500	2,560	14,500	8,550	9,930	3,570	2,560	845	1,890	205
17	65	57	19,800	3,570	6,470	13,400	6,860	4,150	1,780	1,000	1,180	171
18	57	65	15,600	2,680	3,570	12,400	4,450	3,570	1,360	1,670	830	157
19	49	104	13,400	2,220	2,800	8,110	3,570	2,920	1,180	1,670	658	143
20	43	171	6,470	2,000	2,330	5,410	2,920	2,330	920	920	552	129
21	40	157	3,300	2,220	2,110	4,450	2,440	2,330	742	617	456	116
22	37	143	2,440	5,080	1,780	4,450	2,110	3,050	617	526	401	104
23	49	143	1,780	11,900	1,460	9,930	1,890	5,750	539	456	360	93
24	61	143	1,460	18,000	1,360	18,000	1,670	15,600	500	390	320	83
25	57	129	1,180	15,600	1,180	18,000	1,670	14,000	500	330	310	104
26	49	129	1,090	9,930	1,180	11,400	1,460	8,550	1,000	290	290	104
27	46	122	920	8,110	1,460	6,860	1,270	4,760	1,270	256	256	93
28	43	116	1,000	16,200	3,300	4,150	1,270	3,570	1,270	239	239	93
29	40	110	1,090	22,300	-------	3,300	5,750	2,680	1,890	290	222	83
30	37	98	1,180	16,200	-------	2,680	9,000	2,440	1,360	1,270	214	83
31	40	-------	1,270	15,600	-------	2,330	-------	2,440	-------	1,460	205	-------

Monthly discharge of Cumberland River at Cumberland Falls, Ky., for the year ending Sept. 30, 1923

[Drainage area, 2,010 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	273	34	62.7	0.031	0.04
November	171	34	77.7	.039	.04
December	19,800	98	4,270	2.12	2.44
January	22,300	1,180	5,940	2.96	3.41
February	29,500	1,180	9,590	4.77	4.97
March	26,200	2,330	10,100	5.02	5.79
April	9,930	1,270	3,480	1.73	1.93
May	15,600	2,110	4,250	2.11	2.43
June	3,850	500	1,500	.746	.83
July	4,150	239	1,090	.542	.62
August	2,560	205	772	.384	.44
September	467	83	185	.091	.10
The year	29,500	34	3,420	1.70	23.04

CUMBERLAND RIVER AT BURNSIDE, KY.

LOCATION.—Below mouth of South Fork of Cumberland River at Burnside, Pulaski County.

DRAINAGE AREA.—4,890 square miles (measured on topographic maps and maps of Kentucky and Tennessee prepared by the United States Geological Survey; scale, 1: 500,000).

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1923.

GAGE.—Vertical staff in two sections on piers of toll bridge across South Fork about 700 feet above mouth. Sea-level elevation of zero of gage 589.53 feet (Smith Shoals survey datum, United States Engineer Corps).

DISCHARGE MEASUREMENTS.—Flow of South Fork is measured from highway bridge; the Cumberland above the South Fork is measured from a boat, or from the Queen and Crescent Railroad bridge.

CHANNEL AND CONTROL.—Channel permanent except for deposits of mud, which are washed away at high stages. Low-water control is crest of dam No. 21, 28 miles below Burnside; gage height of crest of dam, 1.47 feet. The dam is a concrete structure, and probably little or no water leaks through dam and lock.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 48.2 feet at 12.30 a. m. February 4 (discharge, 103,000 second-feet); minimum stage, 1.9 feet October 7, 17, 19, 21, 23 (discharge, 175 second-feet).

1915–1923: Maximum stage recorded, 69.5 feet at 1 a. m. January 29, 1918 (discharge, roughly, 157,000 second-feet); minimum stage, 1.8 feet September 18–21, 1919 (discharge, 115 second-feet). Lower stages have been recorded but were due to lowering of pool to render assistance to navigation interests.

The flood of January 29, 1918, reached the highest stage recorded since December 15, 1884, the date on which the original gage was established.

ICE.—Stage-discharge relation seldom affected by ice.

REGULATION.—Stage at low water will be affected by any manipulation of the level of pool No. 21 at the lock.

ACCURACY.—Stage-discharge relation fairly permanent although at low stages it may be affected by inflow between the gage and the dam as result of heavy local showers in the basins of small intervening tributaries; not affected by ice during year. Rating curve fairly well defined below 30,000 second-feet; above 30,000 second-feet curve is an extension and may be considerably in error. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair below 30,000 second-feet; subject to error above that point.

COOPERATION.—Gage-height record furnished by United States Weather Bureau

Discharge measurements of Cumberland River at Burnside, Ky., during the year ending Sept. 30, 1923

Date	Made by—	Gage height (feet)	Discharge (second-feet)		
			South Fork	Main river	Total
Oct. 4	King and Livingston	2.07	127	106	233
Jan. 12	P. P. Livingston	9.79	3,920	7,480	11,400
July 22	Livingston and Clawson	2.94	325	766	1,090

Daily discharge, in second-feet, of Cumberland River at Burnside, Ky., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	650	310	650	4,590	41,800	10,300	5,520	16,700	11,700	3,580	2,350	750
2	555	240	650	4,850	43,600	10,800	4,720	12,400	9,510	2,590	2,330	650
3	385	310	750	6,210	93,600	9,040	3,960	9,040	6,490	2,230	2,590	750
4	310	240	1,870	7,520	97,600	7,520	3,830	6,640	4,850	1,520	2,350	650
5	240	310	4,850	7,070	63,100	6,210	4,850	5,520	3,830	1,410	2,350	750
6	240	240	9,040	6,070	40,000	7,820	13,700	4,850	3,580	1,300	2,230	650
7	175	310	9,040	5,250	25,500	60,600	13,200	4,590	3,080	2,350	1,870	960
8	240	240	9,200	4,850	15,900	73,300	10,800	4,590	4,200	4,850	850	960
9	310	310	13,200	4,590	12,700	40,800	8,890	4,850	3,580	9,040	2,110	1,180
10	850	240	13,200	4,200	12,100	24,900	7,660	4,980	2,960	6,210	3,080	1,300
11	750	310	10,300	3,580	10,900	17,400	6,210	5,790	2,470	4,200	2,830	1,410
12	555	240	7,960	3,580	10,800	33,500	5,120	5,790	2,590	2,960	2,230	1,070
13	385	310	5,930	3,080	20,300	60,400	4,850	4,850	9,980	2,710	6,640	1,180
14	385	240	4,460	2,960	52,500	38,100	9,040	6,920	14,200	1,760	4,720	850
15	240	310	17,800	3,580	38,600	22,900	25,700	7,820	9,040	1,870	4,330	850
16	240	310	40,600	6,070	27,900	16,600	21,600	7,360	6,490	1,760	3,580	650
17	175	385	49,800	7,360	18,100	29,600	17,400	10,900	4,590	2,710	3,330	650
18	240	310	58,200	6,920	9,360	29,000	12,700	9,200	3,460	2,350	2,470	240
19	175	465	33,800	5,790	8,120	20,800	9,510	6,640	2,710	2,960	1,870	310
20	240	555	19,900	4,980	6,490	14,900	7,660	5,520	2,350	2,350	1,520	240
21	175	555	11,700	7,520	5,930	11,600	6,210	4,850	2,230	1,640	1,180	650
22	240	465	7,820	30,100	4,850	9,200	5,520	5,930	1,760	1,180	1,180	650
23	175	555	5,930	37,600	4,590	21,000	4,850	6,350	1,760	1,070	1,070	750
24	240	465	4,850	42,800	3,960	34,700	4,200	21,700	1,410	465	960	650
25	240	555	4,200	42,300	3,460	36,200	4,850	25,500	1,520	750	750	650
26	310	465	3,330	26,600	2,960	25,900	5,380	21,700	2,350	650	750	310
27	240	555	2,960	20,300	4,720	17,400	4,460	16,400	3,200	555	555	310
28	310	465	2,830	24,900	7,360	12,200	3,830	10,300	3,580	960	650	240
29	240	750	3,580	47,400	-------	9,200	7,660	7,820	3,580	1,870	850	240
30	310	650	4,460	31,700	-------	7,660	17,400	7,660	4,720	1,300	1,180	240
31	240	-------	4,460	33,800	-------	6,210	-------	11,600	-------	1,300	1,070	-------

Monthly discharge of Cumberland River at Burnside, Ky., for the year ending Sept. 30, 1923

[Drainage area, 4,890 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	850	175	325	0.066	0.08
November	750	240	389	.079	.09
December	58,200	650	11,800	2.41	2.78
January	47,400	2,960	14,500	2.96	3.41
February	97,600	2,960	24,500	5.01	5.22
March	73,300	6,210	23,400	4.79	5.52
April	25,700	3,830	8,710	1.78	1.99
May	25,500	4,590	9,190	1.88	2.17
June	14,200	1,410	4,590	.939	1.05
July	9,040	465	2,340	.479	.55
August	6,640	555	2,140	.438	.50
September	1,410	240	691	.141	.16
The year	97,600	175	8,470	1.73	23.52

CUMBERLAND RIVER AT CELINA, TENN.

LOCATION.—At boat landing at Celina, Clay County, 900 feet below mouth of Obey River, and 75 miles above Carthage, Tenn.

DRAINAGE AREA.—7,320 square miles (64 per cent measured on topographic maps and 36 per cent on United States Geological Survey State maps; scale, 1: 500,000).

RECORDS AVAILABLE.—October 1, 1922, to September 30, 1923. Gage-height record obtained by United States Weather Bureau since December 1, 1903.

GAGE.—Staff gage in four sections at boat landing, read by R. L. Dale. Lower section, —1.0 to 0.2 foot, is vertical iron rod wedged into solid rock just above landing; second section, 0.2 to 30.7 feet, consists of strips of band iron mounted on an inclined timber bedplate just below the low-water section; third section, 30.7 to 46 feet, is a vertical oak timber attached to an elm tree 30 feet north of inclined section; high-water section, 46 to 56 feet, is painted on north wall of ice house.

DISCHARGE MEASUREMENTS.—Made from boat or by wading.

CHANNEL AND CONTROL.—Channel straight 800 feet above and 700 feet below gage. Banks high but are overflowed during extreme high water. Control is rock and gravel shoal 500 feet below gage; permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 44.5 feet at 3 p. m. February 6; minimum stage recorded, 0.7 foot November 6 and 8–14.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Data inadequate for determination of discharge owing to lack of discharge measurements at high stages.

Discharge measurements of Cumberland River at Celina, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 5	P. P. Livingston	0.74	355	July 31	Livingston and Clawson	2.26	2,230
Jan. 15	do	7.42	9,250	31	do	2.26	2,180

Daily gage height, in feet, of Cumberland River at Celina, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.9	0.9	1.2	6.3	33.0	9.8	8.1	12.8	10.8	4.8	2.0	1.7
2	.9	.9	1.3	6.3	30.4	10.5	7.2	14.8	11.3	4.7	1.8	1.6
3	1.2	.9	2.3	6.3	36.6	11.0	6.4	13.2	10.3	3.6	2.4	1.5
4	1.1	.9	3.6	7.0	41.7	10.3	5.9	10.5	8.6	3.2	3.3	1.8
5	.9	.9	4.9	7.8	43.8	9.0	8.0	8.5	7.2	2.7	3.4	2.0
6	.8	.7	8.2	8.1	44.4	9.6	11.2	7.3	6.2	2.3	3.1	1.6
7	.8	.8	9.0	7.4	43.5	24.0	12.0	6.4	5.1	2.2	2.8	1.8
8	.8	.7	12.5	6.8	38.5	30.7	13.7	5.8	4.6	2.1	2.8	1.7
9	.9	.7	15.5	6.2	28.1	34.0	12.2	5.8	4.3	3.0	4.5	2.2
10	.9	.7	14.2	5.7	16.7	35.2	10.4	5.6	4.9	7.2	4.2	1.9
11	1.0	.7	14.2	5.4	13.0	31.2	9.2	5.6	4.9	7.4	3.9	1.7
12	1.0	.7	12.0	5.0	12.0	29.2	8.1	5.9	4.2	5.7	3.6	1.8
13	1.1	.7	9.9	4.6	18.7	31.2	7.4	6.4	4.2	4.3	7.3	2.0
14	1.1	.7	8.0	4.3	25.4	32.4	14.4	6.4	5.6	3.2	6.3	1.8
15	1.1	.8	16.9	6.6	28.6	32.0	18.6	6.4	12.0	2.7	8.1	1.7
16	1.0	.8	21.8	7.6	29.6	28.0	20.4	10.4	10.5	2.2	6.8	1.5
17	.9	.9	30.4	7.2	26.4	25.6	20.0	9.1	7.3	2.2	5.7	1.3
18	.9	.9	34.7	8.1	20.4	23.0	17.4	8.7	6.2	2.4	5.7	1.2
19	.8	1.0	35.1	8.2	14.1	23.5	14.2	9.6	4.8	2.8	4.7	1.2
20	.8	1.0	33.4	7.6	10.4	20.5	11.2	8.1	3.8	2.8	3.5	1.1
21	.8	1.0	26.5	11.2	8.6	16.3	9.4	7.0	3.4	3.0	2.9	1.3
22	.8	1.0	16.5	22.5	7.6	13.3	8.2	6.3	2.9	2.6	2.4	1.6
23	.8	1.2	10.6	25.8	6.8	19.0	7.2	5.7	2.8	2.2	2.2	1.4
24	.8	1.2	8.1	31.6	6.1	23.4	6.9	7.3	2.6	1.8	2.0	1.3
25	.9	1.3	6.8	32.4	5.6	25.9	7.9	13.5	2.3	1.8	1.7	1.7
26	.9	1.3	5.8	31.4	5.1	26.8	6.6	18.6	2.1	2.1	1.6	1.6
27	.9	1.3	5.0	28.2	7.5	24.4	6.8	19.7	2.1	2.3	1.6	1.6
28	.9	1.3	5.3	26.7	9.2	19.3	6.5	16.7	3.1	1.7	1.6	1.5
29	.9	1.3	6.3	27.6	-------	14.3	8.4	12.4	4.6	1.5	1.9	1.2
30	.9	1.3	6.2	28.5	-------	11.2	9.8	10.0	4.3	1.9	1.8	1.1
31	.9	-------	6.2	31.9	-------	9.2	-------	10.3	-------	2.2	1.8	-------

CUMBERLAND RIVER AT CARTHAGE, TENN.

LOCATION.—At highway bridge at Carthage, Smith County, one-fourth mile below mouth of Caney Fork, 8 miles above Lock and Dam No. 7, and the same distance below Lock and Dam No. 8 on Cumberland River.

DRAINAGE AREA.—10,740 square miles (74 per cent measured on topographic maps and 26 per cent measured on State maps compiled by United States Geological Survey, scale 1:500,000).

RECORDS AVAILABLE.—October 1, 1922, to September 30, 1923. Gage-height record has been obtained by the United States Weather Bureau since February 10, 1885.

GAGE.—United States Weather Bureau gage painted on north face of pier in midstream; read by C. C. Davis.

CHANNEL AND CONTROL.—Channel is straight for 500 feet above and 800 feet below gage. Left bank is high and not subject to overflow; right bank subject to overflow. Control for all ordinary stages is dam No. 7, a timber and rock crib structure, 8 miles downstream, which leaks very badly. At low stages the entire flow passes through the dam.

DISCHARGE MEASUREMENTS.—Made from the bridge or from a boat.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 43.0 feet February 6 (discharge, 132,000 second-feet); minimum stage, 7.7 feet November 14 (discharge, 930 second-feet).

A stage of 54.4 feet April 7, 1886, is reported by the United States Weather Bureau.

REGULATION.—The extreme low-water flow is regulated considerably by operation of a hydroelectric plant on Caney Fork.

ACCURACY.—Rating curve well defined above 5,000 second-feet; only fairly well defined below that point owing to difficulty of making accurate low-water measurements. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good above 5,000 second-feet; below that point only fair owing to uncertainty of low-water rating and to daily fluctuations of stage caused by regulation of Caney Fork.

COOPERATION.—Gage-height record furnished by the United States Weather Bureau.

Discharge measurements of Cumberland River at Carthage, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 13	Livingston and King	7.85	955	Mar. 9	P. P. Livingston	31.20	83,600
Nov. 13	P. P. Livingston	8.00	965	Apr. 27	do	11.75	11,900
Jan. 17	do	12.60	14,700	Aug. 7	Livingston and Clawson	10.15	6,490
Feb. 6	do	43.00	132,000				

Daily discharge, in second-feet, of Cumberland River at Carthage, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,180	980	1,950	13,100	89,000	19,600	16,600	22,000	27,300	8,900	4,400	5,000
2	1,180	980	2,200	14,400	89,400	19,600	15,000	26,200	25,600	8,900	5,000	4,100
3	1,180	1,180	3,820	15,700	95,400	21,400	14,400	26,200	21,700	8,000	4,400	3,280
4	1,180	1,180	5,600	15,000	114,000	19,200	11,400	21,700	19,200	7,100	4,400	2,450
5	1,700	1,060	12,100	13,700	130,000	18,000	14,400	18,000	16,300	6,200	4,700	2,720
6	1,700	980	16,000	15,400	132,000	17,000	26,200	15,000	14,400	5,900	5,000	2,720
7	1,500	980	16,000	13,100	128,000	53,100	27,000	13,400	10,200	4,700	6,500	5,000
8	1,500	1,060	14,700	11,800	124,000	71,000	27,300	12,100	11,400	4,100	5,900	4,700
9	1,320	1,060	22,800	12,800	112,000	83,400	27,000	11,100	10,600	4,100	9,500	5,000
10	1,320	980	24,800	10,200	81,800	84,200	22,800	11,100	10,500	6,200	12,100	5,600
11	1,180	980	25,200	9,500	44,900	87,000	19,600	10,500	10,800	11,100	9,500	4,100
12	1,180	980	25,200	9,500	31,800	101,000	14,700	9,500	9,820	9,820	9,500	4,100
13	1,180	980	21,400	8,000	33,200	106,000	16,000	11,400	9,200	8,600	9,820	3,550
14	1,180	930	16,300	8,000	58,400	103,000	30,100	15,000	8,600	6,500	17,600	3,820
15	1,180	980	21,000	10,800	77,400	91,800	43,400	24,500	13,400	5,600	21,400	4,100
16	1,180	1,180	42,600	14,700	76,200	83,000	46,400	28,400	18,000	5,000	24,500	3,550
17	1,180	1,180	77,000	14,700	67,000	80,200	43,400	23,400	14,000	5,000	16,000	3,000
18	1,180	1,320	91,400	14,000	52,400	71,800	39,200	19,200	12,100	6,500	16,000	1,950
19	1,180	1,500	99,000	14,700	37,000	59,900	33,200	18,300	8,300	9,200	15,700	1,950
20	1,180	1,500	93,400	13,400	25,600	50,100	25,900	17,600	7,400	7,700	15,400	2,450
21	1,180	1,320	79,400	15,000	18,600	40,800	21,400	17,600	6,500	7,100	8,900	2,720
22	1,180	1,180	54,200	36,600	16,000	33,200	18,600	15,400	5,300	5,900	8,300	2,720
23	1,320	1,180	28,700	52,000	13,100	52,800	16,300	15,400	5,300	5,300	5,600	2,450
24	1,320	1,320	18,000	71,400	11,800	57,600	13,700	16,000	5,000	3,820	5,300	2,450
25	1,180	1,700	14,700	79,800	10,200	62,100	13,700	16,600	5,000	3,550	4,700	2,720
26	1,180	1,700	10,800	79,800	9,500	64,400	13,100	28,700	4,400	4,400	3,820	2,720
27	1,320	1,500	9,500	74,200	13,400	58,000	12,100	43,000	4,400	5,300	3,900	2,450
28	1,180	1,500	12,400	79,400	18,000	48,600	13,100	40,800	6,500	5,000	3,820	2,450
29	1,320	1,500	11,800	75,800	-------	35,900	14,700	36,600	14,400	4,100	3,820	2,720
30	1,320	1,950	16,000	73,400	-------	26,200	18,300	30,400	12,100	3,280	7,700	2,720
31	1,320	-------	14,000	83,000	-------	21,700	-------	28,400	-------	6,200	5,600	-------

Monthly discharge of Cumberland River at Carthage, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 10,740 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,700	1,180	1,270	0.118	0.14
November	1,950	930	1,230	.115	.13
December	99,000	1,950	29,100	2.71	3.12
January	83,000	8,000	31,400	2.92	3.37
February	132,000	9,500	61,100	5.69	5.92
March	106,000	17,000	56,200	5.23	6.03
April	46,400	11,400	22,300	2.08	2.32
May	43,000	9,500	20,800	1.94	2.24
June	27,300	4,400	11,600	1.08	1.20
July	11,100	3,280	6,230	.580	.67
August	24,500	3,000	8,960	.834	.96
September	5,600	1,950	3,310	.308	.34
The year	132,000	930	20,900	1.95	26.44

CUMBERLAND RIVER AT NASHVILLE, TENN.

LOCATION.—At new municipal wharf at Broad and First streets, Nashville, Davidson County, 2½ miles above Lock and Dam No. 1.

DRAINAGE AREA.—12,860 square miles (62 per cent measured on topographic maps and 38 per cent measured on State maps compiled by the United States Geological Survey; scale, 1: 500,000).

RECORDS AVAILABLE.—October 1, 1918, to September 30, 1923. Gage-height record has been obtained by the United States Weather Bureau since 1873.

GAGE.—Consists of enameled steel sections embedded in concrete walls and columns of the new Municipal Wharf or River Terminals building. Prior to the fall of 1922 gage consisted of inclined and vertical sections located on left bank about 50 feet upstream from present gage. Datum has remained unchanged since date of establishment.

CHANNEL AND CONTROL.—Bed composed of sediment. Banks high but subject to overflow during extreme floods. Channel curved above and practically straight for half a mile below gage. Control for low and medium stages is Dam No. 1, a timber and rock crib structure 2½ miles downstream. Dam is drowned out at stages above 12½ feet.

DISCHARGE MEASUREMENTS.—Made from upstream side of Sparkman Street Bridge, 500 feet upstream from gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, 43.5 feet at 7 a. m. February 9 (discharge, 122,000 second-feet); minimum stage, 6.8 feet November 9–14 (discharge, 1,000 second-feet).

1918–1923: Maximum stage recorded, 45.1 feet, March 16, 1922 (discharge, 128,000 second-feet, revised); minimum stage, that of November 9–14, 1923.

The United States Weather Bureau reports a stage of 55.3 feet for January 22, 1882.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Very slight regulation unless pool is lowered for repairs to lock and dam.

ACCURACY.—Rating curve differs slightly from ones used for previous years and is very well defined throughout. Gage read to tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by the United States Weather Bureau.

Discharge measurements of Cumberland River at Nashville, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 15	King and Livingston	6.95	1,200	Aug. 8	Livingston and Clawson.	9.36	8,250
Jan. 18	P. P. Livingston	11.70	17,300				

Daily discharge, in second-feet, of Cumberland River at Nashville, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,330	1,160	1,510	18,000	98,700	23,700	24,000	20,700	37,600	12,700	3,800	5,310
2	1,510	1,160	1,930	17,200	98,000	23,700	19,800	24,000	32,500	9,730	4,090	4,690
3	1,330	1,160	4,090	17,200	108,000	23,700	16,800	27,700	29,100	8,660	4,390	4,090
4	1,330	1,160	6,610	17,600	116,000	23,500	15,700	28,000	25,600	8,310	3,800	3,230
5	1,160	1,160	10,100	17,600	117,000	21,500	28,000	26,100	21,700	6,610	4,690	3,510
6	1,160	1,160	15,300	16,400	118,000	24,300	34,000	21,700	18,900	5,310	5,630	3,510
7	1,330	1,160	18,400	17,200	120,000	56,800	33,700	18,000	16,100	5,310	9,370	3,510
8	1,330	1,160	18,400	16,100	122,000	71,400	33,100	15,300	13,000	5,310	9,010	4,090
9	1,160	1,000	20,200	13,800	122,000	77,100	32,200	13,400	12,300	4,390	13,000	5,630
10	1,160	1,000	25,000	13,800	120,000	84,300	31,100	12,700	11,600	3,800	11,900	7,280
11	1,330	1,000	28,000	11,600	113,000	92,200	26,100	12,300	11,200	5,310	13,800	5,950
12	1,160	1,000	27,700	11,200	89,000	112,000	21,700	11,900	12,700	10,100	11,200	4,690
13	1,160	1,000	26,400	10,400	58,500	116,000	20,700	12,300	12,300	10,100	15,300	4,390
14	1,160	1,000	21,700	8,660	61,200	114,000	26,900	13,400	10,800	8,310	20,200	3,800
15	1,160	1,160	29,700	14,500	68,600	111,000	47,100	19,800	10,400	6,610	23,000	3,510
16	1,160	1,160	43,200	14,900	78,200	112,000	52,700	39,800	15,700	5,310	25,000	3,510
17	1,330	1,160	60,200	17,600	81,400	112,000	54,400	38,200	19,300	5,630	25,600	2,950
18	1,330	1,330	84,700	17,200	78,200	104,000	51,700	29,400	17,600	5,310	26,900	2,680
19	1,160	1,710	90,400	16,100	67,900	95,100	46,100	23,200	13,000	6,280	24,300	2,170
20	1,160	1,510	94,000	16,100	48,400	82,900	37,300	20,500	9,730	9,010	19,800	2,170
21	1,330	1,510	94,700	18,000	30,200	67,600	29,400	21,500	8,660	8,660	17,200	2,420
22	1,330	1,330	90,100	34,000	21,700	53,400	25,800	20,000	6,940	6,940	11,200	2,420
23	1,330	1,330	74,200	50,400	18,400	69,300	20,500	18,000	5,630	5,310	9,010	2,420
24	1,330	1,330	40,400	75,300	15,300	80,300	20,000	16,800	5,310	4,690	6,940	2,420
25	1,330	1,330	22,000	83,600	13,400	78,500	17,600	18,600	5,310	3,800	5,630	2,170
26	1,160	1,330	16,400	86,500	12,700	77,100	16,400	19,500	4,690	3,800	4,690	1,930
27	1,160	1,330	12,700	86,800	18,900	76,000	14,900	41,000	4,090	3,800	4,090	1,710
28	1,160	1,710	12,700	94,400	22,500	71,400	13,800	54,700	7,620	4,090	3,800	2,170
29	1,330	1,710	19,500	95,800	-------	61,200	15,300	52,700	7,960	4,390	4,090	2,170
30	1,330	1,510	17,600	91,500	-------	44,500	18,000	47,800	14,200	3,800	4,090	2,170
31	1,330	-------	18,600	97,300	-------	30,800	-------	41,400	-------	3,800	6,610	-------

Monthly discharge of Cumberland River at Nashville, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 12,860 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,510	1,160	1,260	0.098	0.11
November	1,710	1,000	1,260	.098	.11
December	94,700	1,510	33,800	2.63	3.03
January	97,300	8,660	36,000	2.80	3.23
February	122,000	12,700	72,800	5.66	5.89
March	116,000	21,500	70,700	5.50	6.34
April	54,400	13,800	28,200	2.19	2.44
May	54,700	11,900	25,200	1.96	2.26
June	37,600	4,090	14,100	1.10	1.23
July	12,700	3,800	6,300	.490	.56
August	26,900	3,800	11,400	.886	1.02
September	7,280	1,710	3,420	.266	.30
The year	122,000	1,000	25,100	1.95	26.52

CUMBERLAND RIVER AT CLARKSVILLE, TENN.

LOCATION.—At steamboat landing at Clarksville, Montgomery County, a quarter of a mile below Louisville & Nashville Railroad bridge and 1 mile above mouth of Red River.

DRAINAGE AREA.—15,980 square miles (56 per cent measured on topographic maps and 44 per cent on United States Geological Survey State maps; scale, 1:500,000).

RECORDS AVAILABLE.—October 1, 1922, to September 30, 1923. Gage-height record obtained by United States Weather Bureau since December 1, 1900.

GAGE.—Staff gage in three sections on right bank at lower end of boat landing; read by R. L. Miller. Lower section, 12.0 to 42.0 feet, is inclined and conforms to slope of bank; middle section, 42.0 to 53.0 feet, is vertical post located at top of bank at head of inclined section; high-water section is painted on the side of a brick warehouse 45 feet northeast of middle section. A temporary chain gage was placed on downstream side of railroad bridge, a quarter of a mile upstream, and was used from November 1 to December, 31, 1922, while the regular gage was being repaired. Both gages referred to same datum.

DISCHARGE MEASUREMENTS.—Cumberland River is measured from downstream side of railroad bridge, a quarter of a mile above gage. Red River is measured from the Tennessee Central Railroad bridge, 1 mile above mouth of river. The combined flow of the two streams gives the flow in the Clarksville pool.

CHANNEL AND CONTROL.—Channel straight for several hundred feet above and below gage. Bed composed of sand and gravel. Both banks high but are overflowed during extreme high water. Control for low and medium stages is at Lock and Dam C, at Sailors Rest, Tenn. The control during high stages may change to points farther down the river and backwater may be caused by high stages on Ohio River, 125 miles downstream. Red River enters this same pool about 1 mile below gage affecting the stage-discharge relation and consequently the flow of Red River is added to Cumberland River discharge.

EXTREMES OF STAGE.—Maximum stage recorded during year, 49.0 feet at 10 a. m., March 17; minimum stage, 12.4 feet October 17, November 12–14, 29, and 30. Lower gage heights were recorded several days during October and November when Lock C was opened for making repairs on dam.

ACCURACY.—Gage read to tenths once daily. Owing to insufficient discharge measurements, estimates of daily discharge are withheld until the rating curve can be more accurately defined.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Cumberland River at Clarksville, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge (second-feet)		
			Red River	Cumberland River	Total
		Feet			
Oct. 18	King and Livingston	12.53	128	1,350	1,480
26	P. P. Livingston	12.55	134	1,340	1,480
Nov. 1[a]	do	11.66	143	2,550	2,690
Jan. 20	do	18.25	4,340	17,700	22,000
22	do	27.00	17,200	46,800	64,100
Feb. 2	do	44.20	11,200	107,000	118,000
Aug. 11	Clawson and Livingston	19.20	11,100	17,800	28,900

[a] Pool drawn down for repairs to dam and Lock C.

Daily gage height, in feet, of Cumberland River at Clarksville, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	12.6	12.1	12.4	18.4	44.0	20.8	21.3	18.8	25.2	16.6	13.5	14.4
2	12.5	12.3	12.5	18.0	44.1	20.6	20.1	19.5	23.0	15.8	13.7	13.9
3	12.1	11.2	13.1	18.0	46.2	20.6	18.9	20.6	21.9	15.2	13.6	13.8
4	12.6	12.2	14.0	17.9	48.1	20.3	18.5	21.2	20.9	15.0	13.9	13.9
5	12.6	12.4	14.9	18.0	48.6	20.0	22.4	20.9	20.1	14.8	16.1	14.0
6	12.1	12.3	16.1	17.7	48.2	21.9	27.8	20.5	19.3	14.3	15.7	14.6
7	12.5	12.5	17.7	17.7	48.0	30.6	24.8	19.1	18.2	14.2	17.6	14.6
8	12.3	12.6	18.5	17.7	47.8	34.6	24.0	18.1	17.4	14.1	16.7	14.3
9	12.2	12.5	18.3	17.1	47.7	34.7	23.3	17.2	16.7	14.0	16.9	14.5
10	12.5	12.5	19.2	16.8	48.0	35.6	22.9	16.8	16.3	13.7	18.5	14.6
11	12.6	12.5	20.3	16.4	47.7	38.6	22.0	16.4	17.2	13.6	17.9	14.6
12	12.6	12.4	20.1	15.8	46.7	44.1	20.6	16.4	16.9	14.2	16.8	14.2
13	12.5	12.4	20.2	15.8	43.4	46.7	21.5	16.5	17.2	15.2	18.5	13.9
14	12.1	12.4	19.3	15.4	39.7	47.1	23.1	16.4	16.5	15.1	21.6	13.7
15	12.4	12.8	19.3	17.4	37.4	46.6	27.0	17.1	16.0	14.6	20.4	13.5
16	12.5	12.7	23.7	17.9	36.9	47.7	27.9	21.6	16.9	14.3	20.0	13.4
17	12.4	12.6	26.2	17.8	37.2	48.8	28.3	25.1	18.6	14.7	20.6	13.3
18	12.5	12.6	31.3	18.1	36.7	48.0	27.8	22.6	18.7	16.3	21.4	13.2
19	12.5	12.7	34.6	17.7	35.1	46.5	26.7	20.9	17.4	15.1	21.8	13.1
20	12.5	12.1	36.1	17.6	31.2	44.3	24.8	19.4	16.3	14.7	19.8	13.1
21	12.5	11.9	37.1	21.3	24.6	41.1	22.8	19.0	15.5	15.1	18.6	13.3
22	12.5	11.2	37.3	26.5	20.7	37.0	21.7	19.1	15.1	14.8	17.2	13.2
23	12.5	11.4	35.9	28.4	19.3	39.2	20.4	18.3	14.9	14.4	16.1	13.1
24	12.6	11.2	30.0	34.8	18.3	42.2	20.5	17.8	14.3	13.9	15.4	13.0
25	12.6	11.5	21.4	38.3	17.5	41.7	19.4	17.9	14.2	14.3	14.8	12.9
26	12.5	11.7	19.5	38.5	17.2	40.0	18.4	18.4	14.3	14.1	14.4	12.8
27	12.7	12.2	17.1	38.4	18.6	38.4	18.0	20.9	14.0	13.6	14.1	12.7
28	12.1	12.3	16.2	40.5	20.4	36.8	17.4	26.1	16.1	13.6	13.9	12.7
29	12.2	12.4	17.7	41.5	-------	34.4	17.3	27.3	15.6	13.7	13.9	12.8
30	12.2	12.4	18.6	41.3	-------	30.4	17.9	27.0	15.7	13.6	13.8	12.7
31	12.5	-------	18.3	42.9	-------	24.6	-------	25.4	-------	13.4	13.8	-------

NOTE.—Lock C open for making repairs on dam Oct. 3, 6, 8, 9, 14, 15, 28, 30, Nov. 1–6, and 20–28.

LAUREL RIVER NEAR OTAS, KY.

LOCATION.—At old wooden highway bridge on Corbin-Rockcastle Springs road, 1½ miles northwest of Otas, Whitley County, 2½ miles northwest of Corbin, and 18 miles above mouth of river. Horse Creek enters half a mile above gage.

DRAINAGE AREA.—198 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1922, to September 30, 1923.

GAGE.—Vertical staff in two sections bolted to left side of first masonry pier from left bank; read by Clayborn Killian.

CHANNEL AND CONTROL.—Channel straight for 300 feet above and 700 feet below gage. Banks high and rocky; not subject to overflow. Bed of stream very rough; composed of coarse gravel and boulders. Control is rocky shoal just below gage; probably permanent.

DISCHARGE MEASUREMENTS.—Made from downstream side of three-span wooden truss bridge at gage, or by wading.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.9 feet at 7 a. m. February 3 (discharge, 7,150 second-feet); practically no flow October 5 and 6.

REGULATION.—None.

ICE.—Not affected by ice during average winters.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 3,000 second-feet; extended above that point. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Laurel River near Otas, Ky., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 2	King and Livingston	0.07	[a] 1.0	Feb. 14	P. P. Livingston	5.70	2,550
Dec. 2	Hanson and Livingston	.40	6.4	15	do	3.00	748
22	do	1.72	263	July 26	Livingston and Clawson	.42	6.1

[a] Estimated.

Daily discharge, in second-feet, of Laurel River near Otas, Ky., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar	Apr.	May	June	July	Aug.	Sept.
1	1	3	9	350	1,600	472	160	550	1,680	305	87	9
2	1	2	9	402	3,550	402	200	368	1,300	260	530	14
3	1	4	41	385	7,100	305	160	215	750	245	173	9
4	.5	3	200	305	3,730	320	290	186	472	160	160	9
5	0	2	275	305	1,400	305	728	160	275	110	87	18
6	0	1	275	275	750	2,240	682	136	260	110	49	18
7	1.5	1.5	420	215	638	5,530	530	110	472	290	160	200
8	5.5	3	775	335	615	2,120	530	136	350	975	305	275
9	14	2	728	320	550	775	420	705	275	530	592	402
10	34	3	530	275	550	728	305	438	186	260	530	186
11	23	3	350	230	550	925	230	275	215	160	275	136
12	14	2	230	200	490	3,240	186	200	638	98	136	76
13	9	1	160	173	3,780	1,740	245	660	490	34	186	49
14	5.5	1.5	275	245	2,960	825	1,540	592	368	7	186	34
15	7	3	3,640	320	1,300	570	1,300	490	230	7	320	18
16	5.5	2	2,480	275	660	1,240	728	402	136	3	148	11
17	5.5	3	4,680	245	550	1,460	570	305	76	230	123	7
18	3	3	2,880	215	455	728	510	230	28	136	66	4
19	2	1	1,180	173	402	530	438	186	14	110	28	5.5
20	1.5	1.5	705	570	305	472	402	186	9	49	14	3
21	1	1.5	320	750	245	402	305	305	5.5	14	9	3
22	1	2	368	2,040	215	490	230	420	7	9	66	3
23	2	3	200	1,850	160	3,550	186	1,600	3	7	320	1.5
24	4	1.5	200	1,780	160	2,520	186	2,360	350	4	173	1
25	4	3	136	1,640	123	1,150	245	925	1,240	4	148	1
26	4	9	245	1,180	275	682	173	660	615	7	49	1
27	3	14	215	1,150	660	592	110	570	592	5.5	34	.8
28	4	9	200	2,480	682	455	245	455	1,150	9	18	2
29	2	9	245	1,710	-------	305	1,090	350	490	28	14	2
30	4	9	350	1,150	-------	186	728	975	402	275	28	3.4
31	3	-------	305	2,160	-------	110	-------	1,880	---------	41	18	-------

NOTE.—Discharge, Oct. 1, estimated; gage not installed.

Monthly discharge of Laurel River near Otas, Ky., for the year ending Sept. 30, 1923

[Drainage area, 198 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	34	0	5.37	0.027	0.03
November	14	1	3.55	.018	.02
December	4,680	9	730	3.69	4.25
January	2,480	173	765	3.86	4.45
February	7,100	123	1,230	6.22	6.48
March	5,530	110	1,140	5.76	6.64
April	1,540	110	455	2.30	2.57
May	2,360	110	550	2.78	3.20
June	1,680	3	436	2.20	2.46
July	975	3	145	.732	.84
August	592	9	162	.818	.94
September	402	.8	50.1	.253	.28
The year	7,100	0	470	2.37	32.16

ROCKCASTLE RIVER AT ROCKCASTLE SPRINGS, KY.

LOCATION.—At Rockcastle Springs, Laurel County, 5 miles above mouth of river and 21 miles southwest of London.

DRAINAGE AREA.—746 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1922, to September 30, 1923.

GAGE.—Staff gage in four sections on left bank 300 feet from Rockcastle Springs post office. Lower section, 0 to 7.3 feet, is inclined and the other three sections are vertical timbers attached to trees and faced with enamel sections; read by Ben Wells.

CHANNEL AND CONTROL.—Channel straight for 1,000 feet above and 300 feet below gage. Banks are steep and wooded and are overflowed at 18-foot stage. Bed composed of solid rock and gravel. Control is rock and coarse gravel shoal 250 feet below gage; probably permanent.

DISCHARGE MEASUREMENTS.—After December 16, 1922, made from cable just above gage or by wading; prior to that date made from boat at cable section and by wading.

EXTREMES OF DISCHARGE.—Maximum stage during year, 26.5 feet at 7.10 a. m. February 3 (discharge, about 27,300 second-feet); minimum stage, 0.10 foot at 8 a. m. October 5 (discharge, 10 second-feet).

REGULATION.—None.

ICE.—Stage-discharge relation seldom affected by ice.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve very well defined below 7,000 second-feet; extended beyond that point. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records below 7,000 second-feet good; above that stage, fair.

Discharge measurements of Rockcastle River at Rockcastle Springs, Ky., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 3	King and Livingston	0.15	13.4	Dec. 10	Hanson and Livingston	4.01	1,340
Dec. 6	Hanson and Livingston	3.52	1,060	11	do	3.14	889
7	do	2.62	621	13	do	2.26	467
7	do	2.70	660	13	do	2.20	427
8	do	3.50	1,080	Feb. 14	P. P. Livingston	9.46	6,270
8	do	4.03	1,420	15	do	6.50	3,510
8	do	4.55	1,730	July 23	Livingston and Clawson	.71	67.5
9	do	4.63	1,790	25	do	.66	56.4

Daily discharge, in second-feet, of Rockcastle River at Rockcastle Springs, Ky., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	14	27	36	555	3,690	1,070	600	1,310	1,310	212	149	115
2	14	32	46	600	22,400	960	510	1,020	650	171	151	88
3	12	28	46	600	24,600	850	465	650	488	159	159	73
4	12	27	60	600	13,600	700	555	555	555	155	119	79
5	11	24	119	532	3,870	600	1,370	600	445	149	192	225
6	12	21	1,020	465	2,320	4,070	2,560	600	405	131	195	510
7	18	22	650	425	1,630	19,800	1,760	532	1,020	350	195	240
8	36	21	1,500	425	1,130	8,120	1,440	465	1,130	2,970	600	270
9	30	21	1,760	465	1,130	3,330	1,130	488	555	1,890	300	212
10	42	18	1,310	465	960	2,030	905	510	368	700	300	180
11	56	20	800	385	1,190	1,760	800	425	332	425	212	135
12	78	18	600	368	1,070	7,520	650	385	1,890	300	159	103
13	60	18	445	332	5,960	9,080	600	960	12,600	225	425	91
14	56	21	405	300	8,120	3,510	2,170	850	4,670	188	425	44
15	38	27	4,670	350	3,150	2,170	2,970	700	2,030	151	255	63
16	36	36	4,370	465	1,890	2,560	2,170	750	1,020	131	188	56
17	32	32	12,300	465	1,440	5,520	1,630	905	750	117	171	47
18	28	48	11,300	425	1,130	2,880	1,310	700	600	112	127	42
19	22	73	2,640	405	960	2,030	1,020	600	510	97	109	38
20	21	100	1,440	425	800	905	850	532	445	85	100	37
21	20	97	960	2,170	700	1,020	750	600	350	79	79	70
22	21	88	750	15,700	600	1,020	510	510	270	76	78	850
23	21	85	600	8,840	488	2,320	532	650	240	34	70	285
24	30	70	488	7,760	465	5,080	465	1,500	225	44	60	190
25	30	64	385	5,740	425	3,150	510	1,250	240	56	56	151
26	22	64	350	3,150	445	2,320	385	1,370	315	76	59	119
27	28	46	300	2,320	850	1,820	350	1,130	350	73	53	92
28	28	52	350	4,470	1,310	1,250	405	800	315	76	51	85
29	27	46	445	4,870	-------	1,070	2,170	1,020	240	225	92	82
30	24	41	532	2,970	-------	850	1,890	905	225	163	114	79
31	24	-------	510	3,600	-------	750	-------	1,370	-------	167	200	-------

NOTE.—Discharge, Oct. 1 and 2, estimated; gage not installed.

Monthly discharge of Rockcastle River at Rockcastle Springs, Ky., for the year ending Sept. 30, 1923

[Drainage area, 746 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	78	11	29.1	0.039	0.04
November	100	18	42.9	.058	.06
December	12,300	36	1,650	2.21	2.55
January	15,700	300	2,280	3.06	3.53
February	24,600	425	3,800	5.09	5.30
March	19,800	600	3,230	4.33	4.99
April	2,970	350	1,110	1.49	1.66
May	1,500	385	795	1.07	1.23
June	12,600	225	1,150	1.54	1.72
July	2,970	34	316	.424	.49
August	600	51	176	.236	.27
September	850	37	155	.208	.23
The year	24,600	11	1,210	1.62	22.07

NEW RIVER NEAR NEW RIVER, TENN.

LOCATION.—At county highway bridge 1½ miles above Cincinnati, New Orleans & Texas Pacific Railroad bridge at New River, Scott County, 1 mile above mouth of Brimstone Creek, and 7 miles above confluence with Clear Fork.

DRAINAGE AREA.—312 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 19, 1922, to September 30, 1923.

GAGE.—Chain gage bolted to downstream side of bridge; read by E. L. Bowling and L. D. Washam.

CHANNEL AND CONTROL.—Channel practically straight for 500 feet above and below gage. Right bank subject to overflow each year; left bank not subject to overflow. Bed composed of gravel and rock. Control is coarse gravel shoal 25 feet below gage; practically permanent.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

EXTREMES OF DISCHARGE:—Maximum stage recorded during year, 21.0 feet at 7 a. m. March 7 (discharge not determined); minimum stage, 0.50 foot at 7 a. m. and 5 p. m. September 20 (discharge, 4 second-feet).

REGULATION.—None.

ICE.—Stage-discharge relation not affected by ice during year.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 3,000 second-feet, extended above that point. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good below 3,000 second-feet and subject to error above that point because of lack of high-water measurements.

Discharge measurements of New River near New River, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 9	P. P. Livingston	0.92	63.7	Feb. 10	P. P. Livingston	4.42	1,390
Nov. 20	do	.91	61.8	10	do	4.48	1,370
20	do	.91	63.0	July 11	Livingston and Clawson	1.01	88.5
Jan. 8	do	2.16	405	Sept. 25	J. P. Clawson	.66	20.6
8	do	2.16	394				

Daily discharge, in second-feet, of New River near New River, Tenn., for the year ending Sept. 30, 1923

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	-------	22	1,440	2,580	925	262	1,200	675	305	103	26
2	-------	26	1,440	2,880	715	234	835	432	221	157	22
3	-------	715	1,020	11,800	555	234	635	350	170	195	15
4	-------	970	715	3,080	485	365	485	290	134	118	12
5	-------	1,540	485	2,160	432	2,820	415	234	134	79	19
6	-------	925	450	1,340	1,490	1,920	365	234	134	68	15
7	-------	675	415	1,200	11,100	1,150	305	221	118	103	15
8	-------	398	380	1,290	2,220	880	262	195	234	70	72
9	-------	398	350	1,290	1,240	635	262	157	234	130	68
10	-------	1,060	320	1,340	925	485	208	120	142	276	55
11	-------	795	290	1,890	3,340	398	182	595	108	157	40
12	-------	415	262	1,060	6,670	335	182	795	77	134	28
13	-------	350	221	5,280	2,700	380	3,860	485	61	350	20
14	-------	276	305	2,820	1,390	1,920	1,600	335	68	221	14
15	-------	4,540	1,020	1,440	925	2,220	970	248	77	485	11
16	-------	3,140	925	970	5,440	1,340	3,340	170	86	305	8.5
17	-------	3,860	675	675	3,080	880	1,600	157	77	170	9.4
18	-------	2,820	485	555	1,600	675	970	125	130	142	12
19	63	1,490	415	415	1,290	520	635	106	79	96	8.5
20	221	755	555	365	1,020	415	755	94	50	72	4.0
21	110	555	970	320	880	365	1,440	82	48	57	8.5
22	72	415	4,120	262	715	320	970	70	28	68	10
23	55	290	2,820	221	3,600	276	1,100	77	25	59	8.5
24	22	234	4,260	195	3,460	755	2,940	195	19	44	14
25	14	208	2,160	182	1,760	835	3,340	635	36	34	19
26	28	170	1,490	208	1,150	635	1,600	485	31	36	13
27	19	132	1,600	715	795	520	1,100	290	23	36	10
28	20	262	7,390	1,240	635	595	880	1,600	17	26	10
29	29	485	2,520	-------	485	3,270	715	925	37	32	10
30	26	432	2,340	-------	398	2,040	880	485	53	29	9.4
31	-------	398	6,160	-------	335	-------	1,200	-------	89	29	-------

NOTE.—Gage-height record missing, Jan. 5–10; discharge estimated on basis of records of flow of South Fork of Cumberland River at Nevelsville and rainfall records.

Monthly discharge of New River near New River, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 312 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
November 19-30	221	14	56.6	0.181	0.08
December	4,540	22	927	2.97	3.42
January	7,390	221	1,550	4.97	5.73
February	11,800	182	1,690	5.42	5.64
March	11,100	335	1,990	6.38	7.36
April	3,270	234	923	2.96	3.30
May	3,860	182	1,140	3.65	4.21
June	1,600	70	362	1.16	1.29
July	305	17	98.2	.316	.36
August	485	26	125	.401	.46
September	72	4	19.9	.064	.07

SOUTH FORK OF CUMBERLAND RIVER AT NEVELSVILLE, KY.

LOCATION.—One-fourth mile below Turkey Creek ferry on Greenwood-Monticello pike, 1 mile from Nevelsville, McCreary County. Little South Fork enters on left 1¾ miles above station.

DRAINAGE AREA.—1,260 square miles (measured on maps compiled by United States Geological Survey, scale 1:500,000).

RECORDS AVAILABLE.—March 10, 1915, to September 30, 1923.

GAGE.—Vertical staff in five sections bolted to rock ledges on left bank; read by J. S. Carrell. A reference gage for use in referencing soundings at the measuring section, is attached to tree on the left bank 110 feet below cable.

DISCHARGE MEASUREMENTS.—Made from cable about 2,000 feet below gage or by wading.

CHANNEL AND CONTROL.—Channel straight above and below; bed, compact gravel. Low-water control is partly the bed of the river below gage and partly a gravel bar about 2 miles below gage. Both are probably permanent. High-water control is bed of stream for several miles below gage, and may be slightly affected by foliage along the banks.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 30.4 feet at 5.30 p. m. March 7 (discharge, 42,400 second-feet); minimum stage recorded, 1.84 feet at 5.30 p. m. November 6 and 14 (discharge, 92 second-feet).

1915–1923: Maximum stage recorded, 51.4 feet January 28, 1918 (discharge, 84,300 second-feet); minimum stage, 1.53 feet September 19, 1919 (discharge, 49 second-feet).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Operation of a small plant a short distance above gage may affect flow at extreme low water.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during year. Rating curve well defined between 100 and 25,000 second-feet; extended above 25,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of South Fork of Cumberland River at Nevelsville, Ky., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 6	King and Livingston	1.92	115	Sept. 26	J. P. Clawson	1.96	109
July 14	Livingston and Clawson.	2.45	247				

Daily discharge, in second-feet, of South Fork of Cumberland River at Nevelsville, Ky., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	128	97	218	1,800	11,400	3,050	1,330	4,370	3,380	850	1,090	193
2	128	103	320	3,380	9,100	2,430	1,210	2,970	2,290	660	910	183
3	122	101	635	2,970	38,900	2,150	1,210	2,360	1,730	535	910	173
4	118	97	1,800	2,500	17,500	1,800	1,210	1,940	1,330	445	768	135
5	114	94	5,410	2,220	8,190	1,590	7,670	1,660	1,270	400	490	183
6	107	92	4,190	1,800	5,860	6,700	6,460	1,450	1,030	490	445	199
7	105	99	3,210	1,590	4,570	42,400	4,190	1,390	1,330	850	360	239
8	196	97	2,650	1,450	4,190	11,800	3,650	1,270	1,210	740	303	320
9	221	99	5,630	1,330	4,100	5,300	2,500	1,210	970	512	1,590	468
10	186	97	3,560	1,210	4,010	3,920	2,010	1,150	712	468	1,390	380
11	168	95	3,130	1,090	3,830	8,190	1,660	1,150	585	380	910	320
12	186	95	2,290	970	3,130	25,100	1,450	850	1,870	286	1,090	254
13	168	94	2,010	910	9,890	13,400	1,590	850	1,520	270	1,520	199
14	153	92	2,080	910	13,000	6,220	12,900	4,770	1,150	233	1,090	175
15	135	128	17,900	2,890	5,980	4,010	12,300	2,430	850	224	1,150	148
16	133	221	12,000	3,560	4,010	9,230	9,100	5,190	712	207	1,210	126
17	128	230	17,700	2,730	2,970	13,400	3,470	3,740	610	660	1,090	120
18	120	270	13,600	2,150	2,360	6,940	2,730	2,360	535	685	535	107
19	114	303	5,740	1,870	1,800	4,100	2,220	1,660	445	468	445	109
20	109	270	3,740	2,150	1,590	3,470	1,800	1,450	400	340	380	107
21	105	380	2,290	3,470	1,520	2,890	1,590	2,500	512	254	303	103
22	99	360	2,010	8,580	1,330	7,800	1,390	2,220	490	204	270	97
23	101	270	1,660	12,200	1,090	11,600	1,330	16,600	360	188	248	133
24	122	236	1,330	16,800	1,030	17,500	2,080	9,100	320	183	216	124
25	156	204	1,150	9,100	970	7,300	2,970	7,800	535	175	186	114
26	142	183	970	5,300	1,030	4,770	2,010	4,770	1,210	224	188	114
27	128	175	970	6,940	1,940	3,380	1,870	3,650	1,090	202	186	122
28	122	180	1,030	28,400	3,470	2,650	2,430	3,130	1,590	193	218	107
29	118	233	1,730	11,200	-------	2,150	6,460	2,570	2,650	239	204	105
30	114	216	1,730	4,100	-------	1,870	5,080	5,630	1,330	242	186	105
31	111	-------	1,730	28,900	-------	1,590	-------	4,470	-------	850	180	-------

Monthly discharge of South Fork of Cumberland River at Nevelsville, Ky., for the year ending Sept. 30, 1923

[Drainage area, 1,260 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	221	99	134	0.106	0.12
November	380	92	174	.138	.15
December	17,900	218	4,010	3.18	3.67
January	28,900	910	5,630	4.47	5.15
February	38,900	970	6,030	4.79	4.99
March	42,400	1,590	7,700	6.11	7.04
April	12,900	1,210	3,600	2.86	3.19
May	16,600	850	3,440	2.73	3.15
June	3,380	320	1,130	.897	1.00
July	850	175	408	.324	.37
August	1,590	180	647	.514	.59
September	468	97	175	.139	.16
The year	42,400	92	2,750	2.18	29.58

OBEY RIVER NEAR BOOM, TENN.

LOCATION.—At county highway bridge on Livingston-Byrdstown road, 1½ miles above mouth of Eagle Creek, 1½ miles below mouth of Franklin Creek, 1½ miles northeast of Boom, Pickett County, and 4 miles southwest of Byrdstown.

DRAINAGE AREA.—416 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 16, 1919, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge; read by Eunice Reynolds.

CHANNEL AND CONTROL.—Bed composed chiefly of rock; both banks high, but left bank subject to overflow at stages above 30 feet. Control for low water is at gravel and rock shoal a quarter of a mile below gage; high-water control indeterminate.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

ICE.—Ice seldom forms at this point.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.3 feet at 9.15 a. m. January 28 (discharge, 15,300 second-feet); minimum stage, 1.14 feet October 21 (discharge, 21 second-feet).

1919–1923: Maximum stage recorded, 35.65 feet March 2, 1922 (discharge, 30,700 second-feet); minimum stage, 0.90 foot November 3, 1920 (discharge, 7 second-feet).

REGULATION.—None.

ACCURACY.—Stage-discharge relation for low stages changed somewhat during high water of January 28. Rating curves used before and after the change fairly well defined below 15,000 second-feet. Gage read to hundredths once daily, oftener during high water. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Discharge measurements of Obey River near Boom, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 11	P. P. Livingston	1.64	76.0	Mar. 8	P. P. Livingston	7.88	3,600
Jan. 12	do	2.48	308	12	do	18.54	13,500
Feb. 8	do	4.93	1,620	Aug. 2	Livingston and Clawson.	1.95	159

Daily discharge, in second-feet, of Obey River near Boom, Tenn., for the year ending Sept. 30, 1923

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	29	39	60	830	4,340	1,480	618	1,720	645	152	65	80
2	25	39	72	1,050	3,140	1,200	565	1,250	618	135	218	68
3	25	37	1,050	995	12,100	1,030	540	1,030	672	115	440	62
4	27	37	1,220	885	8,000	865	540	865	540	95	149	62
5	29	37	1,810	775	3,420	755	2,200	810	440	86	173	167
6	29	37	1,390	665	2,330	1,200	2,330	700	395	82	108	372
7	33	41	1,570	585	1,840	13,900	1,600	618	395	86	372	173
8	55	37	775	535	1,660	3,860	1,300	540	372	78	210	1,140
9	53	27	1,390	485	1,540	2,140	1,080	490	330	74	1,140	372
10	49	27	1,100	410	1,480	1,660	920	465	340	70	1,030	235
11	55	29	775	300	1,300	2,400	810	418	350	63	590	167
12	53	29	775	300	1,140	13,500	672	350	310	56	372	143
13	35	29	535	260	3,940	5,750	700	418	310	53	2,140	128
14	41	33	510	240	4,260	2,590	6,380	618	310	67	1,140	92
15	35	35	6,110	2,300	2,200	1,720	4,420	565	252	47	810	68
16	41	55	3,560	1,690	1,600	4,420	2,260	540	214	44	418	72
17	43	89	6,110	1,220	1,250	4,660	1,600	490	182	252	490	68
18	33	89	3,560	940	1,030	2,460	1,250	440	158	125	490	62
19	33	82	2,110	775	865	1,780	1,030	372	130	78	310	58
20	33	89	1,390	720	755	1,360	920	372	130	53	290	210
21	21	85	1,050	1,450	700	1,140	810	395	120	47	185	122
22	31	70	775	5,570	590	2,460	700	920	95	38	167	86
23	49	61	638	3,420	490	6,560	590	515	86	47	138	72
24	47	70	585	6,020	440	6,020	1,360	395	82	41	102	62
25	47	55	485	3,070	418	3,000	1,080	755	78	270	102	55
26	41	55	435	1,930	418	2,020	810	515	82	86	108	42
27	37	53	365	1,570	1,140	1,480	700	590	86	63	84	235
28	37	79	638	15,200	1,960	1,200	1,140	810	252	53	108	143
29	41	61	995	4,900	-------	975	2,720	810	395	95	88	92
30	41	61	940	2,330	-------	865	2,590	1,260	270	74	84	72
31	41	-------	830	10,400	-------	755	-------	1,720	-------	63	80	-------

NOTE.—Gage not read Nov. 5, May 30, and June 10; discharge interpolated.

Monthly discharge of Obey River near Boom, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 416 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	55	21	38.4	0.092	0.11
November	89	27	52.2	.125	.14
December	6,110	60	1,410	3.39	3.91
January	15,200	240	2,320	5.58	6.43
February	12,100	418	2,300	5.52	5.75
March	13,900	755	3,070	7.38	8.51
April	6,380	540	1,470	3.53	3.94
May	1,720	350	702	1.69	1.95
June	672	78	288	.692	.77
July	270	38	86.7	.208	.24
August	2,140	65	394	.947	1.09
September	1,140	42	159	.382	.43
The year	15,200	21	1,070	2.57	33.27

CANEY FORK NEAR ROCK ISLAND, TENN.

LOCATION.—At power house of Tennessee Electric Power Co., half a mile downstream from storage dam at mouth of Collins River and 1 mile northwest of Rock Island, Warren County.

DRAINAGE AREA.—1,640 square miles (measured on post-route map).

RECORDS AVAILABLE.—November 14, 1911, to September 30, 1923.

GAGE.—Bristol water-stage recorder on right bank, directly opposite power house and about half a mile downstream from Rock Island dam. This gage has been used since October 1, 1920. From January 1, 1917, to September 30, 1920, a Bristol water-stage recorder, known as gage No. 3, was located 100 feet downstream from power house. For description of gages used prior to January 1, 1917, see Water-Supply Paper 473.

DISCHARGE MEASUREMENTS.—Made from boat at section 1,800 feet below power house.

CHANNEL AND CONTROL.—Bed of stream above and below gage consists chiefly of solid rock; practically permanent.

EXTREMES OF DISCHARGE.—Maximum mean daily stage recorded during year, 14.2 feet February 3 (discharge, 36,300 second-feet); minimum discharge, 45 second-feet, represents leakage through dam and occurs during low-water season whenever power plant is shut down.

1911–1923: Maximum stage recorded, 13.2 feet April 2, 1912, at original gage at dam site (discharge, 107,000 second-feet); minimum discharge recorded, same as given above for 1923.

DIVERSION.—None.

REGULATION.—Considerable fluctuation caused by storage in reservoir and operation of plant.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 9,000 second-feet; extended above that point. Operation of water-stage recorder fairly satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by averaging discharge obtained by applying tri-hourly gage height to rating table, except for periods during which recorder did not operate. Records good except for extreme high stages for which they are fair.

COOPERATION.—Gage-height record furnished by Tennessee Electric Power Co.

Discharge measurements of Caney Fork near Rock Island, Tenn., during the year ending Sept. 30, 1923

[Made by P. P. Livingston]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec. ft.*
May 5	4.72	3,550	May 7	5.27	4,280	May 10	3.53	2,140
5	5.72	5,100	7	5.20	4,020	10	3.50	2,000
5	5.70	5,350	7	5.15	4,010	10	3.50	2,020
6	.04	183	7	5.10	4,060	10	4.44	2,960
6	.00	216	8	2.75	1,400	10	4.45	2,950
6	.30	292	8	2.75	1,410			

Daily discharge, in second-feet, of Caney Fork near Rock Island, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	45	450	481	4,360	12,800	4,850	3,290			2,310	1,380	1,480
2	420	400	716	6,700	24,600	3,280	1,530			1,430	1,450	313
3	442	360	2,480	5,200	36,300	2,880	1,530			693	2,090	722
4	420	200	7,620	4,310	29,800	3,180	2,140			1,140	1,590	801
5	438	45	7,290	4,190	22,500	2,930	5,780			2,110	610	1,740
6	560	400	4,230	1,970	15,600	8,240	6,090			1,310	1,450	1,810
7	225	420	2,480	3,960	11,100	33,200	4,460			749	1,050	2,710
8	45	410	2,380	2,630	7,950	24,200	3,540			1,500	1,640	3,240
9	431	402	2,250	2,280	5,690	16,100	2,620		2,630	1,620	3,680	2,110
10	420	396	4,420	3,650	6,720	9,780	2,550		2,390	1,090	3,020	1,630
11	442	45	4,080	981	7,150	16,700	1,970		1,300	1,050	1,940	1,390
12	442	45	3,470	3,000	6,390	32,600	2,210		3,240	1,160	2,900	1,240
13	448	409	2,290	1,640	21,600	19,000	2,930		3,890	1,030	6,390	1,060
14	232	402	3,210	1,510	27,000	11,600	11,400		1,990	571	15,800	991
15	45	409	20,000	4,750	15,600	7,860	9,390		2,160	483	3,890	946
16	522	352	30,000	4,920	11,100	16,500	5,440		1,910	1,090	1,720	99
17	488	375	21,000	4,860	6,870	20,400	4,160		1,180	1,760	1,080	1,140
18	516	335	19,000	3,070	6,350	14,700	3,240		1,970	6,340	3,220	953
19	500	269	10,000	3,980	3,840	12,400	2,680		1,520	4,270	2,900	781
20	475	280	6,540	3,020	3,290	11,300	2,140		1,020	2,540	3,260	759
21	210	405	4,660	5,140	2,810	7,110	2,200		1,070	1,390	2,670	599
22	45	365	4,140	8,760	2,810	6,390	2,570		1,210	843	2,170	269
23	548	375	3,450	9,880	2,600	13,700	2,050		937	1,670	1,480	45
24	518	420	2,800	12,100	1,770	17,900	1,850		1,020	1,590	1,300	573
25	442	232	1,500	9,880	1,620	13,500	1,670		1,200	1,770	867	461
26	465	90	2,330	6,240	2,680	8,080	2,120		972	1,790	1,230	497
27	481	448	2,020	6,940	2,910	6,190	1,650		2,980	1,680	1,410	611
28	255	425	4,370	11,900	5,290	4,190	1,060		11,800	1,320	3,660	790
29	45	431	6,880	10,600		4,260	2,610		4,600	1,600	4,440	251
30	500	65	3,730	9,830		3,590	4,410		2,280	1,810	2,310	45
31	475		4,450	15,600		2,740				2,220	2,320	

NOTE.—Recorder not operating Oct. 30, 31, Nov. 1–8, Dec. 15–19, Jan. 22–25, 28–31, Feb. 1, 2, Apr. 14, 15, and 30; discharge estimated on basis of records of discharge for Collins River near Rowland, Tenn, Gage out of order May 1 to June 8.

Monthly discharge of Caney Fork near Rock Island, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 1,640 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	560	45	372	0.227	0.26
November	450	45	322	.196	.22
December	30,000	481	6,270	3.82	4.40
January	15,600	981	5,740	3.50	4.04
February	36,300	1,620	10,900	6.65	6.92
March	33,200	2,740	11,600	7.07	8.15
April	11,400	1,060	3,380	2.06	2.30
June 9–30	11,800	937	2,420	1.47	1.20
July	6,340	483	1,670	1.02	1.18
August	15,800	610	2,740	1.67	1.92
September	3,240	45	1,000	.610	.68

CANEY FORK NEAR SILVER POINT, TENN.

LOCATION.—At Johnson's ferry on Silver Point-Smithville road, 4 miles south of Silver Point, Putnam County, 4 miles below mouth of Falling Water River.

DRAINAGE AREA.—2,100 square miles (93 per cent measured on topographic maps and 7 per cent measured on map compiled by United States Geological Survey, scale 1:500,000).

RECORDS AVAILABLE.—November 23, 1922, to September 30, 1923.

GAGE.—Staff gage in three sections on right bank at the ferry. The lower section is inclined and reads from 0.0 to 9.4 feet; the two upper sections (9.3 to 20.3 and 19.8 to 30.7 feet) are vertical and are attached to trees, near the lower section; read by John Crawford and J. M. Johnson. On March 7 a Bristol recorder having a 5-foot range in stage was installed 50 feet upstream from gage.

CHANNEL AND CONTROL.—Channel straight for 500 feet above and below gage. Bed composed of rock and coarse gravel. Left bank is high rock bluff; right bank subject to overflow at stages above 20 feet. Control is coarse gravel shoal 50 feet below gage; probably permanent.

DISCHARGE MEASUREMENTS.—Made from cable 25 feet upstream from gage or by wading.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 27.5 feet at 5 p. m. February 4 (discharge, 52,200 second-feet); minimum stage, 1.13 feet at 5.30 p. m. November 27 (discharge, 214 second-feet).

REGULATION.—The flow is regulated to a large extent by the Rock Island hydroelectric plant at Great Falls, 35 miles upstream, and to a slight extent by a small hydroelectric plant located on Falling Water River.

ICE.—Stage-discharge relation seldom affected by ice.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined between 200 and 30,000 second-feet; extended as a tangent above 30,000 second-feet. Gage read twice daily to hundredths. A Bristol recorder operated after March 7 shows that the regulation caused by power plants upstream comes in regular daily cycles, and that no serious error is introduced by using the mean of the two daily staff gage readings as the mean gage height for the day. The Bristol gage recorder was used only for checking staff gage readings, as its limited range of only 5 feet caused it to be out of commission a large part of the time. Daily discharge ascertained by applying to rating table the mean daily gage height obtained from staff gage readings. Records good.

Discharge measurements of Caney Fork near Silver Point, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 8	P. P. Livingston	1.72	440	Jan. 10	P. P. Livingston	4.10	2,510
10	do	1.88	509	11	do	4.91	3,390
14	do	1.13	220	Feb. 7	do	12.05	14,400
27	Hanson and Livingston	1.13	212	Mar. 7	do	17.99	29,400
Jan. 9	P. P. Livingston	2.84	1,270	10	do	9.05	9,220
9	do	3.14	1,470	Apr. 25	do	4.40	3,010
10	do	4.46	3,010	26	do	4.70	3,370
10	do	4.16	2,640	Aug. 3	Livingston and Clawson	2.94	1,330

Daily discharge, in second-feet, of Caney Fork near Silver Point, Tenn., for the year ending Sept. 30, 1923

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		265	5,140	21,800	5,400	2,580	5,140	9,360	2,250	2,360	1,620
2		622	5,790	13,500	5,010	2,690	4,620	6,620	2,690	1,420	1,520
3		1,330	5,920	31,500	2,140	1,720	2,580	5,400	1,330	1,330	475
4		6,340	3,880	51,000	3,520	4,000	3,040	3,880	1,100	2,250	765
5		8,560	4,360	32,200	3,280	6,200	3,040	3,760	2,030	1,420	975
6		5,270	4,000	18,100	4,880	9,200	4,120	1,920	2,360	475	2,250
7		4,880	1,420	14,300	22,000	7,760	2,580	4,120	1,420	1,620	1,820
8		2,250	4,360	12,500	27,100	7,040	3,520	4,620	1,150	622	4,620
9		3,160	2,140	11,400	13,100	5,270	3,040	3,880	2,800	5,140	2,580
10		3,520	3,040	10,500	9,840	4,490	3,880	3,160	1,420	4,120	1,330
11		5,400	3,400	11,800	13,900	4,620	2,250	2,580	1,520	2,470	1,620
12		3,640	1,330	9,680	40,800	4,490	2,800	2,920	1,330	2,800	1,420
13		3,640	3,520	19,200	35,500	3,160	9,040	3,880	1,620	5,400	1,330
14		2,140	1,200	41,000	16,400	9,200	19,400	4,120	1,240	10,300	1,240
15		8,080	3,160	20,800	9,360	15,100	9,520	1,520	848	14,900	1,200
16		44,000	3,880	11,800	13,900	9,200	6,760	3,400	560	5,660	1,200
17		29,000	3,880	9,360	26,300	7,920	6,620	1,920	2,920	4,120	380
18		33,500	3,640	6,620	17,200	6,620	5,400	1,060	6,340	4,360	1,150
19		17,000	2,250	5,920	11,200	5,140	5,010	2,580	5,790	11,400	1,150
20		8,240	3,160	3,400	10,500	5,010	5,530	1,420	3,040	6,900	1,280
21		6,620	3,040	4,240	7,760	4,000	5,660	1,420	1,520	4,360	1,200
22		3,880	8,240	2,800	7,600	4,120	7,320	1,420	1,380	2,140	805
23	402	3,880	14,300	3,160	9,840	3,880	5,920	1,330	805	2,250	340
24	380	3,760	15,100	3,400	19,700	3,640	4,620	1,060	1,620	1,620	300
25	402	2,800	13,700	1,720	16,600	2,690	4,360	1,100	1,620	1,520	265
26	340	1,920	9,520	2,800	9,680	2,920	5,140	1,620	1,820	1,100	265
27	235	2,250	6,060	3,640	9,520	4,120	6,480	1,380	1,620	1,620	530
28	402	2,250	14,100	4,490	6,760	2,140	11,400	9,520	1,380	1,620	590
29	450	6,200	18,800		5,140	3,160	11,600	6,620	1,150	6,060	805
30	450	6,060	11,000		3,880	6,200	10,500	3,760	2,250	2,030	450
31		4,120	19,000		4,620		11,900		1,100	2,920	

Monthly discharge of Caney Fork near Silver Point, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 2,100 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
November 23-30	450	235	383	0.182	0.05
December	44,000	265	7,570	3.60	4.15
January	19,000	1,200	6,530	3.11	3.58
February	51,000	1,720	13,700	6.52	6.79
March	40,800	2,140	12,700	6.05	6.98
April	15,100	1,720	5,280	2.51	2.80
May	19,400	2,250	6,220	2.96	3.41
June	9,520	1,060	3,380	1.61	1.80
July	6,340	560	1,940	.924	1.07
August	14,900	475	3,750	1.78	2.05
September	4,680	265	1,180	.562	.63

COLLINS RIVER NEAR ROWLAND, TENN.

LOCATION.—At Hennessee's iron highway bridge, 1 mile below Mountain Creek, 2½ miles northwest of Rowland, Warren County, 5 miles southwest of Rock Island, and 8 miles upstream, by river, from junction with Caney Fork.

DRAINAGE AREA.—800 square miles (measured by Tennessee Electric Power Co.)

RECORDS AVAILABLE.—April 1, 1916, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge at middle of second span from right bank; read by Joe Keathley. Sea-level elevation of zero of gage, 795.86 feet.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of rock, boulders, and sand. Channel fairly straight for a considerable distance above and below gage. Right bank is a steep rock bluff; left bank is low and subject to overflow above a stage of 8 feet. A series of rock and boulder riffles beginning just below bridge forms the control; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.92 feet at noon August 14 (discharge, 18,500 second-feet); minimum stage, 0.95 foot at 5 p. m. November 10 (discharge, 60 second-feet).

1916–1923: Maximum stage recorded, 16.67 feet April 2, 1920 (discharge, 34,000 second-feet); minimum stage, that of November 10, 1922, as given above.

High-water marks of flood of 1854 as reported by old residents indicate stage of 32.6 feet (estimated discharge, 82,200 second-feet). High-water marks of flood of 1902 indicates a stage of 27.2 feet (estimated discharge, 66,600 second-feet).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Small mills upstream probably cause some diurnal fluctuation.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 8,000 second-feet; extended above that point. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records below 11,300 second-feet are good; above that point only fair.

COOPERATION.—Gage-height record furnished by Tennessee Electric Power Co.

The following discharge measurement was made by P. P. Livingston:
May 11, 1923: Gage height, 2.36 feet; discharge, 1,230 second-feet.

Daily discharge, in second-feet, of Collins River near Rowland, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	111	83	140	2,050	4,470	1,700	1,200	1,470	2,920	550	595	640
2	135	75	219	2,410	3,180	1,470	1,140	1,250	2,170	487	460	568
3	120	69	2,410	1,930	12,000	1,360	1,140	1,090	1,820	426	469	523
4	111	75	3,720	1,580	14,100	1,250	1,470	1,140	1,470	982	443	586
5	145	95	2,780	1,470	6,930	1,140	3,180	1,250	1,580	880	375	880
6	115	111	1,930	1,200	4,940	1,820	3,180	1,700	1,700	604	327	735
7	130	155	1,250	1,140	3,870	8,610	2,410	1,360	1,700	688	735	1,040
8	201	107	1,040	1,250	3,870	5,800	2,050	1,580	1,820	505	880	1,930
9	177	91	982	1,140	3,720	3,580	1,820	1,580	1,700	1,040	1,470	1,090
10	183	66	1,820	982	3,870	2,540	1,360	1,360	1,300	688	1,040	782
11	150	95	1,820	930	3,870	4,320	1,300	1,200	1,300	595	1,090	688
12	130	75	1,360	830	3,440	10,200	1,200	1,470	1,820	460	1,140	568
13	103	155	1,040	735	11,200	5,980	1,930	5,980	1,820	426	2,920	487
14	107	103	1,200	735	10,000	3,580	5,800	4,320	1,420	409	13,300	418
15	83	130	10,500	1,090	4,940	2,660	4,160	2,780	1,140	375	4,160	375
16	145	145	16,000	1,420	3,310	5,800	2,920	2,920	930	550	1,930	351
17	140	145	10,200	1,200	2,540	9,520	2,290	2,410	982	1,580	1,420	311
18	130	155	9,520	1,040	2,050	4,620	1,930	1,820	982	2,410	1,250	295
19	79	130	4,320	982	1,820	3,310	1,700	1,470	688	1,820	982	319
20	115	177	2,780	1,040	1,580	2,920	1,470	1,930	631	1,090	982	303
21	120	103	2,050	1,360	1,470	2,410	1,470	3,720	586	782	830	311
22	83	120	1,420	3,040	1,300	2,170	1,580	3,310	523	622	688	281
23	107	130	1,360	3,720	1,140	4,320	1,420	2,170	541	604	640	246
24	125	111	1,200	4,780	1,090	6,540	1,420	1,700	514	523	604	260
25	140	111	982	3,720	982	4,320	1,300	1,580	496	1,700	532	253
26	115	103	930	2,780	1,090	3,180	1,140	1,820	496	735	496	327
27	95	189	830	2,290	1,470	2,410	1,040	3,440	688	523	478	327
28	99	111	1,700	4,160	1,930	2,050	1,090	4,940	2,050	505	2,290	295
29	75	140	2,540	3,720	-------	1,700	1,580	4,470	982	514	2,050	267
30	145	99	1,930	3,440	-------	1,580	1,930	4,940	688	688	1,090	213
31	125	-------	1,580	5,450	-------	1,360	-------	4,320	-------	595	782	-------

Monthly discharge of Collins River near Rowland, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 800 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	201	75	124	0.155	0.18
November	189	66	115	.144	.16
December	16,000	140	2,950	3.69	4.25
January	5,450	735	2,050	2.56	2.95
February	14,100	982	4,150	5.19	5.40
March	10,200	1,140	3,680	4.60	5.30
April	5,800	1,040	1,920	2.40	2.68
May	5,980	1,090	2,470	3.09	3.56
June	2,920	496	1,250	1.56	1.74
July	2,410	375	786	.982	1.13
August	13,300	327	1,500	1.88	2.17
September	1,930	213	522	.652	.73
The year	16,000	66	1,780	2.22	30.25

HARPETH RIVER AT BELLEVIEW, TENN.

LOCATION.—At county highway bridge on Harding Pike, a quarter of a mile south of Belleview, Davidson County, and 12 miles south of Nashville.

DRAINAGE AREA.—410 square miles (measured on map compiled by United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—April 11, 1920, to September 30, 1923.

GAGE.—Chain gage on downstream side of highway bridge; read by Ellis B. Jones. Previous to December 15, 1920, gage was vertical staff spiked to 18-inch tree on left bank about 40 feet below highway bridge.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Right bank steep and high and is not overflowed; left bank fairly steep up to 12 feet, then flat. Low-water control is well-defined shoal 700 feet below gage, composed of limestone and coarse gravel; may shift in extreme high water. High-water control not determined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.24 feet at 6 p. m. March 23 (discharge, 8,600 second-feet); minimum stage, —0.08 foot October 4, 5, 7, 8, 10, 18, and 21, when there was no flow.

1920–1923: Maximum stage recorded, 17.54 feet at 7 a. m. March 11, 1922 (discharge, 13,400 second-feet); no flow several days in October, 1922.

ICE.—Stage-discharge relation not affected by ice.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve fairly well defined below 8,000 second-feet; extended above that point. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except those for low stages which are fair.

Discharge measurements of Harpeth River at Belleview, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 16	Livingston and King	0.07	7.0	Aug. 9	Livingston and Clawson.	11.52	7,720
Jan. 26	P. P. Livingston	3.13	1,300	9	----do----	6.49	3,480

Daily discharge, in second-feet, of Harpeth River at Belleview, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2	6	14	570	1,720	520	520	450	705	92	36	54
2	2	6	185	595	1,470	472	450	365	450	88	30	74
3	1	4	570	495	6,750	428	428	405	345	80	21	62
4	0	2	595	345	4,310	345	2,630	760	285	76	21	46
5	0	2	705	385	2,500	325	7,200	1,290	250	76	232	570
6	1	28	545	472	1,980	930	2,240	815	285	76	115	815
7	0	20	285	285	1,590	6,210	2,170	570	268	72	72	178
8	0	26	185	250	1,530	2,040	1,170	870	285	97	60	2,630
9	1	20	305	232	1,290	1,410	930	595	232	325	6,840	450
10	0	9	215	215	2,430	990	760	365	182	130	815	385
11	2	11	215	185	1,050	5,430	595	325	1,290	76	305	268
12	1	9	160	172	990	6,480	495	285	1,230	64	200	155
13	1	11	170	158	2,240	2,980	1,470	345	545	45	3,750	125
14	4	6	160	152	1,590	1,780	2,560	325	345	56	930	115
15	7	15	2,040	250	1,230	1,350	1,410	405	268	48	450	106
16	5	13	1,410	285	1,050	6,660	990	3,750	215	45	305	99
17	1	74	2,700	215	815	2,770	815	1,290	172	39	250	82
18	0	42	1,980	185	650	1,720	705	930	162	1,910	345	78
19	1	38	1,050	172	595	1,290	545	705	128	160	232	70
20	1	27	760	168	520	1,050	495	545	108	88	103	66
21	0	24	545	268	472	930	650	760	108	76	122	58
22	2	16	450	815	365	4,630	1,050	365	103	72	128	46
23	2	14	365	930	325	8,100	650	325	99	76	99	36
24	4	16	325	4,870	405	4,470	1,720	250	90	72	132	39
25	4	12	285	1,980	520	2,300	705	268	1,050	68	95	36
26	6	12	250	1,350	450	1,530	495	385	142	170	88	33
27	11	11	215	1,170	405	1,290	450	495	95	88	84	33
28	9	10	1,050	2,910	870	1,050	405	930	305	64	80	27
29	9	12	650	1,590	-------	930	815	1,980	232	56	84	18
30	6	12	495	1,350	-------	705	650	1,290	112	52	88	26
31	6	-------	450	2,360	-------	595	-------	930	-------	42	64	-------

Monthly discharge of Harpeth River at Belleview, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 410 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	11	0	2.9	0.007	0.01
November	74	2	16.9	.041	.05
December	2,700	14	624	1.52	1.75
January	4,870	152	819	2.00	2.31
February	6,750	325	1,430	3.49	3.63
March	8,100	325	2,310	5.64	6.50
April	7,200	405	1,210	2.95	3.29
May	3,750	250	754	1.84	2.12
June	1,290	90	336	.820	.91
July	1,910	39	144	.351	.40
August	6,840	21	522	1.27	1.46
September	2,630	18	226	.552	.62
The year	8,100	0	696	1.70	23.05

RED RIVER NEAR ADAMS, TENN.

LOCATION.—At county highway bridge 1½ miles north of Adams, Robertson County, three-eighths mile below Louisville & Nashville Railroad bridge, and half a mile below mouth of Elk Creek.

DRAINAGE AREA.—678 square miles (average value on United States Geological Survey map, scale 1:500,000, and United States post-route map).

RECORDS AVAILABLE.—June 15, 1920, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge; read by J. T. Brooksher and Forest Jackson.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Right bank steep and not subject to overflow; left bank subject to overflow at gage height of about 28 feet. Control for low and medium stages is a solid rock shoal about 200 feet below gage; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 21.1 feet at 4.30 p. m. February 3 (discharge, 13,600 second-feet); minimum stage, 1.58 feet October 6, 14, and 29 (discharge, 71 second-feet).

1920–1923: Maximum stage recorded, that of February 3, 1923; minimum stage, 1.39 feet at 10.30 a. m. September 18, 1922 (discharge, 39 second-feet).

ICE.—Stage-discharge relation not affected by ice.

ACCURACY.—Stage-discharge relation changed during high water in January. Rating curve used October 1 to January 21 well defined below 5,000 second-feet and extended above; curve used January 22 to September 30 well defined below 13,000 second-feet. Gage read to hundredths once daily, oftener during high water. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Red River near Adams, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 17	P. P. Livingston	1.64	75.7	Feb. 3	P. P. Livingston	19.31	12,300
Nov. 2	do	1.52	54.6	3	do	20.17	12,600
Jan. 24	do	16.86	10,500	Aug. 10	Clawson and Livingston	5.80	2,500

Daily discharge, in second-feet, of Red River near Adams, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	95	88	85	685	6,140	1,380	1,670	740	960	440	595	515
2	90	82	110	740	6,140	1,240	1,530	650	710	330	490	515
3	85	82	125	685	12,600	1,170	1,530	622	595	330	350	515
4	80	90	280	658	9,160	1,100	1,820	650	540	290	1,380	490
5	73	98	580	580	5,060	1,530	5,560	622	830	290	4,120	710
6	71	100	630	530	3,980	3,110	3,400	622	595	515	2,390	1,380
7	80	95	1,030	530	3,260	6,420	2,820	568	710	372	2,180	830
8	74	88	1,340	485	2,750	3,540	2,390	540	540	310	2,030	830
9	80	75	1,090	440	2,610	2,680	2,030	465	490	270	1,600	650
10	85	85	910	440	2,680	2,390	1,740	465	395	252	2,900	515
11	90	90	712	395	2,540	3,470	1,530	465	1,100	235	1,740	490
12	82	95	530	375	2,250	8,730	1,380	440	770	228	1,310	418
13	78	100	485	355	7,790	4,980	2,180	440	568	214	7,220	395
14	71	110	485	580	5,850	3,330	4,340	490	490	200	8,440	350
15	77	245	1,990	1,990	3,110	2,820	3,540	515	440	188	2,820	310
16	84	186	1,220	1,220	2,770	10,200	2,820	568	595	176	2,250	290
17	90	120	910	910	2,440	10,500	2,180	515	830	960	3,540	290
18	82	125	1,030	712	2,100	4,050	1,960	490	595	770	9,590	270
19	75	125	795	685	1,820	3,110	1,740	440	440	465	3,900	270
20	80	105	712	658	1,740	2,820	1,530	395	372	310	2,540	1,030
21	85	100	605	7,430	1,530	2,390	1,380	372	290	270	1,890	895
22	85	80	555	11,000	1,460	4,550	1,380	350	310	228	1,820	595
23	95	85	508	7,860	1,380	7,290	1,100	330	540	200	2,100	395
24	90	80	462	9,950	1,240	9,160	1,240	310	372	440	1,530	1,600
25	88	75	418	4,980	1,100	4,980	1,100	350	350	2,250	1,240	310
26	75	80	395	4,190	1,460	3,470	960	568	330	650	1,030	290
27	90	85	395	3,760	1,960	3,110	895	740	310	418	830	270
28	80	90	485	4,980	1,530	2,610	830	770	1,460	330	830	252
29	71	80	462	3,980	-------	2,250	830	960	895	270	770	221
30	90	85	740	4,410	-------	2,100	830	1,670	515	218	710	214
31	95	-------	740	8,150	-------	1,890	-------	1,240	-------	200	595	-------

NOTE.—Gage not read Oct. 15, 16, and Feb. 16, 17; discharge interpolated.

Monthly discharge of Red River near Adams, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 678 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	95	71	82.8	0.122	0.14
November	245	75	101	.149	.17
December	1,990	85	671	.990	1.14
January	11,000	355	2,720	4.01	4.62
February	12,600	1,100	3,520	5.19	5.40
March	10,500	1,100	3,950	5.83	6.72
April	5,560	830	1,940	2.86	3.19
May	1,670	310	592	.873	1.01
June	1,460	290	598	.882	.98
July	2,250	176	407	.600	.69
August	9,590	350	2,410	3.55	4.09
September	1,600	214	537	.792	.88
The year	12,600	71	1,450	2.14	29.03

TENNESSEE RIVER BASIN

FRENCH BROAD RIVER AT BLANTYRE, N. C.

LOCATION.—At highway bridge 700 feet east of Blantyre railroad station, Transylvania County, 3 miles downstream from mouth of Little River.

DRAINAGE AREA.—296 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 11, 1920, to September 30, 1923.

GAGE.—Chain gage attached to downstream side of bridge; read by Mrs. A. B. Osborne.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Channel straight for several hundred feet above and below gage. Bed composed of sand and gravel, somewhat shifting. Both banks steep and about 15 feet above zero of gage subject to overflow which floods the wide cultivated bottoms. Low-water control formed by a rock ledge 1 mile below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.95 feet at 8 a. m. May 30, 1923 (discharge, 6,000 second-feet); minimum stage, 2.6 feet at 5 p. m. November 26, 1922 (discharge, 239 second-feet).

1920–1923: Maximum and minimum stages recorded, those of May 30, 1923, and November 26, 1922, as given above.

ICE.—None.

REGULATION.—Slight diurnal fluctuation noticeable during low-water periods is probably due to operation of small mills on tributaries.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 3,200 second-feet; extended above that point. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of French Broad River at Blantyre, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 7	L. J. Hall	2.94	301	Aug. 21	L. J. and W. E. Hall	4.19	587
June 15	W. E. Hall	6.09	1,090	21	W. R. King and W. E. Hall	4.20	571
23	L. J. Hall	5.56	967				

Daily discharge, in second-feet, of French Broad River at Blantyre, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	294	313	294	2,740	930	728	812	784	3,870	784	1,110	534
2	294	313	313	1,710	840	672	784	756	2,600	900	812	484
3	294	313	333	1,170	784	644	812	756	2,170	870	644	460
4	275	294	395	960	870	616	960	812	1,860	870	588	508
5	275	294	353	840	1,790	644	1,170	2,020	1,860	812	644	728
6	294	294	333	756	1,570	616	990	1,860	2,020	784	644	588
7	700	294	313	700	1,170	1,110	900	1,300	1,830	812	840	588
8	460	313	353	728	1,020	840	900	1,200	1,610	840	870	870
9	756	275	374	672	930	756	870	1,110	1,470	756	812	616
10	930	275	560	616	870	700	812	990	1,360	700	900	588
11	484	275	438	588	812	700	784	930	1,360	672	700	700
12	395	275	374	560	784	812	756	900	1,360	644	700	700
13	353	294	374	534	1,500	1,360	1,710	900	1,300	644	700	534
14	374	294	353	484	1,470	1,300	3,220	870	1,170	672	588	484
15	508	294	460	616	1,110	1,020	1,710	990	1,110	756	560	460
16	438	294	812	534	960	2,640	1,360	2,600	1,050	756	534	460
17	416	275	2,210	484	870	5,340	1,200	1,860	1,020	1,430	812	460
18	395	275	2,320	484	812	2,640	1,110	1,400	990	1,080	644	438
19	353	275	1,020	484	700	2,240	1,050	1,230	960	784	756	438
20	353	294	756	484	756	1,710	990	1,330	960	700	756	438
21	333	275	700	508	728	1,470	930	1,430	960	644	588	2,280
22	333	275	588	484	672	1,300	930	1,280	960	588	534	1,270
23	353	275	534	484	644	1,230	870	1,980	990	700	534	1,360
24	395	275	484	616	616	1,300	870	2,560	1,230	588	560	812
25	353	257	438	756	616	1,110	840	1,830	1,230	560	484	700
26	333	239	460	728	616	1,080	812	1,570	1,110	560	438	756
27	313	257	460	784	960	990	784	1,470	930	534	460	616
28	313	294	1,790	1,230	784	960	812	2,170	930	534	784	560
29	313	257	990	1,230	-------	900	900	4,690	870	700	812	534
30	313	275	756	960	-------	870	870	5,970	784	588	644	508
31	313	-------	784	1,020	-------	840	-------	5,620	-------	616	588	-------

NOTE.—Discharge for Dec. 31, Jan. 1, 2, Mar. 17, 18, May 16, Sept. 21 and 22 determined from mean daily gage height ascertained from graph constructed on basis of two daily gage readings.

Monthly discharge of French Broad River at Blantyre, N. C., for the year ending Sept. 30, 1923

[Drainage area, 296 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	930	275	397	1.34	1.54
November	313	239	283	.956	1.07
December	2,320	294	668	2.26	2.61
January	2,740	484	805	2.72	3.14
February	1,790	616	935	3.16	3.29
March	5,340	616	1,260	4.26	4.91
April	3,220	756	1,050	3.55	3.96
May	5,970	756	1,780	6.01	6.93
June	3,870	784	1,400	4.73	5.28
July	1,430	534	738	2.49	2.87
August	1,110	438	679	2.29	2.64
September	2,280	438	682	2.30	2.57
The year	5,970	239	890	3.01	40.81

49245—26†—WSP 563——9

FRENCH BROAD RIVER AT ASHEVILLE, N. C.

LOCATION.—At Bingham School concrete highway bridge, 1¼ miles below Smith Bridge, 2¼ miles below Southern Railway station at Asheville, Buncombe County, and 3 miles below mouth of Swannanoa River.

DRAINAGE AREA.—949 square miles at present site (measured on topographic maps). Drainage area for station at Smith Bridge, 941 square miles.

RECORDS AVAILABLE.—September 17, 1895, to December 31, 1901; January 1, 1905, to July 16, 1916, and January 1, 1917, to September 30, 1923. The records January 1, 1905, to September 30, 1922, were obtained at Smith Bridge 1¼ miles above.

GAGE.—Chain gage attached to bridge October 1, 1922; no relation to old gage attached to old bridge at same site because the flood of 1916 carried out the bridge and all bench marks; read by L. W. Roberson. For description of gages used prior to October 1, 1922, see Water-Supply Paper 523.

DISCHARGE MEASUREMENTS.—Made from Bingham School bridge.

CHANNEL AND CONTROL.—Bed of stream composed chiefly of rock; practically permanent. Control is a long shoal composed of rock boulders and gravel beginning about 50 feet below gage; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.30 feet, evening reading May 30 (discharge, 13,300 second-feet); minimum stage recorded, 0.68 foot from morning reading November 25 to morning reading November 27 (discharge, 610 second-feet).

1895–1901; 1905–1923: Maximum stage, 24.13 feet (Smith Bridge gage datum) July 16, 1916, determined by levels from flood marks November 21, 1917 (discharge not determined; stage-discharge relation probably affected by backwater caused by drift lodged against railroad bridge). Maximum stage recorded before or after the flood in July, 1916, 7.8 feet (Smith Bridge gage datum) January 23, 1906 (discharge, 25,800 second-feet). Minimum discharge, 380 second-feet September 16 and 20, 1907.

ICE.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—Negligible; see Swannanoa River at Biltmore, N. C.

REGULATION.—Slight diurnal fluctuation probably caused by small mills on tributaries.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 10,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of French Broad River at Asheville, N. C., during the years ending Sept. 30, 1921–1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1921		*Feet*	*Sec.-ft.*	1922		*Feet*	*Sec.-ft.*
Jan. 3	W. E. and L. J. Hall	1.89	2,170	Jan. 6	L. J. Hall	1.26	1,330
4	do	1.86	2,080	May 19	do	2.94	4,130
22	L. J. Hall	2.01	2,230	July 28	do	1.92	2,240
Apr. 19	do	2.70	3,600	Aug. 29	do	.90	857
June 17	W. E. Hall	2.08	2,380	Sept. 18	do	.70	629
July 2	L. J. Hall	1.49	1,600	1923			
4	do	1.60	1,730	Jan. 1	W. E. Hall	4.07	6,480
Sept. 24	do	1.05	1,070	Mar. 17	L. J. Hall	5.04	9,080
Oct. 24	do	.86	801	Apr. 20	do	1.81	2,060
Dec. 6	do	1.52	1,760	May 7	do	2.82	3,810
				21	do	2.51	3,220

NOTE.—Measurements made prior to the installation of the gage (Oct. 1, 1922) were referenced to a bench mark on the bridge and tied in to the gage datum later.

Daily discharge, in second-feet, of French Broad River at Asheville, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	674	718	800	5,860	2,160	1,640	1,770	1,770	7,300	1,580	1,900	1,060
2	630	707	860	4,600	2,030	1,510	1,770	1,640	5,860	1,900	2,030	990
3	620	707	925	2,620	1,900	1,440	1,640	1,770	4,600	1,900	1,440	990
4	610	707	860	2,160	2,160	1,380	1,640	3,200	3,600	1,640	1,380	990
5	610	707	990	1,900	4,400	1,380	2,030	6,800	3,600	1,770	1,440	1,060
6	610	707	860	1,640	4,800	1,440	2,030	5,420	3,400	1,770	1,380	1,180
7	1,250	685	800	1,640	3,600	2,800	1,900	3,800	3,400	1,900	2,030	1,640
8	1,320	685	740	1,770	2,460	2,160	1,770	5,000	3,000	1,770	1,640	1,770
9	2,030	685	925	1,510	2,160	1,770	1,770	2,620	2,620	1,640	1,510	1,380
10	2,300	663	1,440	1,440	2,030	1,640	1,770	2,300	2,620	1,510	1,640	1,120
11	1,380	663	1,180	1,380	1,900	1,770	1,640	2,160	2,620	1,440	1,510	1,510
12	1,120	663	1,060	1,320	1,900	1,640	1,640	2,030	2,620	1,440	1,510	1,510
13	860	663	1,060	1,250	2,160	2,160	2,300	2,030	2,800	1,640	1,510	1,180
14	925	707	990	1,250	3,200	3,000	5,860	2,160	2,300	1,770	1,250	1,120
15	1,120	707	1,320	1,250	2,160	2,300	4,000	2,030	2,160	1,770	1,180	990
16	1,060	696	1,770	1,180	1,900	4,600	2,800	5,200	2,160	2,300	1,060	925
17	990	696	4,600	1,180	1,900	8,940	2,620	4,400	2,030	2,800	1,060	925
18	860	696	6,080	1,180	1,770	7,300	2,300	3,200	2,030	2,300	1,770	925
19	860	674	3,400	1,120	1,770	5,000	2,160	2,620	1,900	1,770	1,640	860
20	800	674	2,030	1,120	1,580	4,000	2,030	2,620	1,900	1,510	1,380	860
21	800	652	1,640	1,180	1,510	3,400	2,030	3,000	1,900	1,440	1,320	5,000
22	740	652	1,440	1,120	1,510	2,800	1,900	2,460	1,900	1,380	1,120	4,000
23	740	630	1,250	1,120	1,510	2,620	1,900	3,200	1,900	1,250	1,180	2,160
24	925	630	1,180	1,380	1,440	2,620	1,900	5,640	2,300	1,320	1,250	1,640
25	860	610	1,120	1,770	1,380	2,460	1,770	4,400	2,800	1,250	1,120	1,440
26	860	610	1,120	1,900	1,380	2,300	1,770	3,400	2,160	1,250	990	1,320
27	800	620	1,060	1,900	1,770	2,160	1,770	3,000	2,030	1,180	990	1,250
28	800	696	2,160	2,300	1,900	2,030	1,640	2,800	1,900	1,180	1,060	1,120
29	740	718	2,160	2,460	-------	1,900	1,900	2,800	1,770	1,250	1,380	1,060
30	707	740	1,640	2,300	-------	1,900	1,900	8,940	1,640	1,440	1,320	990
31	718	-------	1,580	2,460	-------	1,770	-------	8,100	-------	1,320	1,120	-------

Monthly discharge of French Broad River at Asheville, N. C., for the year ending Sept. 30, 1923

[Drainage area, 949 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,300	610	946	0.997	1.15
November	740	610	679	.715	.80
December	6,080	740	1,580	1.66	1.91
January	5,860	1,120	1,850	1.95	2.25
February	4,800	1,380	2,160	2.28	2.37
March	8,940	1,380	2,700	2.85	3.29
April	5,860	1,640	2,130	2.24	2.50
May	8,940	1,640	3,560	3.75	4.32
June	7,300	1,640	2,760	2.91	3.25
July	2,800	1,180	1,630	1.72	1.98
August	2,030	990	1,390	1.46	1.68
September	5,000	860	1,430	1.51	1.68
The year	8,940	610	1,900	2.00	27.18

FRENCH BROAD RIVER NEAR NEWPORT, TENN.

LOCATION.—At highway bridge at Oldtown, on Newport–Morristown road, 2½ miles northeast of Newport, Cocke County, and 4 miles above mouth of Pigeon River.

DRAINAGE AREA.—1,860 square miles (revised).

RECORDS AVAILABLE.—September 4, 1900, to November 9, 1901; November 1, 1902, to December 31, 1905; August 16 to December 31, 1907; November 17, 1920, to September 30, 1923.

GAGE.—Chain gage bolted to downstream side of bridge, installed November 17, 1920, at independent datum as bench marks for gage used 1902–1907 had been destroyed; read by Frank Odell.

DISCHARGE MEASUREMENTS.—Made from five-span steel highway bridge at gage.

CHANNEL AND CONTROL.—Channel fairly straight for 500 feet above and below gage. Banks high and not subject to overflow. Bed of river composed of sand and gravel. Control is rock and gravel shoal 300 feet downstream; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.21 feet at 7 a. m. March 17 (discharge, 20,300 second-feet); minimum stage, 1.68 feet at 7 p. m. October 5 (discharge, 762 second-feet).

1900–1905; 1907; 1920–1923: Maximum stage recorded, 12.0 feet April 8, 1903 (discharge, 62,200 second-feet); minimum stage, 0.90 foot October 18, 1904 (discharge, 440 second-feet, revised).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—There are three or four medium sized water power plants above the station. As the regulating capacity of these plants is comparatively small, it is believed that the mean of two readings a day closely approximates the true mean for the day.

ACCURACY.—Stage-discharge relation permanent during the year. Rating curve well defined below 11,000 second-feet; extended above that point. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except those for low stages, which are fair.

Discharge measurements of French Broad River near Newport, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 12	P. E. Hanson	1.72	815	Feb. 21	P. E. Hanson	2.60	2,460
Feb. 12	do	3.32	4,460	June 4	P. P. Livingston	3.51	5,260
14	do	4.22	7,140	July 11	Warren Withee	2.35	1,920

Daily discharge, in second-feet, of French Broad River near Newport, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,120	956	956	6,250	6,600	2,380	2,620	2,990	10,200	2,160	1,940	1,450
2	865	956	1,250	9,310	4,950	2,160	2,500	2,620	8,500	2,160	2,990	1,360
3	910	972	2,990	5,580	5,910	2,160	2,380	2,380	5,910	2,380	2,380	1,360
4	820	940	2,500	3,770	6,960	2,050	2,500	2,270	4,950	2,380	2,160	1,450
5	776	972	2,050	3,120	6,960	2,160	2,860	2,620	4,610	2,160	1,840	1,450
6	850	988	2,160	2,620	9,730	2,270	3,240	2,860	4,320	2,160	3,770	1,450
7	940	1,040	1,640	2,380	6,600	11,500	2,740	6,960	4,610	2,500	3,240	1,640
8	1,450	972	1,360	2,500	5,260	6,600	2,500	4,610	4,040	2,500	2,990	2,050
9	1,740	988	1,540	2,620	4,950	4,320	2,500	4,320	3,770	2,270	2,380	1,940
10	3,120	972	1,840	2,270	4,950	3,500	2,380	3,770	3,240	2,160	3,370	1,740
11	2,620	956	2,270	2,050	5,580	4,610	2,270	3,240	3,370	1,940	2,740	1,450
12	1,740	880	1,940	1,940	4,320	4,950	2,270	3,120	3,500	2,050	2,270	2,050
13	1,450	895	1,740	1,840	5,910	4,610	2,380	3,370	3,500	2,270	2,500	1,840
14	1,240	956	1,640	1,840	5,910	5,580	5,910	3,500	3,240	4,040	2,380	1,540
15	1,180	925	5,260	2,380	5,260	4,950	6,600	3,240	2,990	2,740	1,940	1,200
16	1,360	1,150	5,260	2,380	4,040	4,320	4,610	5,580	2,740	2,620	1,640	1,080
17	1,450	1,070	5,910	2,160	3,500	19,000	3,770	7,330	2,740	6,250	1,540	1,150
19	1,360	956	11,900	2,050	3,240	14,100	3,500	5,260	2,620	4,040	1,540	1,150
19	1,170	940	6,600	1,940	2,620	9,730	3,240	4,040	2,500	2,990	1,940	1,150
20	1,080	925	3,770	1,940	2,740	7,710	2,990	3,770	2,500	2,380	2,160	1,130
21	1,040	865	2,860	1,840	2,500	5,910	2,740	4,320	2,380	2,050	1,740	1,270
22	1,080	850	2,380	1,840	2,270	4,950	2,620	4,040	2,500	1,840	1,740	5,260
23	1,040	865	2,050	1,740	2,160	4,610	2,620	4,610	2,500	1,740	1,940	3,120
24	1,120	805	1,840	2,500	2,050	5,260	2,990	9,730	3,120	1,740	2,620	2,500
25	1,270	850	1,840	3,240	1,940	4,320	2,990	7,330	3,770	1,840	1,840	2,050
26	1,220	850	1,740	3,370	2,050	4,040	2,620	5,260	3,500	1,640	1,640	1,640
27	1,050	820	1,640	3,370	2,270	3,770	2,500	4,610	2,860	1,540	1,450	1,540
28	1,000	988	1,740	5,910	2,740	3,370	2,620	4,320	2,990	1,640	1,360	1,450
29	972	910	3,240	4,610	-------	2,990	3,120	5,260	2,620	1,740	1,640	1,360
30	972	835	2,990	4,040	-------	2,860	3,370	14,600	2,380	2,050	1,940	1,250
31	1,000	-------	2,270	10,200	-------	2,740	-------	12,400	-------	2,050	1,740	-------

Monthly discharge of French Broad River near Newport, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 1,860 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	3,120	776	1,260	0.678	0.78
November	1,150	805	935	.503	.56
December	11,900	956	2,880	1.55	1.79
January	10,200	1,740	3,340	1.79	2.06
February	9,730	1,940	4,430	2.38	2.48
March	19,000	2,050	5,270	2.83	3.26
April	6,600	2,270	3,060	1.64	1.83
May	14,600	2,270	4,980	2.68	3.09
June	10,200	2,380	3,750	2.02	2.25
July	6,250	1,540	2,390	1.28	1.48
August	3,370	1,360	2,140	1.15	1.33
September	5,260	1,080	1,700	.914	1.02
The year	19,000	776	3,010	1.62	21.93

FRENCH BROAD RIVER AT DANDRIDGE, TENN.

LOCATION.—At steel highway bridge at Dandridge, Jefferson County, 23 miles by river below mouth of Nolichucky River.

DRAINAGE AREA.—4,450 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1918, to September 30, 1923. Gage-height records obtained by United States Weather Bureau since December 1, 1904.

GAGE.—Graduations painted on shoreward side, near downstream end, of second concrete pier from right end of bridge; read by W. L. Anderson.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed of stream at gage composed of silt and rock; shifting. Control is a series of mill dams and rock dikes across the three channels into which the river divides 1 mile below station. The dikes are in very poor repair and are subject to change at each flood. Right bank high; left bank is subject to overflow at stages above 12 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.2 feet, crest on March 17 (discharge, 43,900 second-feet); minimum discharge, 1,200 second-feet December 2.

1918–1923: Maximum stage recorded, 18.7 feet during night of April 2, 1920 (discharge not determined); minimum stage, 0.1 foot October 10–12, 1918 (discharge, 830 second-feet). The highest known flood reached a stage of 28.0 feet May 21, 1901, according to records of the United States Weather Bureau.

ICE.—Stage-discharge relation not affected by ice.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined between 2,000 and 30,000 second-feet; extended beyond those limits. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table from October 1 to November 30 and May 1 to September 30, and by the indirect method for shifting control from December 1 to April 30. Records below 30,000 second-feet fair, above that stage subject to considerable error on account of lack of definition of rating curve. Discharge for individual days may be in error on account of poor location of gage for observations.

COOPERATION.—Gage-height record furnished by the United States Weather Bureau.

Discharge measurements of French Broad River at Dandridge, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 12	P. E. Hanson	0.34	1,850	Feb. 22	P. E. Hanson	2.46	6,700
Feb. 11	do	4.90	16,400	June 2	P. P. Livingston	4.32	15,300

Daily discharge, in second-feet, of French Broad River at Dandridge, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,200	1,980	1,980	5,620	23,600	6,240	6,560	8,220	21,700			3,640
2	2,200	2,200	1,200	24,100	16,500	5,620	5,930	6,240	15,600			3,130
3	1,770	2,200	2,200	17,000	16,500	5,320	5,930	6,240	12,700			2,650
4	2,200	2,200	5,930	9,640	28,800	5,320	5,930	6,240	10,400			2,890
5	1,770	1,980	5,320	8,920	23,600	5,020	5,930	5,930	8,920			3,380
6	1,980	2,200	5,320	5,620	25,100	5,320	7,540	9,640	9,640			3,130
7	1,770	1,570	5,020	5,620	21,200	31,900	8,570	16,500	9,640			3,130
8	1,980	2,200	3,900	5,320	13,100	29,800	6,560	11,100	8,920			3,380
9	2,890	2,200	3,640	5,620	13,100	17,000	5,930	9,640	8,920			3,900
10	2,420	1,980	3,640	5,620	13,100	11,900	5,930	8,920	8,220			3,380
11	5,320	1,980	5,620	5,020	11,500	12,700	5,930	8,220	7,540			3,640
12	5,020	1,980	5,320	5,020	14,300	19,800	5,620	7,210	6,880			2,890
13	3,380	1,980	4,450	4,730	18,400	17,000	5,620	7,880	8,920			3,640
14	2,650	1,380	3,900	4,730	31,400	17,000	8,570	8,920	7,540			2,890
15	2,200	1,980	7,210	4,450	22,100	15,200	13,100	8,920	6,880			2,650
16	2,200	2,420	26,100	4,450	14,800	14,300	10,800	9,640	6,240			2,650
17	2,650	2,420	17,400	5,620	12,300	37,300	8,570	16,500	5,930			2,420
18	2,420	2,200	35,200	5,320	10,800	34,600	8,570	13,500	5,620			2,200
19	2,420	2,200	22,100	5,020	10,000	26,700	7,880	10,800	5,930			2,200
20	2,200	2,200	13,900	5,320	6,880	22,600	6,880	8,920	5,930			2,200
21	2,200	1,980	7,880	5,320	6,880	17,000	5,930	8,920	5,320			2,420
22	1,980	1,980	6,560	5,320	6,240	13,500	5,930	10,400	5,320			2,650
23	1,980	1,980	5,620	5,620	5,930	11,900	5,620	10,400	5,620			6,240
24	1,980	1,980	5,020	10,800	5,620	17,000	7,540	17,900	5,320			5,620
25	2,650	1,980	4,730	8,920	5,320	15,200	6,880	18,800	6,880			4,730
26	2,420	1,770	4,730	8,920	5,020	12,700	5,930	13,500	7,880			3,380
27	2,420	1,980	4,450	8,220	5,020	9,640	5,620	10,400	7,540			3,380
28	2,200	1,570	4,450	11,100	5,930	8,920	5,620	8,920	8,220			2,890
29	2,200	1,570	5,620	24,100		7,540	5,930	8,920	8,220			2,650
30	2,200	1,770	6,560	17,000		7,210	8,570	25,600	6,240			2,420
31	1,980		5,620	24,100		6,560		27,700				

NOTE.—No gage-height record for July and August.

Monthly discharge of French Broad River at Dandridge, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 4,450 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	5,320	1,770	2,450	0.551	0.64
November	2,420	1,380	2,000	.449	.50
December	35,200	1,200	7,760	1.74	2.01
January	24,100	4,450	8,780	1.97	2.27
February	31,400	5,020	14,000	3.15	3.28
March	37,300	5,020	15,100	3.39	3.91
April	13,100	5,620	7,000	1.57	1.75
May	27,700	5,930	11,300	2.54	2.93
June	21,700	5,320	8,290	1.86	2.08
September	6,240	2,200	3,210	.721	.80

TENNESSEE RIVER AT KNOXVILLE, TENN.

LOCATION.—At Gay Street Bridge in Knoxville, Knox County, 4 miles below junction of French Broad and Holston rivers.

DRAINAGE AREA.—8,990 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 17, 1899, to December 31, 1912, and October 1, 1918, to September 30, 1923. Gage-height records obtained by United States Weather Bureau since February 1, 1883, but prior to 1899 records were not continuous.

GAGE.—Vertical staff, graduated to feet and tenths, bolted to shoreward side near downstream end of second stone pier from right end of bridge; used since January 1, 1909. Elevation of zero of gage, 797.45 feet above mean sea level. A history of earlier gages is given in Water-Supply Paper 323.

DISCHARGE MEASUREMENTS.—Made from downstream side of Gay Street Bridge

CHANNEL AND CONTROL.—Bed of stream below gage composed principally of rock and coarse gravel. Several rock dikes were constructed by the United States Army Engineers during and prior to 1918.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.8 feet at 7 a. m. February 5 (discharge, 92,600 second-feet); minimum stage, −0.2 foot November 12–15, 26, 27, 29, 30, and December 1 (discharge, 3,030 second-feet).

1900–1912; 1919–1923: Maximum stage recorded, 36.4 feet at 5 p. m. March 1, 1902 (discharge, 197,000 second-feet); minimum discharge, 1,600 second-feet October 5–7, 1903.

The United States Weather Bureau reports a maximum stage of 44.4 feet March 10, 1867, which is the highest stage known.

ICE.—Stage-discharge relation not affected by ice.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 110,000 second-feet; extended as a tangent above that point. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good, although daily discharge for individual days may be in error due to infrequency of gage readings and poor location of the gage for observation.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Tennessee River at Knoxville, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 4	Duncan Charlton	0.00	3,390	Feb. 26	P. E. Hanson	2.86	12,100
5	do	−.10	3,120	June 1	Livingston and Withee	5.66	27,800
Nov. 9	P. E. Hanson	−.09	3,140	14	P. E. Hanson	7.94	40,400

Daily discharge, in second-feet, of Tennessee River at Knoxville, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3,380	3,380	3,030	11,400	51,800	13,400	15,800	14,200	23,800	10,200	8,050	7,090
2	3,380	3,380	3,560	23,800	47,700	13,400	14,200	14,200	23,200	9,260	8,820	7,390
3	3,380	3,560	6,810	38,500	46,000	12,700	13,400	12,700	19,800	8,050	9,740	5,590
4	3,380	3,380	8,050	24,200	81,800	12,700	12,700	12,000	18,300	10,800	9,740	5,750
5	3,200	3,380	8,050	19,800	92,600	12,000	13,400	10,800	14,200	10,800	7,710	5,900
6	3,200	3,200	7,710	16,600	68,600	10,800	14,200	10,800	13,400	10,200	10,200	6,060
7	3,200	3,200	8,050	13,400	51,800	45,400	16,600	19,300	13,400	8,050	14,200	6,300
8	3,380	3,200	8,050	12,700	41,900	61,400	15,000	18,300	13,400	8,050	15,800	6,300
9	3,380	3,380	8,420	13,400	32,300	56,000	13,400	13,400	12,700	11,400	12,700	7,090
10	4,310	3,200	8,420	15,000	30,000	31,100	13,400	13,400	12,700	10,200	12,000	6,550
11	5,140	3,200	11,400	13,400	27,800	32,300	12,700	12,700	12,000	9,260	11,400	5,360
12	8,050	3,030	13,400	12,000	33,900	49,500	12,000	12,000	11,400	8,050	12,700	5,360
13	7,710	3,030	12,000	10,800	44,800	40,200	10,800	12,700	12,700	7,390	12,000	5,360
14	5,590	3,030	9,260	9,740	69,800	34,500	15,000	14,200	32,800	8,050	12,700	5,140
15	4,920	3,030	17,800	10,200	75,200	30,600	22,400	13,400	44,300	9,260	16,600	4,920
16	4,120	3,380	49,500	13,400	51,800	28,900	21,000	16,600	22,800	8,820	11,400	4,710
17	3,930	3,560	59,600	15,800	31,700	51,800	17,200	21,400	15,000	8,420	8,050	4,710
18	4,310	3,380	66,200	13,400	25,800	72,200	15,000	23,800	12,700	18,300	7,710	3,930
19	4,310	3,380	56,600	11,400	21,400	63,800	13,400	21,000	12,700	21,400	7,390	4,310
20	4,120	3,560	34,500	10,800	19,800	47,700	13,400	16,600	11,400	19,800	7,390	4,310
21	3,930	3,380	21,000	10,800	18,300	40,800	12,700	19,300	10,200	15,800	7,390	4,510
22	3,560	3,380	17,200	12,000	17,800	28,900	12,000	18,300	8,820	8,050	7,090	4,710
23	3,380	3,380	13,400	13,400	15,800	30,600	10,800	14,200	12,000	7,710	7,090	10,200
24	3,200	3,200	11,400	22,800	13,400	39,100	15,800	19,800	12,000	7,090	8,050	10,200
25	3,200	3,200	10,800	26,200	12,700	34,500	12,700	25,800	11,400	7,090	8,820	8,050
26	3,740	3,030	9,740	21,400	11,400	30,600	11,400	23,800	12,700	7,090	12,000	6,550
27	3,930	3,030	8,420	18,300	12,700	24,200	10,800	19,800	12,700	6,810	7,710	5,820
28	3,740	3,200	8,050	33,900	13,400	22,000	10,200	18,300	15,800	7,090	7,090	5,360
29	3,380	3,030	8,050	60,800	-------	20,200	12,700	14,200	13,400	7,390	7,090	4,920
30	3,380	3,030	10,800	59,600	-------	18,300	14,200	18,300	13,400	7,090	6,550	4,920
31	3,380	-------	10,200	51,200	-------	17,200	-------	23,800	-------	7,090	6,810	-------

NOTE.—Gage readings doubtful Sept. 4 and 5; discharge interpolated.

Monthly discharge of Tennessee River at Knoxville, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 8,990 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	8,050	3,200	4,040	0.449	0.52
November	3,560	3,030	3,260	.363	.40
December	66,200	3,030	17,100	1.90	2.19
January	60,800	9,740	20,600	2.29	2.64
February	92,600	11,400	37,900	4.22	4.39
March	72,200	10,800	33,100	3.68	4.24
April	22,400	10,200	13,900	1.55	1.73
May	25,800	10,800	16,700	1.86	2.14
June	44,300	8,820	15,800	1.76	1.96
July	21,400	6,810	9,810	1.09	1.26
August	16,600	6,550	9,740	1.08	1.24
September	10,200	3,930	5,910	.657	.73
The year	92,600	3,030	15,600	1.74	23.44

TENNESSEE RIVER AT LOUDON, TENN.

LOCATION.—At Huffs Ferry, half a mile northwest of Loudon, Loudon County, 5 miles by river below Southern Railway bridge over Tennessee River at Loudon, and 15 miles below mouth of Little Tennessee River.

DRAINAGE AREA.—12,300 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1922, to September 30, 1923. Daily gage height record obtained by United States Weather Bureau at a gage on Southern Railway bridge, 5 miles upstream, since February 26, 1884.

GAGE.—Staff gage in four sections on right bank, installed November 4, 1922; read by A. T. Hedrick. Inclined section, 1.0 foot to 14.9 feet, consists of a 6 inch by 6 inch timber bolted to 2 inch by 4 inch stakes resting on 4 inch by 6 inch sills set 3 feet in ground, about 100 feet upstream from ferry cable; section 14.3 to 26 feet is vertical timber spiked to 36-inch sycamore tree, 15 feet below inclined section; section 26 to 32 feet is vertical timber attached to large tree beside road, 40 feet upstream from inclined section; section 32 to 40 feet is vertical timber attached to ferry pole.

DISCHARGE MEASUREMENTS.—Made from car suspended from Huffs Ferry cable or from a boat.

CHANNEL AND CONTROL.—Channel slightly curved above and below gage. Banks subject to overflow during high stages. Control for low and medium stages is a rock and gravel shoal and artificial dike at head of Sweetwater Island, 2½ miles below gage. High-water control not determined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.5 feet at 6 a. m. December 18 (discharge, 106,000 second-feet); minimum stage, 1.75 feet at 5 p. m. November 27 and 6 a. m. November 30 (discharge, 4,210 second-feet).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Low-water flow affected somewhat by regulation of Little Tennessee River at Cheoah dam.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 60,000 second-feet; extended above that point. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good below 60,000 second-feet; fair above that point.

Discharge measurements of Tennessee River at Loudon, Tenn., during the year ending Sept. 30, 1923

[Made by P. E. Hanson]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Nov. 5	1.99	5,260	Jan. 10	5.04	21,600	June 12	5.40	23,900
20	1.96	5,600	Feb. 27	4.97	20,100			

49245—26†—WSP 563——10

Daily discharge, in second-feet, of Tennessee River at Loudon, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept
1		5,520	4,640	20,500	68,600	22,800	23,900	24,500	48,400	18,300	13,000	10,000
2		5,300	5,080	35,800	62,000	21,600	22,200	23,900	38,900	16,200	15,600	10,000
3		4,860	11,500	45,800	61,400	20,000	21,600	21,600	32,800	15,100	16,700	9,020
4		5,080	20,000	38,300	91,300	18,300	21,600	20,000	29,200	14,600	14,000	8,540
5		5,300	16,700	28,000	103,000	18,800	25,000	18,300	26,200	17,800	13,500	10,500
6		4,860	14,000	23,300	99,800	18,800	25,600	18,300	25,000	16,200	13,000	9,020
7		5,080	13,500	20,500	75,000	58,800	25,000	23,300	23,300	15,100	17,200	10,000
8		5,080	14,000	19,400	61,400	77,600	24,500	26,200	23,300	16,200	20,500	10,000
9		4,860	14,000	19,400	52,300	68,600	23,900	25,000	22,200	17,200	20,500	9,500
10		4,860	16,200	20,500	45,800	48,400	21,600	22,200	20,500	15,600	17,200	8,540
11		4,860	18,300	20,000	47,100	42,700	20,500	20,500	19,400	15,100	17,200	9,020
12		4,420	19,400	17,800	46,400	61,400	19,400	19,400	23,300	14,000	17,200	9,020
13		4,420	18,800	16,200	57,500	57,500	21,000	21,600	29,800	13,000	16,700	8,060
14		4,640	15,600	15,100	86,800	54,200	37,000	25,000	31,600	14,000	17,800	8,060
15		4,420	27,400	16,700	86,100	47,800	37,700	23,300	49,700	16,200	20,500	8,060
16	5,820	4,860	77,600	18,800	71,800	46,400	34,600	31,000	37,700	14,600	16,700	7,580
17		5,740	70,500	21,600	49,000	77,600	29,200	40,800	25,000	15,100	14,000	7,120
18		5,520	103,000	20,000	38,300	87,400	25,600	37,000	21,000	21,000	13,000	7,580
19		5,300	73,800	17,800	33,400	83,500	23,900	33,400	18,800	28,000	13,500	6,660
20		5,080	54,200	16,200	30,400	67,900	22,800	29,200	17,800	20,500	12,500	7,120
21		5,520	37,200	16,700	27,400	56,800	21,600	32,200	16,700	16,200	11,500	7,120
22		5,080	26,200	17,800	25,600	47,800	21,600	28,600	16,700	14,000	12,000	6,660
23		5,300	21,600	21,600	23,900	47,800	20,000	32,200	17,200	15,600	11,500	8,060
24		5,080	18,300	44,600	22,200	55,600	24,500	38,900	17,800	13,000	12,500	13,000
25		4,860	16,700	48,400	20,500	52,300	26,200	43,300	17,800	12,500	13,000	12,500
26		4,640	15,100	37,000	20,000	45,800	22,200	40,200	19,400	12,500	15,600	11,000
27		4,420	14,600	32,200	21,000	38,900	20,000	34,600	18,800	12,000	13,000	9,020
28		4,860	14,000	46,400	23,900	34,000	19,400	30,400	22,200	12,000	12,000	8,540
29		4,860	16,700	68,600	-------	30,400	21,600	29,800	23,900	14,000	11,500	7,580
30		4,640	15,600	72,400	-------	28,000	23,900	33,400	21,600	14,000	10,500	7,580
31		-------	17,200	69,200	-------	25,600	-------	53,000	-------	13,000	10,000	-------

NOTE.—Mean discharge, Oct 1-31, determined from records of flow at Knoxville and Chattanooga, and the records obtained on intervening tributaries. Discharge, Nov. 1-3, determined by use of readings from United States Weather Bureau gage.

Monthly discharge of Tennessee River at Loudon, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 12,300 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	-------	-------	5,820	0.473	0.55
November	5,740	4,420	4,980	.405	.45
December	103,000	4,640	26,500	2.15	2.48
January	72,400	15,100	29,900	2.43	2.80
February	103,000	20,000	51,900	4.22	4.39
March	87,400	18,300	47,200	3.84	4.43
April	37,700	19,400	24,300	1.98	2.21
May	53,000	18,300	29,100	2.37	2.73
June	49,700	16,700	25,200	2.05	2.29
July	28,000	12,000	15,600	1.27	1.46
August	20,500	10,000	14,600	1.19	1.37
September	13,000	6,660	8,820	.717	.80
The year	103,000	4,420	23,500	1.91	25.96

TENNESSEE RIVER AT CHATTANOOGA, TENN.

LOCATION.—At Walnut Street Bridge in Chattanooga, Hamilton County, 3 miles above mouth of Chattanooga Creek, 4 miles below mouth of South Chicamauga Creek, and 33 miles upstream from Hales Bar dam.

DRAINAGE AREA.—21,400 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 1, 1874, to October 21, 1913; March 1, 1915, to September 30, 1923.

GAGES.—Four gages were used during the year. Two of these, 7 miles apart, are set to the same datum and are used to determine variation in slope of water surface caused by operation of power plant and locks at Hales Bar dam, as the station is within influence of backwater from the dam. The other two gages are at Hales Bar dam and are used to determine discharge at Chattanooga for the periods during which flashboards are in place on the dam, as the slope method does not give consistent results during those periods. Gage No. 1 (United States Weather Bureau gage) consists of a sloping section of railroad rail bolted to rocks, and a vertical timber attached to the rock cliff on left bank about 200 feet upstream from Walnut Street Bridge; elevation of zero 620.8 feet above mean sea level. A Fulton long-distance recording gage operates in connection with gage No. 1; the recorder is in the United States Weather Bureau Office. Gage No. 2 is a chain gage on the Cincinnati Southern Railroad bridge, 7 miles above Chattanooga, installed Janury 5, 1921, to replace the vertical staff which had been used prior to October 1, 1918; read by Walter Ashworth and J. F. Skillern. Gage No. 3 is a Bristol seven-day recorder, on lower lock wall on right bank at Hales Bar dam, zero of which is 588.7 feet above mean sea level; inspected by R. J. Hoge. Gage No. 4 is a Bristol 24-hour recorder situated on upper lock wall on right bank at Hales Bar dam; inspected by employees of Tennessee Electric Power Co. Gages Nos. 3 and 4 were not used in computations of discharge prior to October 1, 1921.

DISCHARGE MEASUREMENTS.—Made from downstream footway of Walnut Street Bridge. Discharge measurements at Hales Bar dam are made from a boat one-fourth mile downstream from dam.

CHANNEL AND CONTROL.—Channel practically permanent. Control now formed by Hales Bar lock and dam. Control for gage No. 3 is rock and gravel shoal one-fourth mile below dam; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 32.1 feet February 7 (discharge, 188,000 second-feet); minimum discharge, 6,780 second-feet November 13.

1874–1923: Maximum stage recorded, 54.0 feet at 7 a. m. March 1, 1875 (discharge, 361,000 second-feet); minimum stage, zero on gage September 11–14, 1881, and September 19, 1883 (discharge, 4,800 second-feet).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Flow during low stages is regulated to a large extent by operation of power plant at Hales Bar dam.

ACCURACY.—Stage-discharge relation affected by changes in slope of water surface caused by operation of power plant at Hales Bar dam and by rising and falling stages. Discharge December 15 to July 27 determined by slope method, the normal rating curve being well defined between 11,500 and 370,000 second-feet. Slope determined from mean of two daily gage readings from gage No. 2, and the gage height at Chattanooga obtained from recorder graph corrected by the daily morning reading from gage No. 1 From December 15–31 morning readings from gage No. 1 were used. Discharge October 1 to December 14, and July 28 to September 30, when

3-foot flashboards were on Hales Bar dam, ascertained by applying the mean gage heights from gage No. 3 (obtained by inspection of recorder graph) to a rating table determined by measurements below the dam after reducing the measured discharge by 2 per cent to give flow at Chattanooga. Rating curve for gage No. 3 is well defined between 8,000 and 17,000 second-feet. Daily discharge thus obtained is corrected for changes in pool level, as determined from the difference between the midnight readings of gage No. 4, to give the unregulated flow at Chattanooga. Records fair.

COOPERATION.—Gage-height record for gage No. 1 furnished by United States Weather Bureau. Gage heights for gages Nos. 3 and 4 furnished by Tennessee Electric Power Co.

Discharge measurements of Tennessee River at Chattanooga, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 10	King and Withee	7.97	9,700	Mar. 15	Livingston and Hanson	20.18	93,800
Nov. 13	Duncan Charlton	7.65	6,940	July 27	Duncan Charlton	7.10	20,100

Discharge measurements of Tennessee River at Hales Bar dam, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
Oct. 20	Withee, Bigwood, and Hanson	*Feet* 2.23	*Sec.-ft.* 10,200	Nov. 8	King, Bigwood, and Charlton	*Feet* 1.75	*Sec.-ft.* 8,360

Daily discharge, in second-feet, of Tennessee River at Chattanooga, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9,000	8,020	7,380	31,000	134,000	41,000	45,000	43,800	86,200	41,000	22,000	14,800
2	9,000	7,710	7,680	37,100	136,000	39,500	41,300	47,800	80,200	33,500	22,700	14,300
3	8,020	7,410	10,400	54,000	118,000	38,600	39,500	48,500	66,000	30,000	23,300	14,500
4	8,670	7,740	18,600	63,200	136,000	35,600	38,600	42,700	55,600	29,400	23,400	13,900
5	8,340	7,740	28,100	61,300	156,000	33,500	46,000	38,300	49,000	26,500	21,900	14,700
6	8,340	7,110	26,700	50,200	178,000	32,200	52,100	34,900	44,600	26,100	18,900	14,300
7	8,020	7,110	22,200	41,300	188,000	55,700	52,200	34,300	42,800	27,100	21,200	15,400
8	8,670	7,410	21,300	35,700	141,000	112,000	48,900	34,700	42,100	26,500	23,500	15,400
9	9,000	7,410	21,000	33,200	109,000	130,000	45,400	41,900	41,400	29,600	28,100	14,300
10	10,000	8,020	22,600	33,200	96,600	120,000	43,300	41,800	37,000	29,000	30,400	14,300
11	9,340	7,110	23,200	32,700	85,300	96,800	40,000	38,300	35,800	27,000	27,800	15,000
12	9,000	7,710	27,500	33,200	82,400	95,500	37,100	34,400	38,300	24,600	25,300	15,100
13	9,000	6,780	28,900	31,200	91,400	124,000	38,200	34,700	47,100	23,200	25,200	14,400
14	11,700	6,820	28,600	28,600	115,000	112,000	55,200	43,200	51,200	22,100	25,400	14,000
15	14,000	7,440	41,300	26,000	137,000	97,600	78,400	52,100	44,700	22,400	24,300	12,800
16	11,100	8,020	70,300	26,200	145,000	94,800	78,600	53,200	72,400	23,600	27,100	13,200
17	9,680	8,020	124,000	29,700	114,000	109,000	72,000	73,000	72,700	24,400	27,100	12,100
18	10,000	7,690	141,000	34,000	91,700	135,000	60,800	75,800	62,800	38,600	23,800	11,100
19	8,340	8,670	164,000	35,000	68,500	141,000	50,900	66,000	41,000	43,000	23,800	11,800
20	8,670	8,670	134,000	31,400	62,000	136,000	48,500	62,500	35,000	43,500	22,800	11,400
21	8,670	8,670	102,000	29,800	54,000	119,000	44,100	66,000	31,500	37,300	21,600	10,800
22	8,670	8,670	67,500	30,100	48,100	98,700	44,700	63,500	29,100	28,300	19,200	11,500
23	9,020	8,010	52,400	40,700	43,100	91,800	39,400	58,200	26,300	23,200	17,800	12,000
24	8,020	8,040	39,500	76,900	39,800	94,100	37,600	60,800	26,000	24,000	20,100	10,300
25	8,340	7,690	32,800	109,000	37,100	102,000	40,200	77,900	30,200	22,600	22,500	11,700
26	9,000	7,690	28,400	101,000	33,800	98,600	44,800	79,900	36,800	20,600	18,600	14,300
27	9,340	7,410	25,400	83,200	34,600	95,200	37,900	77,700	33,200	18,200	18,600	16,300
28	8,340	7,410	25,500	70,800	37,400	79,200	35,000	78,300	33,800	20,200	19,400	14,400
29	9,000	7,710	26,400	89,400	-------	65,500	34,400	74,600	45,800	25,200	19,400	13,900
30	8,670	8,040	29,900	109,000	-------	57,000	39,500	72,000	47,300	25,000	17,900	12,100
31	7,410	-------	28,800	131,000	-------	49,900	-------	74,600	-------	25,800	16,200	-------

Monthly discharge of Tennessee River at Chattanooga, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 21,400 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	14,000	7,410	9,110	0.426	0.49
November	8,670	6,780	7,730	.361	.40
December	164,000	7,380	46,000	2.15	2.48
January	131,000	26,000	52,200	2.44	2.81
February	188,000	33,800	96,900	4.53	4.72
March	141,000	32,200	88,100	4.12	4.75
April	78,600	34,400	47,000	2.20	2.46
May	79,900	34,300	55,700	2.60	3.00
June	86,200	26,000	46,200	2.16	2.41
July	43,500	18,200	27,800	1.30	1.50
August	30,400	16,200	22,600	1.06	1.22
September	16,300	10,300	13,500	.631	.70
The year	188,000	6,780	42,400	1.98	26.94

TENNESSEE RIVER AT FLORENCE, ALA.

LOCATION.—At Southern Railway bridge at lower end of Pattons Island, just below foot of Little Muscle Shoals, 1 mile south of Florence, Lauderdale County.

DRAINAGE AREA.—30,800 square miles.

RECORDS AVAILABLE.—November 7, 1871, to September 30, 1923; gage heights only prior to October 1, 1894.

GAGE.—Rod gage consisting of 4 sections of steel, three-eighths inch by 7¼ inches, attached to right face of stone draw pier, which has batter of 1 inch to the foot. These sections form one continuous gage, graduated from −1.92 to 33.5 feet; read by R. E. Coburn. Zero of gage is 400.85 feet above sea level. For description of gages used prior to September 30, 1913, see Water-Supply Paper 353, page 151.

DISCHARGE MEASUREMENTS.—Made from downstream side of 17-span combined railway and highway bridge at gage, or from boat at section 3,800 feet below bridge.

CHANNEL AND CONTROL.—Bed rocky, rough, and uneven; probably permanent. Control is practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.2 feet at 7 a. m. February 11 (discharge, 215,000 second-feet); minimum stage recorded −0.7 foot November 9–13, 28, December 2 and 3 (discharge, 8,150 second-feet).

1871–1923: Maximum stage recorded, 32.5 feet at 10 and 12 p. m. March 19, 1897 (discharge, 444,000 second-feet); minimum stage, −0.8 foot September 18, 1878 (discharge, 7,350 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—Operation of power plant at Hales Bar lock and dam, 175 miles upstream, may cause some diurnal fluctuation in low-stage flow.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined between 8,000 and 320,000 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Discharge measurements furnished by United States Army Engineers. Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Tennessee River at Florence, Ala., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 2	W. C. Cobb [a]	−0.21	10,700	Nov. 14	R. E. Bassett [a]	−0.45	8,660
30	do	−.15	10,400	15	do	−.27	9,210
Nov. 7	do	−.51	8,950	16	Warren Withee	−.44	9,330
8	do	−.57	9,310	29	W. C. Cobb	−.37	9,230
10	do	−.62	8,310	Dec. 2	R. E. Bassett	−.51	8,770

[a] Employee of United States Engineer Corps.

NOTE.—Measurements made from a boat at section about 3,800 feet below bridge.

Daily discharge, in second-feet, of Tennessee River at Florence, Ala., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9,400	10,800	8,550	43,700	152,000	57,000	79,900	69,300	117,000	45,400	35,200	27,700
2	10,300	10,800	8,150	48,000	162,000	57,000	68,300	66,300	111,000	53,400	39,400	26,100
3	10,300	9,850	8,150	50,700	174,000	57,000	63,300	65,300	106,000	48,000	34,400	23,100
4	10,300	9,850	10,800	53,400	204,000	55,200	59,700	70,300	102,000	43,700	31,800	20,300
5	10,300	9,850	11,700	61,500	204,000	53,400	65,300	77,700	89,000	38,600	29,300	21,000
6	9,850	9,850	14,800	72,300	204,000	49,800	77,700	73,300	79,900	36,000	30,100	21,700
7	9,850	8,950	23,100	72,300	200,000	50,700	82,100	68,300	71,300	35,200	31,000	25,400
8	9,850	8,950	33,500	64,300	205,000	87,800	84,300	58,800	73,300	36,000	26,900	23,100
9	9,850	8,150	34,400	55,200	213,000	107,000	84,300	56,100	68,300	35,200	26,900	23,100
10	10,300	8,150	31,000	48,900	212,000	134,000	76,600	54,300	61,500	35,200	30,100	23,100
11	10,300	8,150	28,500	43,700	215,000	156,000	68,300	54,300	57,900	38,600	43,700	21,000
12	9,850	8,150	31,000	42,000	196,000	170,000	63,300	55,200	53,400	36,900	47,100	19,000
13	10,300	8,150	32,600	39,400	199,000	174,000	61,500	68,300	57,000	35,200	53,400	19,000
14	10,800	8,550	36,900	41,200	198,000	156,000	76,600	81,000	53,400	31,800	53,400	19,000
15	10,800	9,400	47,100	40,300	188,000	148,000	95,000	72,300	58,800	30,100	89,000	18,400
16	10,800	9,400	63,300	39,400	166,000	159,000	103,000	87,800	57,000	26,100	57,000	17,800
17	11,200	8,950	87,800	37,800	175,000	166,000	112,000	105,000	57,000	26,100	50,700	17,800
18	13,800	8,950	131,000	36,900	174,000	162,000	107,000	97,400	69,300	26,900	51,600	16,000
19	13,200	8,950	159,000	36,900	174,000	163,000	99,800	99,800	77,700	31,000	45,400	14,800
20	11,700	8,950	169,000	39,400	162,000	166,000	89,000	102,000	67,300	35,200	40,300	14,300
21	11,200	8,950	172,000	42,000	125,000	174,000	79,900	99,800	53,400	46,200	33,500	13,800
22	11,200	9,400	172,000	43,700	93,800	178,000	81,000	102,000	44,600	49,800	34,400	13,800
23	11,200	9,850	159,000	51,600	76,600	188,000	77,700	103,000	41,200	46,200	31,800	13,800
24	10,800	9,850	121,000	90,200	66,300	196,000	74,400	96,200	38,600	37,800	31,000	13,800
25	10,300	8,950	82,100	114,000	57,900	184,000	74,400	89,000	36,000	32,600	31,000	13,800
26	10,300	8,950	57,000	126,000	54,300	166,000	69,300	89,000	32,600	39,400	28,500	13,200
27	10,300	8,950	48,000	138,000	52,500	158,000	61,500	101,000	35,200	41,200	26,100	12,200
28	9,850	8,150	45,400	144,000	56,100	146,000	61,500	117,000	42,000	35,200	26,100	12,200
29	9,850	8,550	49,800	136,000	-------	133,000	62,400	129,000	41,200	38,600	25,400	17,200
30	9,850	8,550	48,000	124,000	-------	114,000	69,300	126,000	42,000	39,400	31,800	20,300
31	10,800	-------	47,100	138,000	-------	95,000	-------	125,000	-------	36,900	31,000	-------

Monthly discharge of Tennessee River at Florence, Ala., for the year ending Sept. 30, 1923

[Drainage area, 30,800 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	13,800	9,400	10,600	0.344	0.40
November	10,800	8,150	9,100	.295	.33
December	172,000	8,150	63,600	2.06	2.38
January	144,000	36,900	68,200	2.21	2.55
February	215,000	52,500	156,000	5.06	5.27
March	196,000	49,800	131,000	4.25	4.90
April	112,000	59,700	77,600	2.52	2.81
May	129,000	54,300	85,800	2.79	3.22
June	117,000	32,600	63,200	2.05	2.29
July	53,400	26,100	37,700	1.22	1.41
August	89,000	25,400	38,000	1.23	1.42
September	27,700	12,200	18,500	.601	.67
The year	215,000	8,150	62,700	2.04	27.65

TENNESSEE RIVER AT JOHNSONVILLE, TENN.

LOCATION.—At Nashville, Chattanooga & St. Louis Railway warehouse about 1,000 feet below railway bridge at Johnsonville, Humphreys County.

DRAINAGE AREA.—38,500 square miles.

RECORDS AVAILABLE.—October 1, 1875, to September 30, 1923. Gage-height record only prior to October 1, 1889.

GAGE.—Staff at freight elevator on right bank, 1,000 feet below railway bridge. Elevation of zero of gage, 322.77 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from railway bridge consisting of six spans and draw span.

CHANNEL AND CONTROL.—Bed of stream at measuring section at bridge composed of boulders and coarse gravel; apparently permanent. Channel straight for about 1 mile above bridge and half a mile below. Right bank not subject to overflow; left bank is overflowed at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 31.1 feet March 26 (discharge, 258,000 second-feet); minimum stage, 0.6 foot November 13, 14, 30, and December 1 (discharge, 10,300 second-feet).

1889–1923: Maximum stage recorded, 48.0 feet March 24, 1897 (discharge, 410,000 second-feet); minimum stage, −0.9 foot October 26 to November 4, 1904 (discharge, 7,150 second-feet).

The highest unquestioned record of stage since gage was established is that of March 24, 1897.

ICE.—Stage-discharge relation not affected by ice.

ACCURACY.—Stage-discharge relation fairly permanent except as affected by backwater from Ohio River March 27 to April 27. Rating curve previously used has been revised below 25,000 second-feet and is well defined between 12,000 and 302,000 second-feet. At a stage of 11,000 second-feet the discharge from new curve is 8 per cent less than that from old curve. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table, except for period of backwater effect March 27 to April 27, for which it was estimated on basis of discharge at Florence, Ala., plus the inflow from intervening drainage area determined from records of discharge of Duck River at Centerville, Tenn. Records good except for period of backwater effect, for which they are fair.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

The following discharge measurement was made by Withee and Clawson: August 14, 1923: Gage height, 9.74 feet; discharge, 68,400 second-feet.

Daily discharge, in second-feet, of Tennessee River at Johnsonville, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	12,100	11,000	10,300	57,300	185,000	67,700	126,000	80,300	148,000	42,000	39,200	35,100
2	11,700	11,300	10,600	55,000	194,000	68,500	104,000	82,000	143,000	42,700	35,800	33,800
3	11,300	11,300	13,600	53,500	212,000	67,700	88,800	78,600	134,000	47,700	35,800	29,900
4	11,000	11,000	15,800	55,800	225,000	66,100	76,800	81,200	127,000	49,900	37,200	28,000
5	11,300	11,300	20,400	57,300	235,000	65,200	73,900	100,000	120,000	47,700	35,100	27,400
6	11,300	10,600	23,800	62,000	244,000	66,100	114,000	118,000	111,000	43,400	35,800	28,000
7	11,300	11,000	23,200	70,200	248,000	88,100	107,000	116,000	101,000	39,200	35,100	29,300
8	11,300	11,300	23,200	76,000	248,000	98,400	107,000	104,000	94,900	36,500	31,800	30,600
9	11,000	11,700	29,300	73,500	245,000	113,000	104,000	89,800	91,500	35,100	32,500	32,500
10	11,000	11,000	35,800	66,100	245,000	125,000	101,000	76,900	85,500	35,800	36,500	29,300
11	11,000	10,600	37,800	58,100	246,000	143,000	98,200	68,500	81,200	35,800	49,100	28,000
12	11,000	10,600	34,400	51,300	247,000	180,000	88,100	64,400	81,200	35,800	54,300	26,200
13	11,000	10,300	32,500	46,200	248,000	201,000	78,500	63,600	76,900	37,200	53,500	24,400
14	11,000	10,300	33,800	45,500	248,000	211,000	83,000	71,900	72,700	36,500	62,000	23,200
15	11,000	10,600	39,900	44,800	248,000	212,000	88,600	93,200	69,400	34,400	71,900	22,100
16	11,300	12,100	55,800	47,000	249,000	217,000	100,000	127,000	66,900	31,800	92,400	21,000
17	11,300	12,800	76,900	47,000	247,000	220,000	124,000	144,000	66,100	31,200	93,200	20,400
18	11,700	12,400	99,300	46,200	239,000	222,000	124,000	151,000	65,200	34,400	75,200	19,900
19	11,700	11,700	130,000	41,300	229,000	224,000	128,000	144,000	69,400	34,400	70,200	19,300
20	12,800	11,700	157,000	39,900	220,000	220,000	120,000	133,000	79,500	33,800	62,800	18,300
21	13,200	11,300	167,000	40,600	211,000	214,000	110,000	127,000	78,600	33,800	54,300	17,800
22	13,200	11,000	173,000	52,800	195,000	212,000	102,000	122,000	69,400	39,900	46,200	16,800
23	12,400	10,600	175,000	56,500	167,000	233,000	102,000	120,000	57,300	46,200	40,600	16,300
24	12,400	10,600	175,000	76,000	122,000	249,000	97,500	119,000	49,900	47,000	37,800	15,800
25	12,400	10,600	164,000	113,000	98,400	256,000	93,200	117,000	43,400	43,400	35,800	15,800
26	12,100	10,600	132,000	141,000	81,200	258,000	88,300	110,000	40,600	38,500	34,400	15,800
27	11,700	10,600	114,000	154,000	71,000	229,000	85,400	105,000	37,800	37,800	32,500	16,300
28	11,700	10,600	70,200	166,000	68,500	194,000	77,800	108,000	35,800	41,300	30,600	15,800
29	11,300	10,600	55,000	172,000	-------	179,000	73,500	121,000	37,200	42,000	29,300	14,900
30	11,300	10,300	55,000	174,000	-------	163,000	71,900	138,000	40,600	38,500	29,300	14,500
31	11,000	-------	56,500	178,000	-------	147,000	-------	146,000	-------	39,200	31,200	-------

Monthly discharge of Tennessee River at Johnsonville, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 38,500 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	13,200	11,000	11,600	0.301	0.35
November	12,800	10,300	11,000	.286	.32
December	175,000	10,300	72,300	1.88	2.17
January	178,000	39,900	78,000	2.03	2.34
February	249,000	68,500	204,000	5.30	5.52
March	258,000	65,200	168,000	4.36	5.03
April	128,000	71,900	97,900	2.54	2.83
May	151,000	63,600	107,000	2.78	3.20
June	148,000	35,800	79,200	2.06	2.30
July	49,900	31,200	39,100	1.02	1.18
August	93,200	29,300	46,500	1.21	1.40
September	35,100	14,500	22,900	.595	.66
The year	258,000	10,300	77,400	2.01	27.30

DAVIDSON RIVER NEAR BREVARD, N. C.

LOCATION.—At steel highway bridge on road from Brevard to Mount Pisgah, 500 feet downstream from boundary line of Pisgah National Forest, 1½ miles upstream from junction of Davidson and French Broad rivers, 2 miles downstream from mouth of Avery Creek, 2¼ miles downstream from site of old gaging station which was discontinued in 1909, and 5½ miles northeast of Brevard, Transylvania County.

DRAINAGE AREA.—41 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 10, 1920, to September 30, 1923.

GAGE.—An enameled staff gage bolted to left bank pier of bridge; read by Mrs. U. G. Reeves.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Channel is straight 600 feet above and 50 feet below gage. Bed of stream consists of gravel and is shifting. Banks are high and are seldom overflowed. Control is a rock ledge covered with boulders which forms a riffle 20 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.0 feet at 7 p. m. May 29 (discharge, 1,380 second-feet); minimum stage recorded, 0.54 foot at 7 a. m. and 5 p. m. November 21–26 (discharge, 37 second-feet).

1920–1923: Maximum stage recorded, 7.5 feet at 7.30 a. m. December 14, 1920 (discharge not determined); minimum stage, 0.54 foot at 7 a. m. and 5 p. m. November 21–26, 1922 (discharge, 37 second-feet).

ICE.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined between 45 and 400 second-feet; extended beyond these limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Davidson River near Brevard, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
June 15	W. E. Hall	1.41	164	Aug. 21	W. E. Hall and W. R. King	0.89	73.8
23	L. J. Hall	1.24	139				
Aug. 21	W. E. and L. J. Hall	.89	76.2				

Daily discharge, in second-feet, of Davidson River near Brevard, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	42	40	41	420	117	96	136	126	450	106	117	63
2	42	42	51	207	108	90	136	117	390	117	88	62
3	40	41	53	159	108	86	159	117	315	117	80	79
4	40	40	55	136	126	85	232	183	300	108	126	91
5	40	40	51	108	300	84	219	450	300	108	88	96
6	47	40	43	101	195	96	171	286	345	159	183	86
7	108	40	42	91	159	159	159	219	300	117	207	108
8	53	40	44	106	136	108	159	219	246	108	117	100
9	117	38	61	86	126	100	147	183	219	106	126	73
10	66	38	73	78	117	100	136	171	207	96	108	70
11	51	38	52	76	117	108	136	159	207	93	147	63
12	48	38	50	75	117	159	126	147	207	90	117	61
13	46	38	49	73	300	183	390	147	195	88	100	60
14	86	38	48	71	207	147	315	147	171	91	86	54
15	72	40	126	88	159	136	246	540	171	96	80	53
16	68	40	88	72	147	735	219	420	159	96	80	53
17	58	38	665	67	117	480	195	273	147	147	78	54
18	51	40	183	66	103	420	183	195	147	126	126	53
19	47	40	117	66	108	345	171	195	136	106	126	53
20	46	38	86	75	108	273	159	219	136	103	88	55
21	45	37	82	72	103	246	159	207	136	100	75	480
22	44	37	71	67	96	232	147	183	126	90	72	117
23	58	37	64	71	93	219	147	300	136	84	75	103
24	50	37	62	91	80	207	147	246	246	79	73	80
25	46	37	58	94	88	195	136	232	207	78	70	82
26	44	37	56	98	100	183	126	219	159	76	64	75
27	42	38	86	126	136	171	126	219	136	75	72	70
28	42	43	195	195	106	159	126	480	136	82	94	64
29	42	41	108	147	-------	159	171	1,300	126	100	91	63
30	42	39	93	126	-------	147	171	665	108	80	79	61
31	40	-------	126	136	-------	147	-------	510	-------	80	70	-------

NOTE.—Discharge for Sept. 21, 1923, was determined from mean daily gage height ascertained from a graph constructed on basis of two daily readings and by comparison with the similar graph of French Broad River at Blantyre, N. C.

Monthly discharge of Davidson River near Brevard, N. C., for the year ending Sept. 30, 1923

[Drainage area, 41 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	117	40	53.6	1.31	1.51
November	43	37	39.0	.951	1.06
December	665	41	96.1	2.34	2.70
January	420	66	111	2.71	3.12
February	300	80	135	3.29	3.43
March	735	84	195	4.76	5.49
April	390	126	175	4.27	4.76
May	1,300	117	293	7.15	8.24
June	450	108	209	5.10	5.69
July	159	75	100	2.44	2.81
August	207	64	100	2.44	2.81
September	480	53	86.1	2.10	2.34
The year	1,300	37	133	3.24	43.96

SWANNANOA RIVER AT BILTMORE, N. C.

LOCATION.—At Biltmore Avenue concrete bridge, 600 feet upstream from Southern Railway bridge at Biltmore, Buncombe County, 600 feet below mouth of Foster Mill Creek, 1½ miles above junction of Swannanoa and French Broad rivers, and 2 miles south of center of Asheville.

DRAINAGE AREA.—128 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 1, 1920, to September 30, 1923.

GAGE.—An enameled vertical staff attached to downstream end of bridge pier nearest right bank; read by W. M. Brown.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Channel is straight for 300 feet above and below gage. Bed consists of sand, gravel, and boulders; probably permanent. Bridge has vertical concrete abutments and two concrete piers. Low-water channel is confined between two piers. Both banks are high and have never been known to have been overflowed except during the great flood of July, 1916. Control is a rock ledge extending entirely across river making a sharp riffle 300 feet below gage; permanent except that drift sometimes lodges on top of riffle causing temporary disturbance of stage-discharge relation. Great floods on French Broad River, 1½ miles below, may cause backwater but there has been no backwater since this station was established.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.2 feet at 3 p. m. May 29 (discharge, 6,240 second-feet); minimum stage, 1.00 foot at 4.30 p. m. November 11 (discharge, 20 second-feet).

1920–1923: Maximum and minimum stages recorded, same as given above.

ICE.—None during the year.

DIVERSIONS.—The water supply for the city of Asheville is drawn from headwaters of Beetree Creek and North Fork, both tributaries of Swannanoa River. The amount diverted is said to be about 11 second-feet but has not been accurately measured. Practically the entire flow from 28 square miles is used during extreme low stages. Some of the water reenters the river above the gage.

REGULATION.—During low water there will probably be diurnal fluctuation due to operation of a small hydroelectric plant 3 miles upstream.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 1,300 second-feet; extended above that point. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

The following discharge measurement was made by L. J. Hall:
January 5, 1923: Gage height, 1.64 feet; discharge, 191 second-feet.

Daily discharge, in second-feet, of Swannanoa River at Biltmore, N. C., for the year ending Sept. 30, 1923.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	43	59	59	1,320	326	116	164	164	625	116	89	61
2	43	59	75	420	272	113	161	158	482	129	116	59
3	43	59	72	460	290	113	151	151	420	122	80	61
4	43	59	86	200	400	113	161	154	362	113	86	61
5	43	57	75	186	705	113	236	600	362	113	148	75
6	43	57	59	161	482	119	193	625	344	132	119	65
7	116	57	68	135	362	440	154	380	308	116	175	218
8	89	57	72	200	482	254	171	344	272	103	97	145
9	272	57	119	151	254	200	164	308	236	106	94	103
10	254	57	171	129	236	196	158	254	236	97	97	70
11	113	26	122	126	200	200	151	218	236	92	97	100
12	89	50	106	126	200	254	148	200	272	92	135	196
13	80	59	119	103	254	380	254	196	218	171	94	89
14	72	57	103	103	236	344	528	189	218	236	92	72
15	86	59	308	113	196	290	362	182	182	308	86	75
16	83	59	236	103	186	1,160	290	575	175	218	78	70
17	75	59	650	100	178	1,160	272	344	168	440	70	72
18	70	61	400	97	161	625	254	290	148	272	80	65
19	68	59	236	97	175	650	218	254	135	178	75	63
20	65	54	175	86	145	482	193	290	138	148	75	68
21	61	54	148	103	129	380	189	362	129	129	70	362
22	59	54	129	97	129	326	178	272	142	119	70	164
23	68	54	110	103	119	308	164	400	138	110	100	116
24	70	57	100	138	110	362	218	460	154	61	113	110
25	68	63	89	171	113	290	151	362	168	94	83	113
26	63	57	80	164	148	272	164	308	158	92	70	97
27	63	59	83	164	182	236	168	272	135	92	70	83
28	63	54	189	189	129	218	178	272	126	92	68	72
29	59	59	148	182	-------	200	193	2,830	126	97	78	72
30	59	54	126	161	-------	193	171	1,240	119	119	72	70
31	59	-------	122	482	-------	182	-------	760	-------	92	61	-------

NOTE.—Discharge May 29, 30, July 15, Sept. 7 and 21 was determined from mean daily gage heights ascertained from graph constructed on basis of two daily gage readings.

Monthly discharge of Swannanoa River at Biltmore, N. C., for the year ending Sept. 30, 1923

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October	272	43	80.1	May	2,830	151	433
November	63	26	56.2	June	625	119	231
December	650	59	150	July	440	61	142
January	1,320	86	205	August	175	61	91.5
February	705	110	243	September	362	59	102
March	1,160	113	332				
April	528	148	205	The year	2,830	26	189

PIGEON RIVER NEAR CRABTREE, N. C.

LOCATION.—At steel highway bridge on road from Waynesville to Crabtree, 1½ miles upstream from mouth of Crabtree Creek and 2 miles south of Crabtree, Haywood County.

DRAINAGE AREA.—244 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 16, 1920, to September 30, 1923.

GAGE.—Chain gage on upstream side of bridge; read by Miss Mary Kinsland.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Channel straight for 200 feet above and 100 feet below gage. Bed of stream composed of rock, gravel, and sand; probably permanent. Right bank high; seldom subject to overflow. Left bank high and not subject to overflow. Control is a rock riffle 100 feet below gage; permanent except that at times floating logs may lodge on top of riffle and temporarily change stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.7 feet at 5 p. m. December 17, 1922 (discharge, 6,220 second-feet); minimum stage, 1.10 feet at 8 a. m. November 21, 1922, caused by regulation (discharge, 14 second-feet).

1920–1923: Maximum stage recorded, 6.8 feet at 5 p. m. January 21, 1922 (discharge, 6,250 second-feet); minimum stage, that of November 21, 1922.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—Mills on Pigeon River and tributaries cause considerable diurnal fluctuation during low water. On Richland Creek, a good-sized tributary, a large artificial lake is sometimes partly drained and then allowed to slowly fill. Such operation is likely to cut off a large percentage of flow at gage during season of lowest run-off.

ACCURACY.—Stage-discharge relation permanent except when floating logs lodge on control. Rating curve well defined between 120 and 3,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Pigeon River near Crabtree, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
May 29	L. J. Hall	4.20	2,360	Aug. 22	W. E. and L. J. Hall	1.80	259
30	do	3.87	2,050	22	W. E. Hall and W. R. King	1.80	243
June 7	W. E. and L. J. Hall	2.68	839				

Daily discharge, in second-feet, of Pigeon River near Crabtree, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	210	169	164	2,040	658	448	515	515	1,200	448	658	205
2	59	160	270	775	695	448	515	448	1,020	585	480	196
3	74	164	246	585	735	448	515	448	895	515	367	214
4	103	103	260	515	895	448	620	480	855	480	333	260
5	106	156	196	515	1,500	448	735	1,200	935	480	333	260
6	160	120	124	448	1,110	448	620	935	855	480	328	210
7	275	136	44	385	935	895	550	775	855	550	415	255
8	246	144	128	620	815	585	585	735	775	480	350	255
9	228	124	228	448	735	550	550	585	620	415	385	241
10	260	140	275	415	695	515	515	585	620	415	397	250
11	152	156	86	397	658	620	480	480	620	385	328	187
12	120	148	103	379	585	735	480	550	1,200	480	328	218
13	117	160	148	355	1,810	1,110	1,200	585	775	550	355	196
14	140	144	120	367	1,060	855	1,300	515	658	550	322	210
15	182	120	935	550	855	735	855	585	585	585	265	205
16	200	187	585	367	775	1,600	735	1,400	620	585	260	187
17	100	152	3,470	322	695	1,920	695	855	448	695	265	200
18	103	156	1,060	344	695	1,300	695	735	515	550	295	210
19	89	156	620	361	550	1,200	585	695	480	409	515	196
20	96	70	515	350	585	978	550	735	448	385	295	174
21	77	68	409	361	550	895	585	775	448	350	260	397
22	103	148	415	350	515	815	550	695	448	350	246	379
23	96	132	300	373	480	815	515	815	515	338	344	355
24	196	144	350	658	415	855	620	855	1,300	328	316	228
25	83	132	295	620	403	735	515	695	935	373	246	192
26	136	128	306	550	480	695	480	735	658	328	236	174
27	164	152	280	585	735	658	448	658	515	285	228	182
28	169	86	855	935	620	585	515	935	620	295	228	174
29	178	140	385	735	-------	585	620	2,040	550	350	285	164
30	164	128	385	620	-------	480	585	2,160	480	515	255	156
31	106	-------	333	815	-------	550	-------	1,490	-------	448	214	-------

Monthly discharge of Pigeon River near Crabtree, N. C., for the year ending Sept. 30, 1923

[Drainage area, 244 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	275	59	145	0.594	0.68
November	187	68	137	.561	.63
December	3,470	44	448	1.84	2.12
January	2,040	322	553	2.27	2.62
February	1,810	403	759	3.11	3.24
March	1,920	448	773	3.17	3.66
April	1,300	448	624	2.56	2.86
May	2,160	448	826	3.39	3.91
June	1,300	448	715	2.93	3.27
July	695	285	451	1.85	2.13
August	658	214	327	1.34	1.54
September	397	156	224	.918	1.02
The year	3,470	44	497	2.04	27.68

PIGEON RIVER AT NEWPORT, TENN.

LOCATION.—At Cooke County highway bridge, 300 feet above Southern Railway bridge, 1 mile above Newport railway station and 6 miles above mouth of river.

DRAINAGE AREA.—655 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 4, 1900, to October 12, 1901 (fragmentary gage-height record); January 1, 1903, to December 31, 1905; December 1, 1906, to December 31, 1909; November 6, 1918, to September 30, 1923.

GAGE.—Chain gage on downstream side of highway bridge; read by C. M. Babb.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed of stream composed of solid rock overlain with shifting sand near right bank. Well-defined low-water control formed by rock ledge extending across stream in front of a sand-bar island below Southern Railway bridge and 500 feet below gage; probably permanent. The dam at the Newport flour mills, 1 mile downstream, is the control during medium stages. Left bank high rock cliff; right bank is overflowed above stage of 10 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.0 feet at noon March 17 (discharge, 8,890 second-feet); minimum stage, 0.9 foot October 26–31, November 1–16, and 20–27 (discharge, 290 second-feet).

1903–1905; 1907–1909; 1919–1923: Maximum stage recorded, 17.0 feet at 5 a. m. April 2, 1920 (discharge not determined); minimum stage, 0.4 foot October 3, 1919 (discharge, 102 second-feet).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Probably slight regulation caused by operation of power plants upstream.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined between 300 and 5,000 second-feet; extended beyond these limits. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good below 7,000 second-feet, fair above that point.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Pigeon River at Newport, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 11	P. E. Hanson	1.06	342	Feb. 22	P. E. Hanson	2.26	1,280
Feb. 12	do	2.92	2,130	June 3	P. P. Livingston	2.60	1,720
14	do	4.02	3,650	July 11	Warren Withee	1.73	792

Daily discharge, in second-feet, of Pigeon River at Newport, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	330	290	330	935	3,720	1,140	1,250	1,610	2,400	1,140	690	490
2	330	290	430	3,880	2,260	1,140	1,250	1,480	2,000	1,040	935	430
3	330	290	1,040	1,870	3,720	1,040	1,140	1,360	1,740	1,140	690	430
4	330	290	1,250	1,040	5,020	935	1,360	1,250	1,610	1,140	620	430
5	330	290	765	1,040	4,680	1,040	1,740	1,250	1,870	1,250	620	430
6	330	290	690	1,040	3,720	935	1,250	3,120	1,610	1,040	845	430
7	330	290	620	1,040	3,120	7,630	1,140	1,870	1,480	1,040	1,040	490
8	380	290	430	1,140	2,820	3,420	1,140	1,740	1,480	1,040	935	550
9	380	290	490	1,040	2,260	1,870	1,040	1,140	1,360	1,040	1,140	550
10	430	290	490	1,480	2,260	1,360	1,140	1,480	1,140	935	1,610	490
11	430	290	550	1,040	3,720	4,680	1,140	1,360	1,250	845	1,140	430
12	380	290	620	1,040	2,540	5,020	1,040	1,360	1,480	845	1,140	430
13	430	290	620	1,040	2,970	3,720	1,040	2,260	2,260	1,040	1,040	430
14	430	290	690	845	5,360	4,040	4,200	1,740	2,000	1,610	1,040	430
15	380	290	2,970	1,140	3,420	2,820	2,260	1,480	1,740	1,480	1,040	430
16	380	290	3,720	1,040	2,130	2,130	1,740	2,820	1,360	1,610	1,040	430
17	380	330	2,130	845	1,610	8,350	1,610	1,870	1,140	2,000	765	430
18	380	330	6,550	845	1,610	4,680	1,610	1,480	1,140	1,250	690	430
19	380	330	2,000	1,040	1,610	4,350	1,480	1,360	1,040	1,040	690	430
20	330	290	1,610	1,040	1,610	3,720	1,360	1,360	1,040	935	620	430
21	330	290	1,610	845	1,480	3,120	1,360	2,400	1,040	845	620	430
22	330	290	1,140	935	1,250	1,870	1,250	2,000	1,040	765	620	430
23	330	290	1,040	1,040	1,040	2,540	1,250	2,400	1,040	765	690	490
24	330	290	935	1,740	1,040	3,720	1,740	3,270	1,140	690	690	490
25	330	290	935	2,000	1,040	2,260	1,360	1,870	1,480	690	620	550
26	290	290	845	1,250	1,040	2,000	1,250	1,610	1,360	620	620	550
27	290	290	845	2,260	1,610	1,740	1,140	1,610	1,140	550	550	490
28	290	330	935	3,720	1,480	1,480	1,140	1,480	2,260	550	550	490
29	290	330	1,040	2,970	-------	1,360	2,000	2,400	1,480	620	550	430
30	290	330	935	2,260	-------	1,140	2,260	4,040	1,250	690	550	430
31	290	-------	935	4,360	-------	1,250	-------	3,420	-------	690	550	-------

Monthly discharge of Pigeon River at Newport, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 655 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	430	290	348	0.531	0.61
November	330	290	298	.455	.51
December	6,550	330	1,260	1.92	2.21
January	4,360	845	1,540	2.35	2.71
February	5,360	1,040	2,500	3.82	3.98
March	8,350	935	2,810	4.29	4.95
April	4,200	1,040	1,490	2.27	2.53
May	4,040	1,140	1,930	2.95	3.40
June	2,400	1,040	1,480	2.26	2.52
July	2,000	550	998	1.52	1.75
August	1,610	550	805	1.23	1.42
September	550	430	460	.702	.78
The year	8,350	290	1,320	2.02	27.37

NORTH TOE RIVER AT SPRUCE PINE, N. C.

LOCATION.—At county highway bridge at Spruce Pine, Mitchell County, 600 feet southwest of Carolina, Clinchfield & Ohio Railroad station, half a mile below mouth of Beaver Creek, and 3 miles above mouth of Bear Creek.

DRAINAGE AREA.—130 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 19, 1907, to June 30, 1908; April 21, 1920, to September 30, 1923.

GAGE.—Chain gage attached to floor on upstream side of highway bridge, installed February 1, 1921; read by G. A. Wilkie. Original gage, used during 1907 and 1908 was a vertical staff at a suspension footbridge which was probably at the site of the present bridge. Gage used April 21 to October 9, 1920, was a vertical staff fastened to rock ledge on left bank 50 feet above bridge. Datum unchanged since April 21, 1920.

DISCHARGE MEASUREMENTS.—Made from downstream side of highway bridge.

CHANNEL AND CONTROL.—Bed of stream sandy and rough; shifting. Control is well-defined shoal 100 feet below gage; probably shifting. Right bank is overflowed during extreme high water; left bank is overflowed below bridge during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.45 feet at 6 p. m. May 29 (discharge, about 2,380 second-feet); minimum stage, 1.24 feet at 6 a. m. November 28 (discharge, 55 second-feet).

1920–1923: Maximum stage recorded, 6.50 feet at 6 p. m. April 16, 1921 (discharge not determined); minimum stage, that of November 28, 1922.

ICE.—Stage-discharge relation may be slightly affected by ice for short periods.

REGULATION.—Small power plant upstream probably causes some diurnal fluctuation.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined between 100 and 550 second-feet; extended beyond these limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair below 550 second-feet; fair to poor above that point.

Discharge measurements of North Toe River at Spruce Pine, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 19	P. E. Hanson	[a] 2.18	217	June 7	P. P. Livingston	2.32	344

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of North Toe River at Spruce Pine, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	78	71	67	1,210	466	203	240	240	625	292	209	138
2	74	69	166	543	570	194	224	257	517	372	200	148
3	73	78	206	372	418	206	224	257	441	311	194	153
4	69	78	200	257	331	209	257	257	372	274	200	166
5	63	74	194	224	292	209	311	257	372	292	194	172
6	88	78	200	240	274	240	274	311	372	292	189	186
7	224	76	209	224	311	625	257	292	351	441	183	194
8	194	76	224	224	311	372	257	292	311	331	177	183
9	829	76	240	224	351	311	257	274	274	394	175	189
10	740	73	240	209	372	331	351	274	274	710	177	177
11	257	71	274	209	394	331	491	274	240	441	169	166
12	175	71	240	200	372	311	418	274	292	292	183	138
13	166	71	257	194	625	466	372	292	311	240	197	126
14	156	69	240	197	625	418	351	311	274	224	206	121
15	133	73	331	186	517	331	274	351	274	311	194	123
16	136	73	597	192	418	890	240	1,140	351	1,840	164	112
17	146	71	1,210	209	331	1,410	240	653	292	625	158	123
18	138	71	625	209	292	890	209	491	257	466	153	136
19	138	63	441	224	274	740	224	394	240	491	153	107
20	143	69	311	240	274	625	372	351	224	394	175	112
21	130	67	240	257	257	517	372	311	331	311	169	112
22	123	69	224	292	240	441	292	311	372	257	164	107
23	116	67	194	274	224	372	274	625	351	224	164	99
24	107	67	189	240	224	331	240	543	418	224	175	123
25	99	63	183	240	224	331	224	394	441	200	183	128
26	97	60	177	224	224	292	224	351	274	194	177	105
27	99	58	224	257	209	292	224	331	257	206	175	110
28	94	58	372	682	209	274	240	292	257	194	164	107
29	84	60	441	543	-------	274	240	1,700	257	200	156	103
30	84	60	491	441	-------	257	224	1,210	240	224	150	99
31	74	-------	829	829	-------	257	-------	829	-------	209	148	-------

Monthly discharge of North Toe River at Spruce Pine, N. C., for the year ending Sept. 30, 1923

[Drainage area, 130 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	829	63	165	1.27	1.46
November	78	58	69.3	.533	.59
December	1,210	67	324	2.49	2.87
January	1,210	186	325	2.50	2.88
February	625	209	344	2.65	2.76
March	1,410	194	418	3.22	3.71
April	491	209	280	2.15	2.40
May	1,700	240	456	3.51	4.05
June	625	224	329	2.53	2.82
July	1,840	194	370	2.85	3.29
August	209	148	177	1.36	1.57
September	194	99	135	1.04	1.16
The year	1,840	58	283	2.18	29.56

NOLICHUCKY RIVER AT EMBREEVILLE, TENN.

LOCATION.—At county highway bridge at Embreeville, Washington County, 3½ miles northwest of Erwin. North Indian Creek enters at Erwin.

DRAINAGE AREA.—795 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 1, 1920, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge; read by James Ammons.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Control formed by solid rock and gravel shoal 600 feet below gage; shifts occasionally. Both banks wooded; right bank steep and high; left bank subject to overflow above stage of about 15 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.80 feet at 5 p. m. March 16 (discharge, 9,090 second-feet); minimum stage, 2.08 feet at 7 a. m. November 15, and 5 p. m. November 27 (discharge, 324 second-feet).

1920–1923: Maximum stage recorded, about 11.0 feet at noon August 3, 1921 (discharge not determined); minimum stage, that of November 15 and 27, 1922.

ICE.—Stage-discharge relation slightly affected by ice during average winters.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined below 5,000 second-feet; extended above that point. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good for low and medium stages; fair for high stages.

Discharge measurements of Nolichucky River at Embreeville, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 14	P. E. Hanson	2.22	398	Feb. 20	P. E. Hanson	3.43	1,450
Feb. 8	Warren Withee	4.04	2,430	June 7	P. P. Livingston	3.63	1,780
15	P. E. Hanson	4.28	2,760				

Daily discharge, in second-feet, of Nolichucky River at Embreeville, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	414	402	374	5,520	3,660	1,280	1,280	1,340	2,050	1,120	1,060	802
2	362	379	522	3,510	3,360	1,170	1,230	1,170	2,050	1,230	1,060	755
3	357	390	625	2,190	4,470	1,120	1,280	1,120	1,920	1,230	1,060	665
4	352	402	625	1,650	4,470	1,120	1,280	1,280	1,920	1,120	1,170	755
5	379	476	1,280	1,400	3,820	1,060	1,400	4,640	1,780	1,230	1,280	950
6	432	368	1,000	1,340	3,200	1,280	1,520	3,980	1,920	1,230	1,520	755
7	522	450	536	1,060	2,760	6,860	1,400	2,900	1,780	1,170	1,460	802
8	710	396	585	1,230	2,620	3,820	1,340	2,190	1,460	1,280	1,520	710
9	755	362	850	1,170	2,470	2,900	1,280	2,470	1,230	1,170	1,460	710
10	2,900	374	1,280	1,060	2,760	2,620	1,230	1,780	1,280	1,060	1,650	665
11	1,060	335	1,280	950	3,660	2,330	1,170	1,460	1,340	1,060	1,780	665
12	625	368	950	950	3,510	2,620	1,120	1,780	1,400	1,000	1,780	625
13	585	346	802	850	4,980	2,900	1,170	2,470	1,340	1,060	2,190	557
14	585	346	665	850	4,300	3,660	2,050	1,650	1,230	1,120	2,050	508
15	515	362	3,200	1,460	2,760	2,900	1,650	1,460	1,170	1,120	1,780	482
16	508	508	3,510	900	2,190	6,660	1,520	3,360	1,060	3,980	1,590	463
17	515	384	4,140	802	1,650	7,050	1,520	3,060	1,000	5,520	1,400	470
18	522	414	4,140	755	1,520	4,470	1,460	2,330	1,060	2,760	1,280	536
19	482	368	3,510	1,060	1,520	3,980	1,400	1,920	1,060	2,050	1,120	585
20	450	340	2,190	1,000	1,520	3,200	1,340	2,050	1,000	1,460	900	585
21	438	384	1,460	1,000	1,520	2,900	1,280	2,050	950	1,280	1,340	625
22	426	408	1,230	1,000	1,400	2,470	1,230	2,330	1,230	1,170	1,920	665
23	450	402	1,120	1,230	1,340	2,470	1,280	4,140	1,120	1,170	1,400	755
24	802	402	1,060	1,780	1,280	2,330	1,340	3,820	1,120	1,060	1,000	665
25	665	340	900	1,920	1,170	2,190	1,170	2,470	1,120	950	900	625
26	502	362	502	2,190	1,120	1,920	1,120	2,050	1,120	950	802	564
27	489	330	470	4,640	1,280	1,780	1,060	1,920	1,000	1,230	710	550
28	476	396	802	3,660	1,460	1,650	1,230	1,780	950	1,400	665	508
29	476	362	444	2,900	-------	1,460	1,520	4,810	1,060	1,340	585	482
30	450	346	850	2,470	-------	1,400	1,590	4,980	1,120	1,060	585	625
31	426	-------	850	4,140	-------	1,340	-------	2,900	-------	1,120	900	-------

Monthly discharge of Nolichucky River at Embreeville, Tenn., for the year ending Sept. 30, 1923

[Drainage area 795 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,900	352	601	0.756	0.87
November	508	330	383	.482	.54
December	4,140	374	1,350	1.70	1.96
January	5,520	755	1,830	2.30	2.65
February	4,980	1,120	2,560	3.22	3.35
March	7,050	1,060	2,740	3.45	3.98
April	2,050	1,060	1,350	1.70	1.90
May	4,980	1,120	2,510	3.16	3.64
June	2,050	950	1,330	1.67	1.86
July	5,520	950	1,470	1.85	2.13
August	2,190	585	1,290	1.62	1.87
September	950	463	637	.801	.89
The year	7,050	330	1,500	1.89	25.64

NOLICHUCKY RIVER NEAR GREENEVILLE, TENN.

LOCATION.—At Jones highway bridge, half a mile below Camp Creek, 5 miles southeast of Greeneville, Greene County, and 9 miles above power plant of Tennessee Eastern Electric Co.

DRAINAGE AREA.—1,100 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 9, 1903, to December 31, 1908; April 7, 1919, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge; read by J. A. Blevins. Prior to December 31, 1908, a chain gage attached to upstream side of the bridge was used. Datum of present gage is 2.04 feet lower than that of original gage.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed composed of gravel and rock; somewhat shifting. Right bank high but subject to overflow at extreme flood stages; left bank not subject to overflow. Control is formed by well defined gravel and rock riffle about 50 feet below gage; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.25 feet at 8 a. m. March 17 (discharge, 18,000 second-feet); minimum stage, 2.06 feet at 7 a. m. November 27 (discharge, 427 second-feet).

1903–1908; 1919–1923: Maximum stage recorded, 19.3 feet (original datum), crest stage during early morning January 23, 1906 (discharge not determined); minimum stage, −0.15 foot (original datum) October 23, 1904 (discharge, 305 second-feet, revised determination).

REGULATION.—None.

ICE.—Stage-discharge relation not affected by ice during year.

ACCURACY.—Stage-discharge relation changed slightly during high water of March 17. Rating curves used before and after the change, well defined between 500 and 9,000 second-feet. Gage read to hundredths once daily; oftener during extreme high water. Daily discharge ascertained by applying daily gage height to rating table. Records good, except those for extreme high water, which are fair.

Discharge measurements of Nolichucky River near Greeneville, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 13	P. E. Hanson	2.23	546	Feb. 20	P. E. Hanson	3.55	2,310
Feb. 9	Warren Withee	4.40	3,930	June 5	P. P. Livingston	3.40	2,200
15	P. E. Hanson	4.80	4,810				

Daily discharge, in second-feet, of Nolichucky River near Greeneville, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	503	571	625	2,410	6,860	1,910	1,950	2,200	3,700	1,280	1,490	1,020
2	487	535	645	7,150	4,970	1,750	1,870	1,870	3,100	1,280	1,870	900
3	441	535	1,060	4,480	6,580	1,600	1,870	1,560	2,730	3,700	2,200	900
4	487	553	1,450	2,770	8,020	1,600	1,870	1,560	2,550	2,030	2,910	856
5	487	535	1,680	2,410	6,860	1,600	1,950	1,560	2,370	1,710	3,290	960
6	455	553	1,830	1,910	5,750	1,520	1,870	5,120	2,200	1,710	2,910	1,150
7	455	519	1,240	1,680	4,720	11,300	2,030	2,910	2,030	1,640	2,550	1,080
8	553	571	1,000	1,750	4,010	6,860	1,870	2,550	1,950	1,560	2,370	1,150
9	607	589	1,060	1,830	4,010	3,560	1,790	2,370	1,870	1,490	2,200	1,220
10	1,830	553	1,310	4,750	4,240	2,960	1,710	2,030	1,710	1,420	2,370	1,020
11	1,910	535	1,310	1,450	6,020	3,150	1,640	1,950	1,640	1,350	2,730	900
12	1,750	535	1,240	1,380	5,220	4,480	1,640	1,870	1,870	1,280	2,910	878
13	767	553	1,180	1,240	10,700	4,480	1,640	1,870	1,710	790	2,730	1,150
14	685	553	1,060	1,240	10,100	6,020	2,550	2,910	1,560	1,080	2,550	900
15	685	553	2,770	1,750	6,580	4,010	2,550	2,280	1,560	1,870	1,870	878
16	665	725	6,300	2,240	4,010	3,560	2,370	3,700	1,420	1,870	1,640	690
17	685	571	4,480	1,830	3,150	17,900	1,870	5,650	1,350	10,000	1,350	690
18	685	571	9,800	1,450	2,770	14,500	2,200	3,700	1,710	4,620	1,280	670
19	645	607	4,010	1,450	2,410	6,660	1,870	2,550	1,560	2,730	1,280	770
20	625	571	2,770	1,450	2,410	6,660	1,870	2,550	1,710	2,030	1,220	812
21	553	487	2,070	1,600	2,410	4,620	1,790	2,550	1,710	1,710	1,150	1,220
22	535	553	1,600	1,520	2,240	3,920	1,710	2,370	2,030	1,560	1,150	1,220
23	625	503	1,520	1,450	1,910	3,700	1,710	3,100	1,640	1,420	1,220	2,030
24	725	487	1,450	1,750	1,680	4,150	1,560	6,100	1,490	1,350	3,290	1,150
25	725	471	1,240	2,070	1,680	3,290	1,560	3,700	2,200	1,350	1,950	1,280
26	665	441	1,180	1,990	1,680	3,700	1,560	2,910	1,790	1,150	1,560	1,020
27	705	427	1,990	2,410	1,750	2,910	1,560	2,550	1,560	1,020	1,280	900
28	553	441	1,680	8,900	1,520	2,550	1,490	2,030	1,950	900	1,150	834
29	553	535	1,520	6,580	-------	2,550	2,200	2,200	1,790	1,150	1,280	790
30	553	580	1,450	4,010	-------	2,280	2,550	12,100	1,490	1,280	1,080	690
31	553	-------	1,750	5,220	-------	2,200	-------	5,380	-------	1,870	1,020	-------

Monthly discharge of Nolichucky River near Greeneville, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 1,100 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,910	441	715	0.650	0.75
November	725	427	540	.491	.55
December	9,800	625	2,070	1.88	2.17
January	8,900	1,240	2,620	2.38	2.74
February	10,700	1,520	4,440	4.04	4.21
March	17,900	1,520	4,580	4.16	4.80
April	2,550	1,490	1,890	1.72	1.92
May	12,100	1,560	3,150	2.86	3.30
June	3,700	1,350	1,930	1.75	1.95
July	10,000	790	1,940	1.76	2.03
August	3,290	1,020	1,930	1.75	2.02
September	2,030	670	991	.901	1.01
The year	17,900	427	2,220	2.02	27.45

NOLICHUCKY RIVER NEAR MORRISTOWN, TENN.

LOCATION.—At Jones Bridge, on main road between Morristown and Newport, 9 miles southeast of Morristown, Hamblen County, and 11 miles above mouth of river. Bent Creek enters 3 miles above station and Lick Creek 1 mile farther upstream.

DRAINAGE AREA.—1,650 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 15, 1920, to September 30, 1923.

GAGE.—Chain gage on upstream side of bridge; read by Lizzie Smith.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed of stream smooth and uniform. Channel straight for 1,000 feet above and 600 feet below gage. Low-water control is rock and gravel shoal 600 feet below gage; probably permanent. Left bank high and not subject to overflow; right bank subject to overflow during extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.1 feet at 5 p. m. March 17 (discharge, 17,900 second-feet); minimum stage, 1.46 feet at 5 p. m. October 18 (discharge, 162 second-feet).

1920–1923: Maximum stage recorded, 15.37 feet at 7 a. m. July 21, 1921 (discharge, 24,000 second-feet, revised determination); minimum stage, that of October 18, 1922.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Considerable regulation at low water is caused by operation of power plant of Tennessee Eastern Power Co., 22 miles upstream.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined between 150 and 15,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Comparison of records for this station with those for Greeneville and Embreeville, indicates that they are probably fair for high stages and perhaps poor for low and medium stages.

Discharge measurements of Nolichucky River near Morristown, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 13	P. E. Hanson	1.54	184	Feb. 21	P. E. Hanson	4.92	3,040
Feb. 12	do	7.44	6,560	June 4	P. P. Livingston	4.64	2,980
Feb. 14	do	11.33	14,200	July 10	Warren Withee	3.89	2,080

Daily discharge, in second-feet, of Nolichucky River near Morristown, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	675	675	480	4,250	9,070	2,670	2,560	2,450	4,120	1,350	2,120	1,010
2	340	745	710	8,330	7,610	2,450	2,670	2,120	3,370	1,530	1,920	780
3	608	542	1,350	4,650	11,000	2,120	2,450	2,230	3,010	2,230	1,170	892
4	608	510	2,230	3,610	12,200	2,020	2,670	1,920	2,560	2,230	1,620	892
5	640	710	1,920	2,890	10,600	2,340	2,780	1,820	2,670	2,020	2,340	892
6	710	390	2,020	2,340	8,690	3,730	3,130	3,010	3,010	1,440	3,010	930
7	640	710	1,620	2,120	7,610	12,700	2,780	3,730	3,010	1,620	2,230	930
8	675	745	1,350	2,670	6,280	12,000	2,340	2,890	3,250	1,820	2,120	892
9	362	675	1,530	2,780	5,660	6,280	2,340	2,560	2,120	1,920	2,120	1,010
10	710	640	2,340	2,230	6,600	4,120	2,230	2,560	1,920	1,620	2,120	1,090
11	2,560	675	2,890	1,920	7,610	9,070	2,120	2,450	2,020	1,820	3,010	855
12	1,440	480	1,920	1,720	6,600	8,150	2,020	2,120	2,450	1,440	2,780	745
13	1,440	190	1,440	1,530	12,700	7,610	2,230	2,560	2,230	1,720	3,490	780
14	608	640	1,720	1,720	13,100	6,600	3,130	3,130	2,780	1,440	3,130	780
15	710	640	7,970	2,560	9,450	5,210	3,130	2,780	2,020	2,340	2,230	855
16	640	710	9,640	3,370	5,510	6,930	2,670	4,250	1,720	2,120	1,720	640
17	780	710	11,000	2,560	4,380	14,600	2,450	5,360	1,440	5,360	1,440	335
18	480	640	12,000	2,020	3,730	12,000	2,340	3,860	1,920	5,960	1,260	745
19	675	640	6,930	1,920	3,610	8,880	2,560	2,780	1,720	3,250	1,170	640
20	710	450	4,510	2,340	3,130	7,610	2,230	2,780	1,440	2,450	1,530	608
21	675	675	2,670	2,340	3,010	5,660	1,920	3,130	1,620	1,920	1,350	970
22	675	640	2,560	2,890	2,780	4,790	1,920	3,010	1,530	1,530	818	1,820
23	324	710	2,340	3,010	2,670	5,960	2,230	3,130	2,120	1,720	1,720	2,120
24	780	575	1,720	5,070	2,450	6,760	2,120	4,510	1,820	1,620	3,370	1,440
25	675	710	1,530	4,250	2,120	5,360	2,120	4,650	2,120	1,720	2,560	1,090
26	710	542	1,530	3,010	2,450	4,380	1,920	3,250	1,720	1,530	1,620	1,090
27	675	185	1,440	5,360	2,670	3,730	1,720	2,670	2,560	1,010	1,530	855
28	818	745	1,720	11,800	2,890	3,370	1,820	2,340	2,780	1,440	1,170	780
29	510	675	2,230	11,200	-------	3,130	2,020	2,350	2,780	1,260	1,440	818
30	450	675	2,120	7,610	-------	3,010	2,890	14,000	2,230	1,530	930	542
31	640	-------	1,620	8,510	-------	2,780	-------	7,600	-------	1,260	1,170	-------

NOTE.—Gage-height record missing May 30 and 31; discharge estimated on basis of records for Nolichucky River near Greenville, Tenn. Temporary gage in use June 1 to July 10. Accuracy of records for this period doubtful.

Monthly discharge of Nolichucky River near Morristown, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 1,650 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,560	324	740	0.448	0.52
November	745	185	608	.368	.41
December	12,000	480	3,130	1.90	2.19
January	11,800	1,530	3,950	2.39	2.76
February	13,100	2,120	6,290	3.81	3.97
March	14,600	2,020	6,000	3.64	4.20
April	3,130	1,720	2,380	1.44	1.61
May	14,000	1,820	3,480	2.11	2.43
June	4,120	1,440	2,340	1.42	1.58
July	5,960	1,010	2,010	1.22	1.41
August	3,490	818	1,940	1.18	1.36
September	2,120	335	928	.562	.63
The year	14,600	185	2,800	1.70	23.07

LITTLE PIGEON RIVER AT SEVIERVILLE, TENN.

LOCATION.—At H. O. Eckel's farmhouse, half a mile below Sevierville, Sevier County, and confluence of East and West forks of river, and 5 miles above junction with French Broad River.

DRAINAGE AREA.—346 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 23, 1920, to September 30, 1923.

GAGE.—Vertical staff in two sections spiked to trees on left bank, 100 feet from Eckel's farmhouse; read by Harry Eckel.

DISCHARGE MEASUREMENTS.—Made by measuring East and West forks of river from highway bridges just above confluence and half a mile above gage, or by wading at section 1,000 feet below confluence.

CHANNEL AND CONTROL.—Channel straight for a quarter of a mile above gage and 500 feet below. Right bank at gage low and subject to overflow above stage of 6 feet; left bank high and not subject to overflow except during extreme high water. Extreme floods submerge practically the entire town of Sevierville. Low-water control is rock shoal 500 feet below gage; probably permanent. Medium and high water control is a concrete dam in three sections about 1 mile below gage. During extreme floods on French Broad River stage-discharge relation may be affected by backwater.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.26 feet at 5 p. m. December 17 (discharge, 13,100 second-feet); minimum stage, 0.65 foot at 7 a. m. October 15 (discharge, 15 second-feet).

1920–1923: Maximum stage recorded, 10.25 feet at 5 p. m. February 10, 1921 (discharge, 15,400 second-feet); minimum stage, that of October 15, 1922.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Operation of power plant on West Fork 3 miles above Sevierville causes considerable fluctuation during low water. Several flour mills on both forks cause some regulation.

ACCURACY.—Stage-discharge relation fairly permanent during the year. Rating curve differs somewhat from curve previously used and is well defined between 50 and 2,500 second-feet; fairly well defined between 2,500 and 15,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Discharge measurements of Little Pigeon River at Sevierville, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 10	P. E. Hanson	0.84	63.4	Feb. 22	P. E. Hanson	1.75	493
Feb. 6	do	3.64	2,220	June 2	P. P. Livingston	2.23	821

Daily discharge, in second-feet, of Little Pigeon River at Sevierville, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	74	40	163	3,290	2,290	425	580	870	1,030	548	395	200
2	53	40	455	1,480	1,580	425	548	515	758	485	425	218
3	77	45	910	990	6,630	395	485	425	650	455	255	187
4	48	40	615	720	4,590	455	515	384	615	455	187	159
5	38	35	515	615	3,140	515	832	455	1,290	425	455	119
6	50	59	548	548	2,160	1,920	720	455	870	455	685	119
7	42	62	384	485	1,920	8,680	580	455	580	485	832	171
8	139	62	390	548	1,800	2,160	548	580	548	395	950	119
9	147	98	1,030	455	1,580	1,290	485	720	455	368	395	175
10	56	90	720	455	1,920	1,030	425	548	351	351	485	159
11	50	90	548	373	2,160	3,440	395	455	455	305	1,070	84
12	62	74	455	356	1,580	2,840	455	425	1,690	245	720	71
13	50	90	515	340	4,940	2,040	685	1,920	795	179	1,030	50
14	35	84	548	330	3,600	1,580	910	1,290	650	236	615	35
15	23	42	18,200	455	1,580	1,070	650	720	455	265	395	35
16	50	455	2,290	425	1,580	3,760	580	720	425	222	351	84
17	50	135	10,200	373	950	5,670	485	720	356	425	320	112
18	50	56	2,990	368	758	1,920	515	758	356	270	384	62
19	40	53	1,290	340	685	2,560	455	795	335	222	395	62
20	94	104	910	395	615	1,480	425	832	305	183	340	62
21	25	74	515	346	515	1,120	425	685	270	119	320	77
22	42	77	485	548	425	1,030	368	515	320	151	425	94
23	35	65	455	685	425	1,480	515	1,800	455	167	615	62
24	195	42	425	3,600	425	1,480	870	1,800	515	187	650	98
25	77	35	373	1,120	395	1,290	720	1,480	615	218	425	104
26	50	23	351	685	395	1,030	580	1,120	548	175	280	77
27	23	38	384	2,040	485	870	515	1,120	720	175	218	71
28	42	50	548	4,760	155	720	548	910	1,290	195	195	84
29	40	42	515	1,920	-------	650	650	1,580	950	280	250	77
30	32	48	395	1,920	-------	615	1,120	1,580	795	455	240	71
31	40	-------	395	5,860	-------	615	-------	910	-------	290	187	-------

Monthly discharge of Little Pigeon River at Sevierville, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 346 square miles]

Month	Discharge in second-feet.				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	195	23	59.0	0.171	0.20
November	455	23	74.9	.216	.24
December	18,200	163	1,560	4.51	5.20
January	5,860	330	1,190	3.44	3.97
February	6,630	155	1,760	5.09	5.30
March	8,680	395	1,760	5.09	5.87
April	1,120	368	586	1.69	1.89
May	1,920	384	888	2.57	2.96
June	1,690	270	648	1.87	2.09
July	548	119	303	.876	1.01
August	1,070	187	467	1.35	1.56
September	218	35	103	.298	.33
The year	18,200	23	780	2.26	30.62

SOUTH FORK OF HOLSTON RIVER NEAR CHILHOWIE, VA.

LOCATION.—At Riverside Bridge, half a mile downstream from Bebord's flour mill, 2 miles below Holstein mill, and 5 miles southeast of Chilhowie, Smyth County.

DRAINAGE AREA.—94.5 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 1, 1920, to September 30, 1923. From June 10, 1907, to December 31, 1909, records were obtained at a point just below mouth of Grose Creek, 4½ miles downstream from present gage.

GAGE.—Chain gage bolted to downstream side of bridge; read by Nottie Williams.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Section at bridge very rough.

CHANNEL AND CONTROL.—Bed composed of boulders and coarse gravel; both banks are low and subject to overflow during unusual floods. Control is rocky shoal about 100 feet downstream from gage; may change slightly during high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.7 feet at 4 p. m. June 12 (discharge, 4,450 second-feet); minimum stage, 0.28 foot at 6 p. m. September 8, caused by closing gates of dam above (discharge, 3.4 second-feet).

1920–1923: Maximum and minimum stages, same as given above for 1923.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Several flour and grist mills above the gage cause considerable diurnal fluctuation during low water.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 50 and 1,100 second-feet; extended beyond these limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good between 50 and 1,100 second-feet; others fair.

The following discharge measurement was made by P. P. Livingston:
June 14, 1923: Gage-height, 3.16 feet; discharge, 702 second-feet.

Daily discharge, in second-feet, of South Fork of Holston River near Chilhowie, Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	37	36	56	415	335	118	125	145	165	86	64	46
2	46	33	50	305	485	105	118	125	145	109	62	43
3	43	38	51	235	1,960	104	111	120	145	91	60	47
4	42	38	62	185	1,020	109	112	112	125	83	99	54
5	45	38	85	145	560	102	123	111	114	81	94	41
6	46	42	68	125	415	123	198	104	109	145	75	46
7	46	38	72	125	350	690	165	93	118	89	71	50
8	51	55	81	165	248	415	155	91	104	85	68	18
9	64	29	99	165	248	275	153	80	97	75	64	38
10	101	49	135	155	320	235	151	69	93	74	72	50
11	62	43	135	135	485	248	149	75	104	74	71	42
12	55	40	105	125	450	290	147	74	3,450	72	75	36
13	50	56	101	105	1,150	305	145	88	1,720	68	94	44
14	56	54	97	135	790	305	112	75	600	72	72	45
15	41	36	520	185	485	275	104	77	365	74	64	42
16	53	72	398	185	350	320	102	210	305	78	67	41
17	49	49	398	155	290	645	93	185	235	71	60	43
18	30	42	398	135	235	415	101	155	198	64	48	44
19	45	65	275	125	210	432	93	145	175	64	55	48
20	43	46	198	135	175	365	89	125	155	61	57	48
21	46	40	155	125	155	305	88	112	145	55	45	210
22	38	46	135	116	135	248	86	102	135	62	47	85
23	49	49	123	109	135	235	83	222	114	64	44	68
24	51	51	105	120	116	235	86	365	114	56	54	45
25	47	65	101	114	105	222	88	248	111	65	48	47
26	41	37	89	109	116	210	83	185	107	57	51	45
27	41	59	85	165	125	185	80	165	118	55	51	43
28	29	46	94	845	121	165	91	145	102	47	44	48
29	47	62	85	560	-------	155	123	210	97	57	35	43
30	32	26	72	365	-------	145	145	260	89	61	34	39
31	33	-------	75	335	-------	135	-------	185	-------	81	41	-------

NOTE.—Gage not read Apr. 9–12; discharge interpolated.

Monthly discharge of South Fork of Holston River near Chilhowie, Va., for the year ending Sept. 30, 1923

[Drainage area, 94.5 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	101	29	47.1	0.498	0.57
November	72	26	46.0	.487	.54
December	520	50	145	1.53	1.76
January	845	105	207	2.19	2.52
February	1,960	105	413	4.37	4.55
March	690	102	262	2.77	3.19
April	198	80	117	1.24	1.38
May	365	69	144	1.52	1.75
June	3,450	89	322	3.41	3.80
July	145	47	73.4	.777	.90
August	99	34	60.8	.643	.74
September	210	18	51.3	.543	.61
The year	3,450	18	155	1.64	22.31

SOUTH FORK OF HOLSTON RIVER AT BLUFF CITY, TENN.

LOCATION.—At highway bridge at Bluff City, Sullivan County, 300 feet below Virginia & Southwestern Railroad bridge and 1 mile below mouth of Indian Creek.

DRAINAGE AREA.—828 square miles.

RECORDS AVAILABLE.—July 17, 1900, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge; read by W. C. Massengill. Previous to March 21, 1920, gage was vertical staff attached to downstream side of bridge pier, nearest right bank. Gage datum unchanged.

DISCHARGE MEASUREMENTS.—Made from footway on upstream side of railroad bridge 300 feet upstream from gage, or by wading.

CHANNEL AND CONTROL.—Bed of river very rough. Control consists of a shallow ledge; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.3 feet at 8 p. m. February 3 (discharge, 16,100 second-feet); minimum stage, 0.17 foot at 7 a. m. October 6 (discharge, 201 second-feet).

1900–1923: Maximum stage recorded, 15.0 feet May 22, 1901 (discharge not determined); minimum stage, −0.1 foot October 16–19, 21–25, 27, 29–31, and November 1, 1904 (discharge, 160 second-feet, revised determination).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Operation of small mills upstream causes some diurnal fluctuation.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 250 and 6,000 second-feet; extended beyond these limits. Gage read to hundredths once daily, oftener during high water. Daily discharge ascertained by applying daily gage height to rating table. Records good below 8,000 second-feet; others fair.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of South Fork of Holston River at Bluff City, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 6	Warren Withee	4.89	4,870	June 11	P. P. Livingston	1.14	700
17	P. E. Hanson	3.60	2,910				

Daily discharge, in second-feet, of South Fork of Holston River at Bluff City, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	207	261	289	3,450	4,890	1,240	1,330	1,810	1,240	888	525	325
2	214	285	297	3,450	5,040	1,160	1,280	1,510	1,000	815	615	309
3	207	301	645	2,570	12,500	1,120	1,200	1,200	1,000	1,160	498	301
4	242	277	678	1,910	12,100	1,080	1,200	1,080	925	925	555	269
5	273	269	1,610	1,610	6,640	1,200	1,330	1,000	850	780	555	309
6	201	245	1,510	1,420	4,890	1,160	2,120	962	1,000	710	1,040	370
7	220	253	1,080	1,240	4,010	8,000	1,910	888	850	1,510	888	370
8	234	277	925	1,420	3,320	5,510	1,710	780	815	1,510	710	370
9	321	309	1,810	2,010	3,320	3,450	1,510	1,000	780	1,160	678	348
10	1,510	309	2,450	1,710	3,590	2,450	1,330	925	678	815	555	325
11	1,510	261	2,570	1,510	4,440	3,060	1,200	780	645	710	815	370
12	555	224	1,610	1,330	4,740	3,730	1,120	780	1,810	645	710	348
13	470	238	1,200	1,200	8,540	3,590	1,120	815	15,000	615	962	348
14	370	231	1,000	1,080	9,800	3,060	1,240	1,160	8,540	710	780	348
15	348	231	5,350	2,930	5,510	2,810	1,240	1,000	4,010	615	678	325
16	470	555	8,900	2,570	4,010	2,810	1,160	1,420	2,690	555	615	309
17	395	585	4,590	2,010	3,060	7,490	1,080	2,930	1,910	2,810	470	285
18	370	420	6,980	1,910	2,690	5,350	1,120	1,910	1,610	678	420	285
19	321	420	3,870	1,420	2,230	4,590	1,040	1,510	1,610	850	420	301
20	313	525	2,570	1,280	2,120	4,440	1,000	1,240	1,330	678	395	297
21	313	420	2,120	1,910	1,810	3,450	962	1,160	1,510	615	395	678
22	249	370	2,010	1,710	1,710	2,930	888	1,040	1,420	555	370	1,200
23	249	348	1,710	1,510	1,610	2,450	815	962	1,240	525	420	678
24	348	325	1,200	1,810	1,420	3,730	850	2,570	1,160	585	370	615
25	325	348	1,080	1,910	1,420	2,930	815	2,120	1,000	710	325	445
26	325	305	1,000	1,810	1,280	2,810	780	1,610	1,120	585	285	395
27	317	313	925	1,810	1,420	2,230	745	1,330	1,120	470	325	370
28	309	325	925	9,440	1,420	2,120	780	1,160	1,710	445	370	348
29	293	313	1,000	7,150	-------	1,910	1,710	1,040	1,080	498	420	325
30	269	297	925	4,290	-------	1,610	2,230	1,510	1,240	445	395	289
31	261	-------	850	4,890	-------	1,510	-------	1,510	-------	585	395	-------

Monthly discharge of South Fork of Holston River at Bluff City, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 828 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,510	201	387	0.467	0.54
November	585	224	328	.396	.44
December	8,900	289	2,050	2.48	2.86
January	9,440	1,080	2,460	2.97	3.42
February	12,500	1,280	4,270	5.16	5.37
March	8,000	1,080	3,060	3.70	4.27
April	2,230	745	1,230	1.49	1.66
May	2,930	780	1,310	1.58	1.82
June	15,000	645	2,030	2.45	2.73
July	2,810	445	812	.981	1.13
August	1,040	285	547	.661	.76
September	1,200	269	395	.477	.53
The year	15,000	201	1,560	1.88	25.53

HOLSTON RIVER NEAR ROGERSVILLE, TENN.

LOCATION.—At Virginia & Southwestern Railway bridge near Austin Mill, half a mile below county highway bridge, 2 miles downstream from mouth of Dodson Creek, and 3 miles south of Rogersville, Hawkins County.

DRAINAGE AREA.—3,060 square miles.

RECORDS AVAILABLE.—March 10, 1902 (daily-discharge record beginning January 1, 1904), to September 30, 1923.

GAGE.—Vertical staff attached to right side of bridge pier nearest right bank; read by Fred Beal.

DISCHARGE MEASUREMENTS.—Made from steel highway bridge half a mile upstream from gage.

CHANNEL AND CONTROL.—Bed of stream composed of solid rock, boulders, and gravel. Right bank high and not subject to overflow; left bank high but subject to overflow at extremely high stages. Control formed by rock shoals below bridge; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.0 feet at 2 p. m. February 4 (discharge, 58,600 second-feet); minimum stage, 1.3 feet October 1–10, November 3, 7, 8, 12–14, and September 20 (discharge, 700 second-feet).

1904–1923: Maximum stage recorded, 20.0 feet at crest on January 29, 1918 (discharge, about 70,900 second-feet); minimum stage, 1.0 foot October 23 to November 3, 1904 (discharge, 490 second-feet).

The United States Weather Bureau reports a stage of 38.4 feet on March 10, 1867.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Some diurnal fluctuation is caused by operation of Austin Mill power plant and several small plants on tributaries, but the effect is negligible except during very low water.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined below 33,000 second-feet; extended above that point. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Holston River near Rogersville, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 17	P. E. Hanson	1.81	1,590	Feb. 21	P. E. Hanson	3.81	6,340
Feb. 10	Warren Withee	5.25	10,600	June 5	P. P. Livingston	2.72	3,590
13	P. E. Hanson	9.10	26,400				

Daily discharge, in second-feet, of Holston River near Rogersville, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	700	860	860	3,940	19,600	4,670	4,180	5,460	4,930	3,270	2,450	1,700
2	700	860	860	16,400	15,600	4,180	4,180	4,420	3,940	2,650	2,850	1,520
3	700	700	1,020	11,400	32,000	3,940	4,180	3,710	3,490	2,450	2,450	1,520
4	700	860	2,070	7,860	57,000	3,490	3,940	3,490	3,710	3,940	1,880	1,520
5	700	860	2,450	6,020	33,200	3,940	4,180	2,850	3,490	3,270	3,710	1,880
6	700	860	3,270	5,190	18,400	4,180	5,190	2,850	2,850	2,450	3,940	2,450
7	700	700	3,940	4,180	14,500	15,300	6,310	3,270	3,490	2,650	6,610	1,880
8	700	700	3,270	5,190	12,200	25,800	5,190	3,060	3,710	4,420	3,940	1,700
9	700	860	3,710	7,220	10,300	13,300	4,420	3,060	3,060	4,930	3,940	1,520
10	700	860	6,610	6,610	10,700	8,870	4,180	3,490	3,060	3,940	4,670	1,700
11	4,180	860	8,190	5,460	12,900	9,220	3,940	3,490	2,650	3,270	2,850	1,520
12	3,060	700	6,310	4,930	14,500	13,300	3,710	3,270	2,850	2,650	3,490	1,520
13	1,880	700	4,930	4,180	20,100	11,800	3,490	2,850	22,500	2,450	3,940	1,520
14	1,520	700	3,490	3,490	42,200	10,700	4,180	3,940	36,000	2,260	8,190	1,520
15	1,350	860	8,870	5,190	25,800	9,220	4,670	3,940	15,300	2,650	4,670	1,520
16	1,350	1,020	36,900	7,860	14,500	8,190	4,420	4,930	7,860	2,260	3,490	1,350
17	860	1,520	17,600	6,310	10,300	17,600	3,940	8,190	6,020	2,650	2,650	1,350
18	860	1,700	21,700	4,930	8,190	25,800	3,940	7,540	4,420	8,870	2,450	860
19	1,350	1,520	16,400	4,420	7,540	15,300	3,940	5,740	3,940	4,930	2,070	860
20	1,180	1,180	9,570	4,180	6,310	14,500	3,710	4,670	3,490	3,270	2,070	700
21	1,020	1,180	6,610	4,930	6,020	11,800	3,490	4,180	3,940	2,650	1,880	860
22	860	1,180	5,740	5,740	5,740	9,570	3,270	3,940	3,940	2,070	1,880	2,450
23	860	1,020	4,930	5,460	4,930	10,300	3,060	3,710	3,710	2,070	1,880	3,060
24	860	1,020	3,940	8,870	4,670	12,200	2,850	5,190	3,270	2,070	2,260	2,260
25	1,350	1,020	3,490	7,860	4,420	11,400	2,650	6,910	3,060	2,070	4,180	1,700
26	1,350	1,020	3,270	6,910	4,420	9,570	2,450	5,460	5,740	2,070	2,650	1,520
27	1,350	860	3,060	6,910	4,180	7,860	2,650	4,420	3,490	1,880	2,070	1,520
28	1,180	860	3,060	21,700	4,670	6,910	2,650	3,940	5,460	1,880	1,880	1,350
29	1,020	860	3,270	35,600	.....	6,310	3,270	3,490	4,930	2,070	1,880	1,350
30	1,020	1,020	3,710	17,600	.....	5,190	4,670	3,490	3,490	3,940	1,880	1,180
31	860	.....	3,060	15,600	.....	5,190	.....	6,310	.....	2,070	2,070	.....

Monthly discharge of Holston River near Rogersville, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 3,060 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	4,180	700	1,170	0.382	0.44
November	1,700	700	964	.315	.35
December	36,900	860	6,650	2.17	2.50
January	35,600	3,490	8,460	2.76	3.18
February	57,000	4,180	15,200	4.97	5.18
March	25,800	3,490	10,300	3.37	3.88
April	6,310	2,450	3,900	1.27	1.42
May	8,190	2,850	4,360	1.42	1.64
June	36,000	2,650	6,060	1.98	2.21
July	8,870	1,880	3,040	.993	1.14
August	8,190	1,880	3,120	1.02	1.18
September	3,060	700	1,580	.516	.58
The year	57,000	700	5,340	1.75	23.70

MIDDLE FORK OF HOLSTON RIVER AT CHILHOWIE, VA.

LOCATION.—At steel highway bridge at Chilhowie, Smyth County, 20 miles above confluence with South Fork.

DRAINAGE AREA.—144 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 8, 1907, to December 31, 1909; and November 2, 1920, to September 30, 1923.

GAGE.—Chain gage on upstream side of bridge; read by L. B. Ramsey. Datum unchanged since originally installed.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge, or by wading.

CHANNEL AND CONTROL.—Practically solid rock bottom. Channel straight for about 100 feet above and 800 feet below gage. Both banks are rather low and subject to overflow during floods. Control is solid rock shoal 50 feet downstream from gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.4 feet the evening of June 12 (discharge, 7,710 second-feet); minimum stage, 0.75 foot at 5.30 p. m. October 4 (discharge, 30 second-feet).

1907–1909; 1920–1923: Maximum stage recorded, that of June 12, 1923; minimum discharge, 25 second-feet November 22–29, 1908, and October 30 to November 4, 1909.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Operation of small mills upstream causes some diurnal fluctuation.

ACCURACY.—Stage-discharge relation changed during high water on June 12. Rating curves used before and after the change well defined between 50 and 5,000 second-feet, and extended beyond these limits; above 900 second-feet, the two curves are identical. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

The following discharge measurement was made by P. P. Livingston:
June 13, 1923: Gage height, 7.90 feet; discharge, 4,740 second-feet.

Daily discharge, in second-feet, of Middle Fork of Holston River at Chilhowie, Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	39	46	41	500	705	167	177	234	146	177	94	56
2	38	50	58	375	2,750	163	177	198	216	184	100	61
3	44	50	51	260	5,460	153	180	177	153	248	94	56
4	38	51	55	209	1,720	153	180	163	174	210	88	69
5	44	58	101	219	960	160	212	170	114	184	91	56
6	44	55	84	174	655	209	205	150	114	166	100	51
7	39	55	60	260	565	905	219	133	107	170	94	58
8	43	50	90	316	478	375	180	133	104	181	122	53
9	87	46	230	316	565	316	170	143	114	166	152	66
10	260	41	241	241	565	316	143	146	90	146	170	69
11	98	46	184	198	755	416	153	130	107	132	174	135
12	51	53	133	150	805	705	150	120	5,550	139	116	71
13	44	48	98	133	2,350	500	153	153	5,280	119	88	66
14	44	48	93	180	1,360	436	188	153	1,540	132	94	60
15	38	87	2,990	297	610	260	150	260	700	152	91	63
16	41	74	705	260	457	436	180	655	482	482	88	51
17	39	62	610	205	355	1,300	177	336	330	482	76	66
18	38	51	436	180	355	565	163	230	330	192	74	56
19	46	90	395	174	278	755	156	209	271	139	82	61
20	43	90	260	163	223	500	130	180	271	139	88	66
21	43	51	216	205	177	436	76	180	350	129	85	76
22	41	51	180	170	230	355	143	150	330	166	88	82
23	50	50	160	191	216	375	130	297	210	146	88	100
24	62	38	139	191	191	610	123	436	750	119	97	106
25	48	36	126	198	194	395	104	278	310	126	79	88
26	39	46	114	194	205	336	104	230	271	103	97	66
27	43	44	107	278	209	297	123	191	252	100	88	56
28	43	58	117	1,600	198	260	120	167	290	94	88	56
29	43	50	107	755	-------	237	241	156	271	94	82	49
30	43	43	96	457	-------	219	241	153	225	88	69	56
31	44	-------	120	655	-------	205	-------	160	-------	94	61	-------

Monthly discharge of Middle Fork of Holston River at Chilhowie, Va., for the year ending Sept. 30, 1923

[Drainage area, 144 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	260	38	53.5	0.372	0.43
November	90	36	53.9	.374	.42
December	2,990	41	271	1.88	2.17
January	1,600	133	313	2.17	2.50
February	5,460	177	843	5.85	6.09
March	1,300	153	404	2.81	3.24
April	241	76	162	1.12	1.25
May	655	120	209	1.45	1.67
June	5,550	90	648	4.50	5.02
July	482	88	168	1.17	1.35
August	174	61	96.7	.672	.77
September	135	49	67.7	.470	.52
The year	5,550	36	270	1.88	25.43

WATAUGA RIVER AT BUTLER, TENN.

LOCATION.—At county highway bridge at edge of town of Butler, Johnson County, 800 feet upstream from Virginia & Southwestern Railway bridge. Roane Creek enters just above gage.

DRAINAGE AREA.—427 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 14, 1900, to December 31, 1901; November 1, 1920, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge; read by Paul Yonce. Gage used 1900 and 1901 was a vertical staff spiked to a large tree on right bank about 200 feet downstream from present site. Present gage set at independent datum.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Stream bed is composed of rock and gravel; smooth and uniform. Channel straight for 1,000 feet above and 500 feet below gage. Control is well defined rock and gravel shoal about 300 feet below gage; not permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.55 feet at 7 a. m. March 17 (discharge, 6,200 second-feet); minimum stage, 1.24 feet at 5 p. m. November 29 (discharge, 152 second-feet).

1920–1923: Maximum stage recorded, 6.70 feet at 5 p. m. February 10, 1921 (discharge, 8,500 second-feet); minimum stage, that of November 29, 1922.

A stage of 15.0 feet was recorded October 23, 1900, and 16.27 feet May 21, 1901.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—There is no artificial regulation above the gaging station.

ACCURACY.—Stage-discharge relation not permanent. Rating curve used October 1 to March 17 fairly well defined between 180 and 3,500 second-feet; extended above 3,500 second-feet on basis of discharge (6,480 second-feet) computed for crest stage (5.71 feet) of the flood of June 13, 1924, by use of Chezy formula. Curve used March 18 to September 30 well defined below 3,500 second-feet. Above 3,200 second-feet the two curves are identical. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good below 3,500 second-feet and fair above.

Discharge measurements of Watauga River at Butler, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 14	P. E. Hanson	1.32	176	Feb. 16	P. E. Hanson	2.89	1,490
Feb. 7	Warren Withee	2.89	1,430	June 9	P. P. Livingston	2.02	610

Daily discharge, in second-feet, of Watauga River at Butler, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	164	185	185	2,670	2,670	510	648	605	1,250	495	530	395
2	161	185	214	1,500	2,670	475	605	568	1,250	1,540	530	371
3	161	185	326	1,020	3,380	475	605	530	1,190	1,360	780	347
4	158	185	336	770	3,200	475	648	495	925	975	875	323
5	155	182	635	635	2,330	475	735	568	875	780	828	428
6	155	179	550	550	1,710	475	735	690	828	828	780	347
7	182	185	353	475	1,380	4,130	605	568	875	975	605	395
8	311	185	315	635	1,140	2,010	605	605	735	875	530	530
9	550	185	375	510	1,250	1,250	568	648	605	1,030	530	428
10	1,080	182	1,020	475	1,640	1,020	568	568	568	735	690	353
11	401	179	770	414	2,670	1,310	530	530	605	648	690	530
12	280	176	475	414	2,170	1,380	495	495	1,360	605	605	395
13	243	173	408	382	3,940	1,860	605	735	1,360	568	1,360	377
14	221	188	358	364	2,840	1,860	780	648	1,030	568	735	329
15	214	210	2,330	770	1,570	1,380	648	605	780	495	568	323
16	214	311	1,640	590	1,140	2,500	568	2,700	648	1,360	460	317
17	214	218	2,330	414	970	5,500	568	1,610	568	1,800	395	311
18	207	200	2,330	510	920	2,860	690	1,140	568	1,190	428	299
19	194	214	1,250	510	770	2,540	568	925	530	780	495	293
20	194	218	820	475	770	1,940	568	828	530	648	389	323
21	194	200	680	635	725	1,540	530	828	568	568	389	648
22	191	200	550	635	635	1,360	530	690	690	495	428	530
23	204	191	440	550	510	1,300	495	1,190	495	495	1,800	428
24	293	182	401	635	394	1,250	495	1,610	495	428	1,300	377
25	218	179	364	635	475	1,080	495	1,140	1,030	495	780	353
26	191	173	336	635	510	975	460	925	690	428	605	341
27	188	194	336	1,080	680	925	460	828	735	353	495	347
28	188	185	510	5,500	590	828	568	735	828	377	460	305
29	185	155	440	2,840	-------	780	780	2,220	605	428	648	281
30	179	176	358	1,640	-------	735	780	3,030	530	389	530	275
31	182	-------	348	3,380	-------	690	-------	1,670	-------	925	428	-------

Monthly discharge of Watauga River at Butler, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 427 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,080	155	247	0.578	0.67
November	311	155	192	.450	.50
December	2,330	185	703	1.64	1.89
January	5,500	364	1,040	2.44	2.81
February	3,940	394	1,560	3.65	3.80
March	5,500	475	1,480	3.47	4.00
April	780	460	598	1.40	1.56
May	3,030	495	998	2.34	2.70
June	1,360	495	792	1.85	2.06
July	1,800	353	762	1.78	2.05
August	1,800	389	667	1.56	1.80
September	648	275	377	.883	.99
The year	5,500	155	781	1.83	24.83

DOE RIVER AT VALLEY FORGE, TENN.

LOCATION.—At concrete highway bridge 50 feet downstream from Eastern Tennessee & Western North Carolina Railroad bridge, a quarter of a mile from Valley Forge, Carter County, and 4 miles above Elizabethton and mouth of river. Laurel Creek enters at Hampton, 4 miles upstream.

DRAINAGE AREA.—132 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 11, 1911, to October 23, 1916; November 5, 1920, to September 30, 1923.

GAGE.—Chain gage attached to parapet wall on downstream side of concrete highway bridge; read by R. M. Snyder. Gage used 1911–1916 was a chain gage attached to ends of ties on downstream side of railroad bridge, 50 feet upstream. Gage datum not changed.

DISCHARGE MEASUREMENTS.—Made from either highway or railroad bridge or by wading.

CHANNEL AND CONTROL.—Bed of stream is smooth and uniform, composed principally of coarse gravel; channel straight for 500 feet above and below gage. Right bank is low and subject to overflow at stage of about 5 feet; left bank high and not subject to overflow. Control is gravel riffle 200 feet downstream from gage; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.52 feet the afternoon of August 13 (discharge, 2,410 second-feet); minimum stage, 0.83 foot October 2–6 (discharge, 55 second-feet).

1911–1916; 1920–1923: Maximum stage recorded, 5.9 feet the afternoon of July 20, 1921 (discharge, 4,080 second-feet); minimum discharge, 35 second-feet November 24, 1914.

ICE.—Stage-discharge relation not affected by ice.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined below 800 second-feet; extended above that point on basis of a computed discharge by Kutter's formula at a stage of 6.7 feet (discharge, 5,040 second-feet). Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good below 800 second-feet; fair above that point.

Discharge measurements of Doe River at Valley Forge, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 16	P. E. Hanson	1.30	166	June 9	P. P. Livingston	1.35	196
Feb. 16	do	1.95	408				

Daily discharge, in second-feet, of Doe River at Valley Forge, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	59	68	97	1,180	710	223	220	183	220	153	212	168
2	57	68	115	620	800	206	216	174	216	206	183	159
3	55	68	144	650	1,110	202	216	165	230	220	168	159
4	55	64	165	325	970	206	230	162	198	174	183	150
5	55	64	485	248	710	198	285	230	189	165	368	141
6	55	64	202	212	510	230	248	248	209	305	325	135
7	80	70	165	206	485	1,340	209	223	248	345	248	156
8	84	70	147	248	412	650	209	248	202	485	202	226
9	305	64	168	216	412	460	195	248	180	325	180	168
10	368	64	345	183	680	368	180	230	162	230	305	144
11	135	64	265	153	970	510	180	216	195	192	460	138
12	90	64	186	153	800	590	174	195	230	192	435	135
13	82	64	168	144	1,510	865	230	325	265	220	1,690	156
14	82	64	156	141	970	620	248	285	209	223	620	130
15	82	82	900	368	650	460	230	248	177	180	390	130
16	82	132	535	265	562	710	206	650	162	305	285	122
17	82	88	865	248	325	1,600	206	412	147	1,690	248	115
18	82	80	740	248	325	770	220	345	153	562	223	110
19	76	86	325	248	368	770	209	265	138	345	325	118
20	72	74	265	230	305	590	198	265	153	265	265	120
21	68	68	230	206	305	510	198	248	183	226	265	368
22	68	68	195	212	305	368	189	248	192	226	285	220
23	76	68	177	202	285	368	186	265	141	220	1,180	153
24	82	64	159	248	248	412	180	265	141	189	535	132
25	80	64	147	285	220	368	174	226	202	202	345	122
26	78	64	135	285	216	345	174	212	189	171	265	112
27	74	64	128	562	285	305	168	192	174	156	248	110
28	68	64	162	1,340	248	285	174	186	209	165	265	110
29	68	63	156	680	-------	265	248	368	192	159	265	110
30	68	88	144	460	-------	248	209	390	162	144	209	106
31	68	-------	138	1,110	-------	230	-------	285	-------	248	180	-------

***Monthly** discharge of Doe River at Valley Forge, Tenn., for the year ending Sept. 30, 1923*

[Drainage area, 132 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	368	55	91.5	0.694	0.80
November	132	63	71.2	.540	.60
December	900	97	265	2.01	2.32
January	1,340	141	383	2.90	3.34
February	1,510	216	561	4.25	4.43
March	1,600	198	493	3.74	4.31
April	285	168	207	1.57	1.75
May	650	162	265	2.01	2.32
June	265	138	189	1.43	1.60
July	1,690	144	287	2.17	2.50
August	1,690	168	366	2.77	3.19
September	368	106	147	1.11	1.24
The year	1,690	55	276	2.09	28.40

NORTH FORK OF HOLSTON RIVER NEAR SALTVILLE, VA.

LOCATION.—At Cedar Branch bridge, 1½ miles northeast of Saltville, Smyth County, and 3¼ miles above mouth of Sturgeon Creek.

DRAINAGE AREA.—228 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 2, 1920, to September 30, 1923, at present site; June 11, 1907, to November 12, 1908, at Mattheson Alkali Works, 1½ miles downstream.

GAGE.—Chain gage on upstream side of bridge; read by Homer Pendergrass.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge, or by wading. Section at bridge is rough.

CHANNEL AND CONTROL.—Bed rough and rocky. Right bank high and is not overflowed; left bank above bridge low and subject to overflow. Control is at boulder rapids about 50 feet downstream from gage; probably fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.97 feet at 2 p. m. February 3 (discharge, 8,220 second-feet); minimum stage, 1.40 feet at 5 p. m. October 1 and 4 (discharge, 38 second-feet).

1907–1908; 1920–1923: Maximum stage recorded, that of February 3, 1923; minimum discharge, 33 second-feet on October 5, 1908.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Possibly some regulation from small mills above station during extreme low water.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 40 and 3,500 second-feet; extended above 3,500 second-feet. Gage read to hundredths twice daily. Daily discharge accertained by applying mean daily gage height to rating table. Records good.

The following discharge measurement was made by P. P. Livingston:
June 15, 1923: Gage height, 4.87 feet; discharge 1,180 second-feet.

Daily discharge, in second-feet, of North Fork of Holston River near Saltville, Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	43	61	49	1,260	1,320	249	235	320	277	263	95	75
2	47	47	53	786	4,730	235	249	320	335	221	102	62
3	46	44	56	610	8,160	221	249	277	495	208	109	48
4	42	51	65	530	2,880	249	263	249	350	292	95	57
5	45	56	168	277	1,510	263	320	208	292	249	168	60
6	45	61	268	320	1,200	320	495	221	249	320	136	85
7	45	61	221	292	875	2,500	442	181	221	277	119	74
8	51	53	263	825	610	1,080	395	365	495	235	106	63
9	119	51	350	780	650	690	335	460	306	208	89	144
10	425	48	690	570	690	570	306	442	263	181	114	79
11	194	49	530	460	975	530	263	365	263	156	134	69
12	123	47	306	365	925	1,080	235	306	3,600	156	181	83
13	107	59	263	320	5,440	650	263	350	6,480	156	208	74
14	74	58	235	277	2,120	530	292	263	4,000	144	194	62
15	51	55	5,360	350	1,140	460	306	365	1,140	121	134	54
16	53	64	1,780	350	1,140	690	335	690	825	425	114	57
17	51	59	1,510	320	610	2,350	335	925	570	460	105	58
18	52	61	1,700	292	495	1,080	306	610	460	365	105	60
19	51	71	735	277	320	925	277	442	380	156	82	60
20	51	78	530	249	320	735	249	380	365	119	79	69
21	49	94	380	249	320	650	235	156	495	156	70	156
22	51	68	306	306	306	530	208	292	395	119	76	208
23	65	58	277	320	263	735	194	249	320	129	61	125
24	57	59	235	335	208	975	194	460	335	156	76	99
25	61	50	221	380	235	825	156	410	410	168	75	86
26	60	51	194	380	235	570	156	380	380	129	65	65
27	53	49	168	460	292	495	156	320	350	119	69	60
28	88	54	181	2,200	263	425	142	277	425	109	58	55
29	57	45	168	1,380	-------	350	530	249	365	112	54	48
30	56	50	168	825	-------	335	442	610	277	97	71	51
31	51	-------	714	1,380	-------	306	-------	425	-------	94	85	-------

NOTE.—Gage not read Dec. 31; discharge interpolated.

49245—26†—WSP 563——12

Monthly discharge of North Fork of Holston River near Saltville, Va., for the year ending Sept. 30, 1923

[Drainage area, 228 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	425	42	76.3	0.335	0.39
November	94	44	57.1	.250	.28
December	5,360	49	583	2.56	2.95
January	2,200	249	572	2.51	2.89
February	8,160	208	1,360	5.96	6.21
March	2,500	221	697	3.06	3.53
April	530	142	285	1.25	1.40
May	925	156	373	1.64	1.89
June	6,480	221	837	3.67	4.10
July	460	94	197	.864	1.00
August	208	54	104	.456	.53
September	208	48	78.5	.344	.38
The year	8,160	42	429	1.88	25.55

NORTH FORK OF HOLSTON RIVER AT MENDOTA, VA.

LOCATION.—At highway bridge one-fourth mile east of railway station at Mendota, Washington County, and three-fourths mile below Virginia & Southwestern Railroad bridge and mouth of Abrams Creek.

DRAINAGE AREA.—500 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1920, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge, installed October 31, 1920; read by Opie Hendricks.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Channel straight for about 1,000 feet above and below gage. Right bank high and not subject to overflow; left bank subject to overflow, covering a wide stretch of cultivated land. Bed of river composed of gravel and small boulders; smooth and uniform. Control for low water is gravel shoal at head of small island about 400 feet below gage. High-water control is at Barker's mill dam, 1¼ miles downstream.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.4 feet at 4.15 p. m. February 3 (discharge, 19,600 second-feet); minimum discharge, 62 second-feet at 6 p. m. September 3.

1920–1923: Maximum stage and minimum discharge recorded, same as given above.

The United States Weather Bureau reports a stage of 17.5 feet June 14, 1907, referred to gage at Barker's mill 1½ miles downstream.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Several small mills are located above the gage but their effect is believed to be negligible.

ACCURACY.—Stage-discharge relation changed during high water February 3. Rating curve used October 1 to February 3 well defined between 100 and 2,500 second-feet; fairly well defined between 2,500 and 16,000 second-feet. Rating curve used February 4 to September 30 well defined between 100 and 2,750 second-feet; above 2,750 second-feet the two curves are identical. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good below 2,500 second-feet; fair above that point.

The following discharge measurement was made by P. P. Livingston:
June 13, 1923: Gage-height, 12.55 feet; discharge, 15,300 second-feet.

Daily discharge, in second-feet, of North Fork of Holston River at Mendota, Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	85	91	130	3,310	3,430	525	552	765	445	420	208	112
2	97	88	118	2,860	6,030	445	498	610	445	370	200	103
3	85	91	264	1,740	18,500	445	470	525	610	498	172	82
4	85	109	291	1,280	9,340	445	498	445	552	420	240	154
5	82	109	550	920	4,180	498	670	445	445	370	252	134
6	82	109	522	725	2,540	798	970	395	525	348	420	151
7	85	91	495	665	1,960	6,190	900	395	395	420	395	190
8	109	103	495	2,080	1,280	4,580	765	370	445	498	307	204
9	136	97	1,060	1,820	1,600	1,780	640	445	552	420	445	200
10	855	100	1,580	1,420	1,780	1,280	610	765	370	307	395	193
11	665	103	1,500	1,130	2,050	1,440	525	498	395	216	312	137
12	420	109	888	888	1,960	2,340	470	498	5,580	240	420	151
13	300	91	725	725	8,580	2,140	525	610	14,800	224	1,120	124
14	139	97	445	635	7,340	1,600	670	670	7,680	204	640	137
15	156	75	9,150	1,060	3,190	798	670	640	2,540	212	525	118
16	139	139	6,830	888	1,870	1,280	670	900	1,600	1,360	325	115
17	139	176	3,550	695	1,360	3,310	640	1,690	1,040	1,360	272	88
18	118	156	4,440	635	1,120	2,540	610	1,120	798	552	272	94
19	124	239	2,080	605	865	2,440	552	798	670	420	220	91
20	118	219	1,350	578	765	1,960	445	640	580	395	204	97
21	115	187	990	758	700	1,690	420	525	525	236	172	316
22	112	184	790	790	552	1,280	420	470	670	220	190	470
23	118	187	605	822	552	1,780	395	1,280	498	224	186	307
24	145	173	550	1,060	470	2,970	348	1,440	445	200	165	208
25	152	112	445	1,350	445	2,140	348	970	395	232	190	172
26	112	136	420	1,130	470	1,780	307	765	700	216	151	130
27	115	139	370	1,350	470	1,200	420	610	670	182	144	115
28	121	115	445	5,280	525	970	316	525	732	208	130	100
29	106	100	470	3,310	-------	798	970	470	610	244	140	103
30	115	133	420	1,500	-------	700	970	420	470	200	151	118
31	109	-------	395	2,450	-------	640	-------	640	-------	179	134	-------

Monthly discharge of North Fork of Holston River at Mendota, Va., for the year ending Sept. 30, 1923

[Drainage area, 500 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	855	82	172	0.344	0.40
November	239	75	129	.258	.29
December	9,150	118	1,370	2.74	3.16
January	5,280	578	1,430	2.86	3.30
February	18,500	445	3,000	6.00	6.25
March	6,190	445	1,700	3.40	3.92
April	970	307	575	1.15	1.28
May	1,690	370	688	1.38	1.59
June	14,800	370	1,540	3.08	3.44
July	1,360	179	374	.748	.86
August	1,120	130	293	.586	.68
September	470	82	157	.314	.35
The year	18,500	75	939	1.88	25.52

LITTLE TENNESSEE RIVER AT FRANKLIN, N. C.

LOCATION.—At highway bridge one-fourth mile northeast of Southern Railway station at Franklin, Macon County, and 1 mile below mouth of Cullasaja Creek.

DRAINAGE AREA.—297 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 12, 1907, to July 12, 1910; February 9, 1921, to September 30, 1923.

GAGE.—Chain gage attached to upstream side of highway bridge, set at datum of old staff gage on right bank 700 feet upstream from bridge which was used 1907–1910; read by H. H. Mashburn.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Channel above and below gage is slightly curved. Bed of stream composed of rock, sand, and gravel; fairly permanent. Banks are steep but extreme floods will overflow both banks and cultivated flats. Control formed by a boulder riffle just below bridge and another 800 feet below. The remains of an old fish trap about one-fourth mile below will probably have no effect on stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.6 feet at 5.10 p. m. December 17 (discharge, 5,550 second-feet); minimum stage, 1.02 feet at 8 a. m. November 18 and 5.10 p. m. November 25 (discharge, 201 second-feet).

1907–1910 and 1921–1923: Maximum stage recorded, 10.0 feet at 7 a. m. June 4, 1909 (discharge, 7,950 second-feet); minimum stage, that of November 18 and 25, 1922.

ICE.—None during year.

REGULATION.—A few small plants on tributaries cause diurnal fluctuations at low stages.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Little Tennessee River at Franklin, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
June 14	L. J. Hall	2.62	1,040	Aug. 26	W. R. King	1.53	386
15	do	2.54	1,000	26	L. J. Hall and W. R. King.	1.53	392

Daily discharge, in second-feet, of Little Tennessee River at Franklin, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	242	242	242	2,330	890	890	792	825	2,330	728	515	375
2	260	260	465	1,250	960	792	760	792	1,980	825	490	355
3	242	242	1,100	1,030	960	760	792	792	1,800	792	490	375
4	242	242	662	890	1,180	760	960	890	1,480	760	465	398
5	225	242	465	792	2,330	728	1,030	1,030	1,640	792	465	375
6	242	242	398	728	1,720	728	890	960	1,560	695	420	375
7	442	242	355	695	1,400	1,100	825	890	1,400	792	630	398
8	490	242	465	728	1,100	890	890	1,100	1,320	760	490	398
9	398	225	890	630	1,030	792	825	960	1,180	728	630	355
10	355	242	662	570	1,030	760	792	890	1,100	630	662	335
11	295	242	570	570	960	825	792	825	1,100	600	490	335
12	278	225	465	515	890	1,030	760	792	1,640	600	465	335
13	260	225	442	515	3,140	1,480	1,980	890	1,180	792	515	315
14	260	242	442	490	1,890	1,320	2,870	792	1,030	825	420	295
15	315	242	1,100	825	1,480	1,030	1,640	792	960	662	420	278
16	295	278	960	600	1,250	2,510	1,320	1,890	890	695	398	295
17	295	242	3,860	542	1,180	2,600	1,180	1,250	890	960	398	295
18	260	210	2,690	542	1,030	1,800	1,100	1,100	825	792	570	278
19	260	335	1,250	542	960	1,890	1,030	1,030	825	630	542	278
20	260	260	890	570	960	1,480	960	1,320	825	600	465	295
21	260	242	515	515	890	1,320	1,030	1,320	825	570	420	442
22	242	242	695	542	825	1,250	890	1,100	825	542	398	465
23	260	242	630	890	792	1,180	890	3,950	825	515	490	375
24	355	210	542	1,720	760	1,180	1,030	2,870	960	490	542	355
25	278	210	542	1,480	760	1,030	890	1,720	890	515	398	375
26	260	210	515	1,180	792	1,030	825	1,890	825	465	375	355
27	242	242	515	1,030	1,180	960	825	1,720	760	442	375	355
28	225	242	1,180	1,100	890	890	890	2,150	1,180	515	570	335
29	242	225	760	960	-------	890	960	2,960	890	760	630	315
30	260	225	662	890	-------	890	890	3,770	760	542	442	295
31	242	-------	662	1,030	-------	825	-------	2,690	-------	490	398	-------

NOTE.—Discharge Dec. 17 and 18 determined from mean daily gage height ascertained from graph constructed on basis of two daily readings and a third reading on Dec. 17.

Monthly discharge of Little Tennessee River at Franklin, N. C., for the year ending Sept. 30, 1923

[Drainage area, 297 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	490	225	283	0.953	1.10
November	335	210	240	.808	.90
December	3,860	242	826	2.78	3.20
January	2,330	490	861	2.90	3.34
February	3,140	760	1,190	4.01	4.18
March	2,600	728	1,150	3.87	4.46
April	2,870	760	1,040	3.50	3.90
May	3,950	792	1,480	4.98	5.74
June	2,330	760	1,160	3.91	4.36
July	960	442	661	2.23	2.57
August	662	375	483	1.63	1.88
September	465	278	347	1.17	1.30
The year	3,950	210	808	2.72	36.93

LITTLE TENNESSEE RIVER AT JUDSON, N. C.

LOCATION.—One-fourth mile downstream from concrete highway bridge at Judson railroad station, Swain County, half a mile below mouth of Yalaka Creek, 1 mile upstream from old United States Geological Survey gaging station site at Southern Railway bridge, and 3 miles below mouth of Nantahala River at Almond, N. C.

DRAINAGE AREA.—668 square miles (measured by Knoxville Power Co. on topographic maps).

RECORDS AVAILABLE.—April 16, 1912, to September 30, 1923. June 25, 1896, to September 13, 1913, at old station of United States Geological Survey at Southern Railway bridge.

GAGE.—Vertical staff attached to big sycamore tree on right bank; read by an employee of Knoxville Power Co. Prior to October 26, 1918, the gage was a Friez automatic recorder located at site of present rod. Recorder was washed away by flood of October 26, 1918. Datum of present gage probably somewhat different from that of Friez recorder, owing to settlement. Elevation of zero of Friez gage was 1,400 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from concrete highway bridge one-fourth mile above gage since 1920.

CHANNEL AND CONTROL.—Channel straight for several hundred feet above and below bridge. Bed of stream at bridge consists of gravel and boulders and is rough; at gage, sand, probably shifting. Banks slope, but are high and subject to overflow only during extremely high stages. Control formed by a riffle one-fourth mile below gage; probably permanent.

EXTREMES OF DISCHARGE.—Maximum mean daily stage during year, 24.0 feet December 17 (discharge, 10,800 second-feet); minimum mean daily stage, 17.1 feet November 27 (discharge, 360 second-feet).

1896–1912 (old station): Maximum stage recorded, 16.19 feet morning reading of February 28, 1902 (discharge, 43,300 second-feet, revised determination); minimum stage, 2.1 feet October 13 to November 1 and December 20, 1904 (discharge, 275 second-feet).

1913–1923: Maximum mean daily discharge, 30,000 second-feet March 4, 1917; minimum mean daily discharge, that of November 27, 1922.

ICE.—None during year.

REGULATION.—Very slight diurnal fluctuations during low stages from small plants on tributaries.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 2,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by Knoxville Power Co., a subsidiary of the Aluminum Co. of America.

Discharge measurements of Little Tennessee River at Judson, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
June 13	L. J. Hall	19.98	3,140	Aug. 24	W. R. King and W. E. Hall.	18.33	1,390
Aug. 24	L. J. and W. E. Hall	18.33	1,270				

Daily discharge, in second-feet, of Little Tennessee River at Judson, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	570	450	400	4,900	2,410	1,950	1,850	1,850	4,250	1,650	900	810
2	540	425	945	2,930	2,410	1,850	1,750	1,850	3,500	1,550	1,040	605
3	510	425	2,930	2,410	3,070	1,750	1,750	1,750	3,070	1,550	1,080	765
4	450	400	2,170	1,950	3,350	1,850	2,060	1,750	2,930	1,750	1,080	855
5	480	400	1,450	1,850	5,790	1,750	2,410	1,950	2,930	1,650	990	810
6	570	400	990	1,650	6,170	1,750	1,950	1,950	2,790	1,750	990	640
7	1,040	400	990	1,550	5,240	3,070	1,450	1,750	2,660	1,750	1,950	605
8	1,040	380	1,040	1,750	3,210	2,290	1,750	2,170	2,530	1,350	1,170	605
9	855	400	1,750	1,550	2,410	2,060	1,850	1,950	2,290	1,550	1,850	570
10	765	400	1,750	1,350	2,530	1,950	1,750	1,850	2,290	1,350	1,750	450
11	605	380	1,450	1,350	2,410	2,410	1,850	1,750	2,290	1,350	1,350	450
12	510	380	1,350	1,260	2,170	2,410	1,750	1,750	5,420	1,170	1,170	425
13	510	380	1,170	1,260	3,500	3,500	3,500	1,950	3,070	1,260	1,170	400
14	510	380	1,170	1,260	5,240	3,350	5,600	1,750	2,530	1,350	1,040	400
15	510	400	3,950	1,950	3,800	2,790	3,800	1,950	2,170	1,350	900	400
16	540	425	3,210	1,550	3,070	4,570	2,930	4,410	2,060	1,450	810	450
17	540	400	10,800	1,350	2,660	6,170	2,660	3,210	1,950	1,450	945	425
18	510	400	6,930	1,350	1,350	4,410	2,410	2,660	1,850	1,450	1,850	400
19	480	400	3,650	1,350	1,260	4,100	2,170	2,290	1,850	1,350	1,350	400
20	480	400	2,410	1,350	2,170	3,350	2,060	3,070	1,850	1,260	1,120	450
21	450	400	2,060	1,350	2,060	3,070	2,060	3,210	1,850	1,170	1,080	1,950
22	480	380	1,750	1,450	1,950	2,790	1,950	2,790	1,850	1,170	1,120	1,170
23	540	380	1,550	1,650	1,850	2,930	1,850	4,250	2,060	1,170	1,350	1,750
24	900	380	1,260	5,240	1,750	2,930	2,290	4,410	2,060	1,080	1,170	1,550
25	605	380	1,170	3,800	1,750	2,410	2,170	3,350	2,060	1,120	1,040	1,350
26	540	380	1,080	2,660	1,850	2,410	2,060	3,500	1,850	990	1,040	990
27	540	360	1,350	2,410	2,530	2,170	1,950	3,070	1,650	990	680	1,350
28	510	380	1,350	2,660	2,170	2,060	2,060	3,500	2,660	1,040	570	990
29	480	380	1,750	2,290	-------	2,060	2,170	5,070	2,170	1,850	1,170	605
30	450	400	1,550	2,290	-------	1,950	2,060	6,170	1,850	1,080	945	605
31	450	-------	1,450	2,660	-------	1,950	-------	5,070	-------	900	810	-------

NOTE.—Discharge, June 24–30, estimated by comparison with graph of Little Tennessee River at Franklin and Nantahala River at Almond.

Monthly discharge of Little Tennessee River at Judson, N. C., for the year ending Sept. 30, 1923

[Drainage area, 668 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,040	450	579	0.867	1.00
November	450	360	395	.591	.66
December	10,800	400	2,160	3.23	3.72
January	5,240	1,260	2,080	3.11	3.58
February	6,170	1,260	2,860	4.28	4.46
March	6,170	1,750	2,710	4.06	4.68
April	5,600	1,450	2,260	3.38	3.77
May	6,170	1,750	2,840	4.25	4.90
June	5,420	1,650	2,480	3.71	4.14
July	1,850	900	1,350	2.02	2.33
August	1,950	570	1,140	1.71	1.97
September	1,950	400	774	1.16	1.29
The year	10,800	360	1,800	2.69	36.50

LITTLE TENNESSEE RIVER AT CALDERWOOD, TENN.

LOCATION.—At pump house of Knoxville Power Co. at Calderwood, Blount County, 8 miles below North Carolina-Tennessee State line, 10 miles below mouth of Cheoah River and dam and power house of Aluminum Co. of America.

DRAINAGE AREA.—1,870 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1912, to December 31, 1918; January 1, 1921, to September 30, 1923.

GAGE.—A vertical staff gage installed July 20, 1922, at the downstream end of timber crib pier near right end of highway bridge was used until May 31, 1923; read by Johnnie Nichols. From June 1 to September 30, 1923, a vertical staff in three sections at the pump house of the Aluminum Co., 1,000 feet downstream from the gage at highway bridge; low-water section attached to the upstream side of the pumphouse intake crib; second section attached to a tree 25 feet upstream from low-water section; and high-water section attached to vertical post supporting one side of porch of an adjacent construction camp building, 10 feet back from the middle section. This gage is at the same location and set to the same datum as the former Aluminum Co. gage which is described in their records as the "Section gage."

DISCHARGE MEASUREMENTS.—Made from upstream side of highway bridge, 1,000 feet above gage.

CHANNEL AND CONTROL.—Stream bed composed of coarse gravel, smooth and uniform. Left bank steep hillside, subject to overflow above stages of 12 feet. Right bank gradual slope, subject to overflow above stages of about 10 feet. Control for gage at bridge is rock and gravel shoal 300 feet below bridge; control for pump house gage is rock and gravel shoal about 800 feet downstream from gage; both probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.90 feet at 5 p. m. December 17 (discharge, 36,400 second-feet); minimum stage recorded, 0.76 foot at 8 a. m. November 20 (discharge, 364 second-feet).

1912–1918; 1921–1923: Maximum mean daily discharge recorded, 70,000 second-feet March 4, 1917; minimum discharge, that of November 20, 1922.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Considerable regulation of flow caused by operation at the dam and power house 10 miles upstream.

ACCURACY.—Stage-discharge relation practically permanent for both gages. Both rating curves well defined between 1,000 and 25,000 second-feet; extended beyond these limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating tables. Records good above 1,000 second-feet; fair below that point.

COOPERATION.—Gage-height record furnished by Knoxville Power Co.., a subsidiary of the Aluminum Co. of America.

The following discharge measurement was made by P. E. Hanson:
November 8, 1922: Gage height, 1.53 feet; discharge, 2,030 second-feet.

Daily discharge, in second-feet, of Little Tennessee River at Calderwood, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,560	1,470	1,080	12,600	9,840	5,660	4,950	5,660	11,100	4,180	3,260	2,460
2	1,400	1,620	2,850	8,050	9,390	4,950	4,950	4,950	9,120	4,180	3,860	2,220
3	1,600	1,810	6,410	6,410	12,200	4,620	4,950	4,950	8,640	4,860	3,700	2,460
4	1,670	1,830	6,410	5,660	13,600	5,300	6,410	4,950	7,710	5,220	3,260	2,100
5	1,670	1,620	4,460	4,950	17,500	4,950	7,620	5,660	7,710	4,340	3,120	2,340
6	1,650	1,810	3,260	4,620	16,500	5,300	6,410	5,660	7,710	4,340	3,260	2,340
7	1,650	1,830	3,120	4,300	12,200	15,000	6,030	4,950	7,260	4,510	5,990	2,220
8	950	1,780	3,120	5,300	9,840	8,940	6,030	6,410	6,400	4,340	4,020	2,100
9	1,250	1,340	3,120	4,140	8,490	7,200	6,410	6,030	5,990	4,020	4,020	1,380
10	1,400	1,290	5,300	4,140	8,050	6,410	5,300	5,300	5,600	3,700	4,510	2,340
11	1,560	1,100	3,840	3,540	6,410	9,840	5,300	4,950	7,260	3,550	3,860	2,220
12	1,600	1,030	3,990	3,540	6,410	9,390	4,620	4,620	11,600	3,550	3,860	2,100
13	1,560	1,250	3,540	3,400	16,500	11,700	8,050	6,800	9,610	3,260	3,700	2,340
14	1,560	1,200	3,260	3,400	17,000	10,800	16,500	5,660	7,710	5,220	3,400	1,990
15	516	1,200	14,500	6,410	11,200	8,940	9,840	5,300	6,400	3,550	3,550	1,990
16	971	1,620	11,700	4,620	8,050	11,700	8,050	14,500	5,990	3,550	2,710	1,880
17	1,420	1,250	26,900	3,990	8,490	20,500	7,200	10,800	5,600	4,510	2,710	1,880
18	1,400	931	19,500	3,990	6,030	13,600	7,200	8,050	5,220	5,600	2,710	2,340
19	1,490	598	6,410	3,990	7,200	13,600	6,410	6,410	4,860	3,700	3,700	2,340
20	1,490	931	10,800	3,690	6,410	10,800	8,050	8,050	4,510	3,700	3,400	2,340
21	1,490	1,120	5,660	3,840	6,410	8,940	5,660	9,840	5,220	3,120	2,710	1,880
22	1,450	1,100	4,950	3,990	5,300	8,940	5,300	8,050	4,510	4,180	3,400	2,220
23	1,580	1,100	4,620	5,300	4,950	8,940	4,950	8,490	4,510	3,400	3,120	2,100
24	1,780	1,120	3,990	17,500	4,950	9,390	6,800	12,600	4,510	2,980	2,840	2,100
25	1,580	817	3,840	12,800	4,950	8,050	5,660	9,840	5,990	3,260	2,980	2,340
26	1,560	532	3,540	8,050	4,620	7,620	5,660	8,940	5,990	2,980	2,460	2,100
27	1,470	992	3,400	8,050	6,410	6,800	5,660	8,050	4,860	2,840	2,980	2,100
28	1,490	1,380	5,300	12,600	6,030	6,410	5,660	8,940	5,600	2,840	2,460	1,990
29	1,450	1,290	4,460	7,620	-------	5,660	6,800	11,700	5,220	4,860	2,340	2,220
30	1,450	950	3,690	7,200	-------	5,660	6,800	15,500	4,510	3,550	2,840	1,990
31	1,490	-------	3,990	13,600	-------	5,660	-------	13,100	-------	3,260	2,340	-------

NOTE.—Gage not read Nov. 13, 14, and Jan. 25; discharge estimated.

Monthly discharge of Little Tennessee River at Calderwood, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 1,870 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,780	516	1,460	0.781	0.90
November	1,830	532	1,260	.675	.75
December	26,900	1,080	6,160	3.29	3.79
January	17,500	3,400	6,490	3.47	4.00
February	17,500	4,620	9,100	4.87	5.07
March	20,500	4,620	8,750	4.68	5.40
April	16,500	4,620	6,640	3.55	3.96
May	15,500	4,620	7,890	4.22	4.86
June	11,600	4,510	6,560	3.51	3.92
July	5,600	2,840	3,910	2.09	2.41
August	5,990	2,340	3,320	1.78	2.05
September	2,460	1,380	2,150	1.15	1.28
The year	26,900	516	5,300	2.83	38.39

LITTLE TENNESSEE RIVER AT McGHEE, TENN.

LOCATION.—At Louisville & Nashville Railroad bridge half a mile south of railroad station at McGhee, Monroe County, and half a mile downstream from mouth of Tellico River.

DRAINAGE AREA.—2,470 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1905, to December 31, 1913, and October 1 1918, to September 30, 1923. Gage-height records have been obtained by the United States Weather Bureau since November 29, 1904.

GAGE.—Chain gage bolted to ties on upstream side of railroad bridge; read by Annie V. Ray. Datum unchanged since October 1, 1918; for changes in datum previous to that date see Water-Supply Paper 503.

DISCHARGE MEASUREMENTS.—Made from downstream lower chord members of the nine-span bridge.

CHANNEL AND CONTROL.—Banks are subject to overflow above a gage height of 12 feet, but all water passes under the bridge and its trestle approaches Bed is rocky; probably permanent. Control practically permanent although flood stages on Tennessee River may affect gage readings at times.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.3 feet at 7 a. m. December 18 (discharge, 51,600 second-feet); minimum stage, 2.7 feet October 16, November 19, and 27 (discharge, 1,070 second-feet).

1905–1923: Maximum stage recorded 30.0 feet at 5 p. m. November 19, 1906 (30.8 feet referred to present datum); the flood of April 2, 1920, reached a stage of 30.5 feet at noon (discharge not determined). Minimum discharge, 720 second-feet December 9, 1918 (caused by the closing of Cheoah power dam) and October 2, 1919.

The United States Weather Bureau reports a stage of 39.0 feet March, 1867 (discharge not determined).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Large power development of Knoxville Power Co., 30 miles upstream causes some diurnal fluctuation at gage.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 1,500 and 25,000 second-feet; extended beyond these limits. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair except for low stages when discharge for individual days may be greatly in error because of regulation at power plant above.

Discharge measurements of Little Tennessee River at McGhee, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 6	P. E. Hanson	3.22	1,850	Feb. 5	P. E. Hanson	10.06	21,100

Daily discharge, in second-feet, of Little Tennessee River at McGhee, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,810	1,490	1,200	8,410	15,200	6,480	6,480	7,570	14,600	4,680	3,980	2,900
2	1,650	1,340	1,650	14,900	12,200	5,940	5,680	6,210	12,200	4,680	5,170	2,700
3	1,650	1,810	5,680	7,020	13,700	5,680	5,680	6,210	10,100	4,920	4,680	2,510
4	1,650	1,810	12,200	7,570	29,600	5,170	6,480	5,940	8,970	4,680	4,210	3,310
5	1,650	1,810	6,480	6,210	18,900	6,480	8,970	5,680	9,250	5,170	3,750	2,700
6	1,650	1,650	4,210	5,680	29,600	4,920	8,690	6,750	8,970	4,680	3,530	2,700
7	1,650	1,810	3,750	5,170	18,200	27,300	7,020	5,940	8,690	4,440	4,680	2,900
8	1,650	1,980	3,530	4,680	14,900	15,200	6,480	6,210	8,690	4,920	4,920	2,510
9	1,490	1,490	3,980	5,420	11,900	10,100	7,850	8,970	7,850	5,420	4,210	2,700
10	1,650	1,490	6,750	4,440	11,000	8,410	6,480	7,020	6,480	4,210	4,920	1,980
11	1,650	1,340	4,920	4,440	10,700	11,600	6,210	6,210	6,750	4,210	5,170	2,510
12	1,650	1,200	4,210	3,980	9,250	15,600	5,680	5,680	9,820	3,980	4,210	2,330
13	1,490	1,490	4,920	3,750	13,100	13,100	5,170	6,210	15,900	3,530	4,440	2,510
14	1,650	1,340	3,980	3,530	32,900	15,900	23,700	8,130	10,100	3,100	4,680	2,330
15	1,490	1,340	10,100	4,680	15,600	11,900	14,900	6,480	8,690	3,530	3,750	2,150
16	1,070	1,810	33,700	5,680	12,200	10,400	11,000	13,100	7,020	3,750	3,310	2,330
17	1,490	1,650	15,200	4,680	10,100	39,000	8,970	17,800	7,020	4,920	3,530	1,980
18	1,650	1,490	51,600	3,980	8,970	21,600	8,130	11,000	6,480	6,750	3,310	2,150
19	1,490	1,070	16,800	4,440	8,410	16,500	7,570	9,250	5,170	5,420	4,920	2,510
20	1,490	1,340	10,700	4,210	7,570	15,600	7,020	8,410	5,420	3,980	4,210	2,330
21	1,490	1,490	7,570	4,440	7,290	12,500	6,480	14,600	5,680	3,750	3,310	2,510
22	1,490	1,650	6,210	4,440	6,480	9,530	7,290	10,400	6,210	3,310	3,530	2,150
23	1,490	1,810	5,680	5,680	6,210	11,900	6,210	11,300	5,680	4,920	3,100	2,700
24	1,980	1,650	4,680	26,600	5,680	14,600	7,850	21,600	5,680	3,750	3,530	2,330
25	1,810	1,650	4,210	15,900	5,680	11,300	9,820	14,900	5,680	3,750	2,900	2,510
26	1,650	1,340	3,980	10,700	5,680	9,820	7,290	11,600	5,680	3,750	2,900	2,330
27	1,490	1,070	3,980	8,690	6,750	8,690	6,480	11,000	5,680	3,530	2,700	2,150
28	1,490	1,650	4,680	15,200	8,690	7,850	6,750	10,700	6,480	3,750	2,700	1,980
29	1,490	1,650	6,480	13,700	-------	7,570	8,130	13,400	7,850	5,420	3,100	1,980
30	1,340	1,650	4,680	10,100	-------	7,020	8,970	17,800	5,680	6,210	3,100	2,700
31	1,490	-------	4,440	18,900	-------	6,750	-------	20,900	-------	4,440	2,900	-------

Monthly discharge of Little Tennessee River at McGhee, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 2,470 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,980	1,070	1,580	0.640	0.74
November	1,980	1,070	1,550	.628	.70
December	51,600	1,200	8,460	3.43	3.95
January	26,600	3,530	7,970	3.23	3.72
February	32,900	5,680	12,700	5.14	5.35
March	39,000	4,920	12,100	4.90	5.65
April	23,700	5,170	8,110	3.28	3.66
May	21,600	5,680	10,200	4.13	4.76
June	15,900	5,170	7,950	3.22	3.59
July	6,750	3,100	4,440	1.80	2.08
August	5,170	2,700	3,850	1.56	1.80
September	3,310	1,980	2,450	.992	1.11
The year	51,600	1,070	6,750	2.73	37.11

CULLASAJA CREEK AT CULLASAJA, N. C.

LOCATION.—At wooden highway bridge at Cullasaja, Macon County, on road from Franklin to Cullasaja Falls, 1 mile below mouth of Ellijay Creek, 3½ miles above junction of Cullasaja Creek and Little Tennessee River, and 5 miles downstream from Cullasaja Falls.

DRAINAGE AREA.—87 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 13, 1907, to December 31, 1909; February 12, 1921, to September 30, 1923.

GAGE.—Enameled vertical staff bolted to face of rock bluff on right bank 50 feet upstream from bridge; installed July 11, 1921. Gage used prior to that date was a wooden vertical staff attached to left bank pier of bridge. Gage datum unchanged. Gage read by J. L. Clark.

DISCHARGE MEASUREMENTS.—Made from the bridge.

CHANNEL AND CONTROL.—Channel straight for 200 feet above and below gage. Bed of stream composed of rock and boulders; permanent. Banks high and not subject to overflow. Control is a solid rock ledge and boulders which form a riffle just below bridge; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.1 feet at 7 a. m., May 23 (discharge, 3,740 second-feet); minimum stage, 0.66 foot at 7 a. m., November 29 (discharge, 58 second-feet).

1907–1909; 1921–1923: Maximum and minimum stages same as given above. A stage of 17.2 feet occurred during the flood in July, 1916, determined by leveling to high-water mark (discharge not determined).

ICE.—None this year.

DIVERSIONS.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 78 and 770 second-feet; extended above that point. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Cullasaja Creek at Cullasaja, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
June 15	L. J. Hall	2.24	318	Aug. 26	L. J. Hall and W. R. King	1.12	102
Aug. 26	W. R. King	1.11	96.3				

Daily discharge, in second-feet, of Cullasaja Creek at Cullasaja, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	74	69	74	1,080	250	240	240	261	815	240	172	100
2	69	69	126	550	261	210	240	250	680	250	140	100
3	65	69	210	378	261	200	240	240	550	261	133	100
4	65	69	133	350	350	200	474	336	510	230	126	106
5	65	69	112	336	905	190	336	350	550	220	126	112
6	83	69	100	284	474	220	296	309	590	240	172	106
7	119	69	100	240	378	336	261	350	550	200	172	156
8	126	69	94	220	336	261	261	408	440	200	126	112
9	119	69	200	210	309	240	240	336	408	190	133	94
10	106	69	230	200	309	230	230	296	378	190	140	88
11	83	69	200	190	309	240	220	284	350	190	126	83
12	78	69	164	181	309	322	510	272	550	181	220	83
13	74	69	106	156	770	240	1,260	296	378	220	181	83
14	74	69	112	156	474	230	635	284	336	190	126	83
15	74	69	309	156	378	240	474	408	309	261	112	78
16	74	74	230	156	336	1,180	408	680	284	200	112	78
17	74	69	1,670	156	322	950	408	408	272	550	112	78
18	74	69	550	156	296	680	378	378	261	284	164	78
19	74	88	322	148	296	860	309	336	240	200	126	83
20	69	83	240	148	284	474	284	474	296	172	112	78
21	69	78	210	148	261	440	272	408	272	156	106	250
22	88	74	200	148	250	408	261	350	240	148	106	133
23	94	69	181	181	250	378	350	1,670	250	148	164	112
24	83	65	156	510	250	336	350	950	309	140	119	100
25	78	61	148	408	230	309	296	725	284	140	106	119
26	74	61	148	336	250	296	272	860	240	133	100	112
27	74	61	250	284	378	296	261	680	230	126	100	106
28	69	65	408	336	284	272	250	905	408	220	148	100
29	69	61	261	284	------	272	296	1,180	261	210	148	88
30	69	78	250	284	------	261	261	1,040	240	156	119	88
31	69	------	322	272	------	250	------	905	------	133	106	------

NOTE.—Discharge for May 23 and Sept. 21 determined from mean daily gage height ascertained from graph constructed on basis of three and two daily readings respectively.

Monthly discharge of Cullasaja Creek at Cullasaja, N. C., for the year ending Sept. 30, 1923

[Drainage area, 87 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	126	65	79.8	0.917	1.06
November	88	61	69.7	.801	.89
December	1,670	74	252	2.90	3.34
January	1,080	148	279	3.21	3.70
February	905	230	349	4.01	4.18
March	1,180	190	363	4.17	4.81
April	1,260	220	352	4.05	4.52
May	1,670	240	536	6.16	7.10
June	815	230	383	4.40	4.91
July	550	126	206	2.37	2.73
August	220	100	134	1.54	1.78
September	250	78	103	1.18	1.32
The year	1,670	61	258	2.97	40.34

NANTAHALA RIVER AT ALMOND, N. C.

LOCATION.—At Almond, Swain County, 1,000 feet downstream from railroad station and concrete highway bridge and one-fourth mile above junction of Nantahala and Little Tennessee rivers.

DRAINAGE AREA.—177 square miles (measured on topographic map).

RECORDS AVAILABLE.—April 16, 1912, to November 30, 1917; January 31, 1921, to September 30, 1923.

GAGE.—Present gage is an enamel-faced staff attached to a large blackgum tree on right bank near rear of J. H. Coffey's store; read by Mrs. Coffey. For description of gages used 1912–1917 by Knoxville Power Co., see Water-Supply Paper 523.

DISCHARGE MEASUREMENTS.—Made from concrete highway bridge 1,000 feet above gage.

CHANNEL AND CONTROL.—Channel straight for several hundred feet above and below gage. Bed consists of gravel and boulders, probably permanent. Both banks slope gradually to river at gage and converge to high, steep banks 600 feet downstream. Control formed by a rocky riffle, which breaks off sharply 500 feet below gage. Though the Nantahala joins Tennessee River only one-fourth mile below gage, the fall in that distance is so great that there is little chance of backwater.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.1 feet at 5 p. m. December 17 (discharge, 7,500 second-feet); minimum stage, 0.7 foot at 5 p. m. November 29 (discharge, 115 second-feet).

1912–1917; 1921–1923: Maximum stage recorded, 7.75 feet at 1.30 p. m. January 21, 1922 (discharge, 15,400 second-feet); crest stage record not available for March 4, 1917, for which mean discharge was 15,240 second-feet. Minimum stage, that of November 29, 1922.

ICE.—None during this year.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 3,000 second-feet; extended above that point. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Discharge measurements of Nantahala River at Almond, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
June 13	L. J. Hall	2.25	1,100	Aug. 24	W. R. King and W. E. Hall	1.36	409
Aug. 24	L. J. and W. E. Hall	1.36	406				

Daily discharge, in second-feet, of Nantahala River at Almond, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	170	148	182	1,860	1,050	770	690	690	1,540	610	400	334
2	150	132	535	1,100	1,300	690	690	690	1,250	572	465	329
3	150	150	1,600	950	1,480	690	770	650	1,150	610	400	364
4	150	132	950	770	1,600	730	860	650	1,050	860	388	352
5	132	132	610	730	2,460	690	950	650	1,150	650	400	370
6	170	132	465	690	1,860	730	860	610	950	690	382	329
7	296	150	388	650	1,480	1,360	770	610	950	650	650	329
8	340	143	500	690	1,250	950	860	770	950	650	500	329
9	199	132	860	610	1,150	860	770	690	860	610	610	312
10	170	132	815	572	1,150	815	730	650	815	535	572	280
11	158	132	610	535	1,050	1,150	690	610	995	500	500	255
12	150	132	572	535	950	1,150	690	610	1,600	500	465	255
13	150	132	535	500	3,660	1,600	1,480	860	1,250	500	465	250
14	150	132	535	500	2,150	1,360	1,730	690	1,050	610	432	240
15	170	158	2,150	950	1,600	1,150	1,250	770	905	500	394	235
16	170	465	1,420	650	1,360	1,860	1,050	1,860	860	500	376	235
17	170	158	4,800	610	1,200	2,300	950	1,200	815	650	358	235
18	170	150	2,300	572	1,150	1,600	950	1,060	730	572	730	226
19	150	199	1,420	572	1,000	1,600	860	905	690	500	535	235
20	143	212	1,050	610	950	1,300	770	1,300	690	465	388	235
21	132	170	860	535	860	1,150	770	1,250	650	432	376	318
22	132	150	770	610	860	1,100	770	1,050	650	400	500	255
23	190	150	690	770	770	1,150	690	1,050	905	432	535	235
24	329	150	610	2,000	690	1,100	770	1,150	730	394	465	230
25	182	143	610	1,250	690	1,050	690	1,050	770	465	394	226
26	158	132	535	1,050	730	950	690	1,150	650	388	376	230
27	150	150	535	950	1,000	905	690	1,050	610	370	352	260
28	150	170	860	1,150	770	860	815	1,250	905	400	352	226
29	150	143	610	950	-------	770	860	1,600	815	690	465	212
30	150	158	535	950	-------	770	770	2,300	650	432	358	217
31	150	-------	610	1,200	-------	770	-------	1,860	-------	388	334	-------

Monthly discharge of Nantahala River at Almond, N. C., for the year ending Sept. 30, 1923

[Drainage area, 177 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	340	132	174	0.983	1.13
November	465	132	159	.898	1.00
December	4,800	182	952	5.38	6.20
January	2,000	500	841	4.75	5.48
February	3,660	690	1,290	7.29	7.59
March	2,300	690	1,090	6.16	7.10
April	1,730	690	863	4.88	5.44
May	2,300	610	1,010	5.71	6.58
June	1,600	610	916	5.18	5.78
July	860	370	533	3.01	3.47
August	730	334	449	2.54	2.93
September	370	212	271	1.53	1.71
The year	4,800	132	710	4.01	54.41

TUCKASEGEE RIVER NEAR EAST LAPORT, N. C.

LOCATION.—At steel highway bridge on road between Sylva, and East Laport, 1 mile west of East Laport, Jackson County, 1½ miles downstream from mouth of Caney Fork, and 7½ miles southeast of Sylva.

DRAINAGE AREA.—200 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 27, 1907, to December 31, 1909; December 21, 1920, to September 30, 1923.

GAGE.—Chain gage attached to downstream handrail of bridge; read by W. D. Wike. Gage used 1907–1909 was a vertical staff attached to a post on left bank 75 feet below site of present gage. No change in gage datum.

DISCHARGE MEASUREMENTS.—Made from the bridge.

CHANNEL AND CONTROL.—Channel straight for 500 feet above and below gage. Bed is rock, sand, and gravel; cross-section slightly shifting. Right bank high but is overflowed beyond end of bridge at extremely high stages; left bank high and not subject to overflow. Control formed by a series of solid rock riffles several hundred feet below gage; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.80 feet at noon December 17 (discharge, 4,220 second-feet); minimum stage, 0.99 foot November 29 and 30 (discharge, 103 second-feet).

1907–1909 and 1920–1923: Maximum stage recorded, 9.6 feet February 15, 1908 (extimated discharge, 8,000 second-feet); minimum stage, that of November 29 and 30, 1922.

ICE.—None during the year.

REGULATION.—Practically none.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined between 150 and 2,000 second-feet; extended beyond those limits. Gage read to hundredths once daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Tuckasegee River at East Laport, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
June 17	L. J. Hall	2.53	660	Aug. 23	W. R. King and W. E. Hall	1.64	292
Aug. 23	L. J. and W. E. Hall	1.64	298				

Daily discharge, in second-feet, of Tuckasegee River near East Laport, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	147	132	134	2,380	620	504	526	482	1,480	482	526	288
2	142	132	171	910	620	461	526	482	1,270	504	461	288
3	137	127	379	694	596	461	526	461	1,140	572	419	419
4	127	132	305	549	800	461	526	572	1,020	644	419	341
5	127	132	239	526	1,410	461	746	694	1,270	596	379	305
6	127	132	182	482	1,270	461	644	644	1,270	482	379	305
7	305	132	160	440	910	746	549	596	1,140	549	461	305
8	271	132	176	549	800	572	596	855	1,270	549	440	288
9	202	127	224	419	746	526	572	694	1,020	596	461	271
10	174	123	379	379	694	504	549	596	855	694	440	271
11	163	123	255	360	644	572	504	572	800	504	440	379
12	152	123	205	360	596	572	504	549	855	504	440	305
13	147	123	199	323	1,710	910	596	572	910	572	461	288
14	142	123	205	341	1,080	746	1,270	526	800	549	379	271
15	157	123	379	482	910	644	910	526	746	482	379	271
16	157	168	620	323	746	1,790	800	1,560	694	572	341	271
17	157	132	4,220	323	644	2,200	746	965	644	1,710	440	255
18	152	168	1,200	305	549	1,270	746	800	644	746	620	255
19	137	142	694	305	526	1,560	644	694	596	549	379	239
20	137	142	504	305	596	1,020	596	965	596	504	360	3,890
21	132	123	440	323	549	910	572	800	572	504	360	549
22	137	118	379	323	526	855	549	746	549	482	323	549
23	137	118	341	323	482	800	526	2,950	549	399	461	461
24	163	118	305	746	461	910	694	1,410	694	482	323	419
25	147	114	288	746	461	746	620	1,080	855	549	305	305
26	142	109	288	620	482	694	572	1,080	694	504	305	360
27	137	109	271	572	800	694	549	965	596	360	305	341
28	132	114	1,200	800	549	644	526	1,870	596	461	461	305
29	127	103	504	694	-------	620	572	3,050	620	419	399	305
30	127	103	461	572	-------	596	549	2,200	549	461	305	288
31	132	-------	379	746	-------	572	-------	2,040	-------	482	288	-------

Monthly discharge of Tuckasegee River near East Laport, N. C., for the year ending Sept. 30, 1923

[Drainage area, 200 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	305	127	154	0.770	0.89
November	168	103	127	.635	.71
December	4,220	134	506	2.53	2.92
January	2,380	305	555	2.78	3.20
February	1,710	461	742	3.71	3.86
March	2,200	461	790	3.95	4.55
April	1,270	504	627	3.14	3.50
May	3,050	461	1,030	5.15	5.94
June	1,480	549	843	4.22	4.71
July	1,710	360	563	2.82	3.25
August	620	288	402	2.01	2.32
September	3,890	239	446	2.23	2.49
The year	4,220	103	565	2.82	38.34

TUCKASEGEE RIVER AT BRYSON, N. C.

LOCATION.—At highway bridge in Bryson, Swain County, on main street between Southern Railway station and county courthouse, half a mile below mouth of Deep Creek.

DRAINAGE AREA.—673 square miles (measured by Knoxville Power Co. on topographic maps).

RECORDS AVAILABLE.—November 7, 1897, to September 30, 1923.

GAGE.—A vertical rod attached to first pier from left bank; read by employees of Knoxville Power Co.

DISCHARGE MEASUREMENTS.—Made from downstream side of the bridge.

CHANNEL AND CONTROL.—Bed at gage is sand, gravel, and boulders; fairly permanent. Banks high and not subject to overflow beyond ends of bridge. Control is a rock, gravel, and sand riffle half a mile downstream; practically permanent.

EXTREMES OF DISCHARGE.—Maximum mean daily stage during year, 5.6 feet December 17 (discharge, 9,080 second-feet); minimum mean daily stage, 0.95 foot November 25 (discharge, 360 second-feet).

1898–1923: Maximum stage recorded, 11.0 feet (Old Geological Survey gage) March 19, 1899 (discharge, 38,600 second-feet); minimum discharge, 300 second-feet several days in September, October, and November, 1899, and August 25, 1902.

ICE.—Stage-discharge relation seldom, if ever, affected by ice.

REGULATION.—Slight diurnal fluctuations during low stages caused by operation of small plants upstream; probably not enough to affect accuracy of records during periods when record is based on two daily rod readings.

ACCURACY.—Stage-discharge relation for low water changed slightly during high water of December 17. Rating curve used up to December 17 well defined between 410 and 16,000 second-feet; curve used after December 17 is well defined between 450 and 16,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table.

COOPERATION.—Gage-height record furnished by Knoxville Power Co.

Discharge measurements of Tuckasegee River at Bryson, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
June 14	L. J. Hall	2.40	2,480	Aug. 23	W. R. King and W. E. Hall	1.79	1,500
Aug. 23	L. J. and W. E. Hall	1.79	1,540				

Daily discharge, in second-feet, of Tuckasegee River at Bryson, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	575	476	542	4,840	2,990	1,680	1,990	2,070	3,160	1,530	1,240	820
2	465	465	738	2,990	2,820	1,600	1,910	1,990	3,160	1,530	1,310	820
3	443	454	1,520	2,070	2,990	1,600	1,990	1,760	2,650	1,530	1,240	716
4	432	421	1,220	1,830	3,510	1,680	2,150	1,680	2,480	1,600	1,240	876
5	410	421	935	1,600	5,470	1,600	2,480	1,830	2,990	1,530	1,310	820
6	443	454	810	1,530	4,440	1,760	2,150	2,150	2,650	1,530	1,910	848
7	810	487	810	1,380	3,510	3,690	1,990	2,150	2,480	1,460	1,600	781
8	935	509	810	1,760	2,480	2,480	2,150	2,150	2,480	1,460	1,380	716
9	654	487	1,140	1,380	2,650	2,150	1,910	2,150	2,150	1,530	1,600	794
10	810	476	1,290	1,310	2,310	2,650	1,830	1,910	1,990	1,310	1,380	794
11	608	465	1,070	1,240	2,310	3,160	1,760	1,680	2,650	1,240	1,380	781
12	597	509	935	1,170	2,150	2,990	1,680	1,680	3,870	1,240	1,460	755
13	564	509	870	1,100	6,340	4,250	3,510	2,310	2,820	1,380	1,380	742
14	542	498	870	1,170	3,870	3,330	4,250	2,070	2,480	1,240	1,240	703
15	619	542	2,760	1,680	3,160	2,820	2,990	2,310	2,150	1,310	1,100	690
16	619	750	2,590	1,310	2,650	2,990	2,650	4,250	2,070	1,380	1,100	664
17	553	597	9,080	1,030	2,480	6,120	2,480	3,330	2,070	1,990	1,170	664
18	542	597	3,870	1,030	2,480	4,060	2,310	2,990	1,830	1,910	1,600	651
19	531	531	2,480	1,240	2,310	4,060	1,990	2,650	1,760	1,310	1,380	638
20	520	487	1,910	1,170	2,150	3,330	1,910	3,160	1,680	1,240	1,310	690
21	520	476	1,680	1,240	1,990	2,820	1,910	5,260	1,680	1,170	1,310	1,760
22	520	443	1,530	1,240	1,830	2,650	1,830	4,250	1,680	1,100	1,240	1,100
23	542	421	1,380	1,310	1,680	2,990	1,830	4,250	1,680	1,170	1,460	690
24	726	390	1,310	2,990	1,680	2,990	2,150	3,870	1,760	1,100	1,240	690
25	575	360	1,170	2,480	1,680	2,650	1,910	2,990	2,150	1,240	1,100	638
26	542	421	1,100	2,310	1,600	2,480	1,830	2,820	1,760	1,100	960	807
27	520	432	1,380	2,650	2,310	2,310	1,760	2,480	1,680	1,310	848	768
28	520	476	2,150	3,510	1,910	2,150	2,070	2,990	2,310	1,240	1,030	742
29	509	454	1,310	2,480	-------	2,070	2,150	5,050	1,830	1,530	1,240	664
30	509	443	1,170	2,820	-------	1,990	2,150	4,440	1,760	1,460	960	599
31	487	-------	2,820	3,870	-------	2,070	-------	3,690	-------	1,100	834	-------

NOTE.—No gage-height record May 15–18; discharge estimated by a comparison with graph of Little Tennessee River at Judson, N. C., and also with a graph of the sum of the discharge of Tuckasegee River at East Laport, and of Oconalufty River at Cherokee.

Monthly discharge of Tuckasegee River at Bryson, N. C., for the year ending Sept. 30, 1923

[Drainage area, 673 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	935	410	569	0.845	0.97
November	750	360	482	.716	0.80
December	9,080	542	1,720	2.56	2.95
January	4,840	1,030	1,930	2.87	3.31
February	6,340	1,600	2,780	4.13	4.30
March	6,120	1,600	2,750	4.09	4.72
April	4,250	1,680	2,190	3.25	3.63
May	5,260	1,680	2,850	4.23	4.88
June	3,870	1,680	2,260	3.36	3.75
July	1,990	1,100	1,380	2.05	2.36
August	1,910	834	1,280	1.90	2.19
September	1,760	599	781	1.16	1.29
The year	9,080	360	1,740	2.59	35.15

OCONALUFTY RIVER AT CHEROKEE, N. C.

LOCATION.—At cable footbridge one-fourth mile upstream from Cherokee Indian School in Cherokee Indian Reservation, one-fourth mile downstream from small milldam, three-fourths mile upstream from Cherokee, Swain County, and 2 miles upstream from mouth of Soco Creek.

DRAINAGE AREA.—133 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 27, 1921, to September 30, 1923, at present site; August 27, 1907, to June 30, 1908, at a site just below mouth of Soco Creek, 2 miles downstream from present gage.

GAGE.—Vertical staff with enamel face attached to a large maple on right bank 6 feet below bridge; read by J. L. Walters.

DISCHARGE MEASUREMENTS.—Made from cable footbridge just above gage.

CHANNEL AND CONTROL.—Channel straight for several hundred feet above and below gage. Banks steep and about 11 feet high. Wide cultivated bottoms on both banks are overflowed during extreme flood stages. Bed gravel and small boulders; probably permanent. A rocky riffle 400 feet below forms low-water control and is practically permanent; 1,000 feet downstream the hills close in to form bluffs on both banks which control extreme flood stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.7 feet at 7.30 a. m. December 17 (discharge, 3,030 second-feet); minimum stage, 3.55 feet various days in October and November (discharge, 78 second-feet).

1921–1923: Maximum stage recorded, 9.5 feet at 1 p. m. January 21, 1922 (discharge, not determined); minimum stage, 3.55 feet various days in October and November, 1922, (discharge, 78 second-feet).

ICE.—None during year.

REGULATION.—A small dam one-fourth mile upstream, which operates lighting system for Indian school, has very little storage but may cause sufficient diurnal fluctuation during low stages to affect accuracy of daily mean gage height.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined between 100 and 1,000 second-feet; extended beyond these limits. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Oconaluftу River at Cherokee, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
June 16	L. J. Hall	4.40	463	Aug. 25	W. R. King and W. E. Hall	4.03	261
Aug. 25	L. J. and W. E. Hall	4.03	261				

Daily discharge, in second-feet, of Oconaluftу River at Cherokee, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	108	78	118	1,440	1,130	415	415	540	685	344	260	168
2	92	87	648	610	1,230	385	385	540	610	328	355	180
3	92	87	385	475	1,330	385	415	475	540	300	328	180
4	92	78	344	415	1,180	445	475	508	475	610	355	180
5	78	78	328	367	1,790	415	765	540	540	367	344	180
6	118	78	260	355	1,330	1,030	610	475	475	355	415	180
7	131	92	225	328	1,080	1,440	540	445	475	415	385	200
8	180	87	240	385	850	808	575	540	475	367	328	192
9	118	78	385	328	765	685	475	540	445	344	311	160
10	108	78	311	300	685	610	475	475	415	311	311	160
11	92	78	225	275	610	1,230	415	445	648	290	311	160
12	92	78	275	260	575	1,230	415	445	725	275	300	160
13	92	78	260	250	2,300	1,670	1,130	765	610	415	540	142
14	98	78	290	300	1,230	1,180	985	540	540	355	311	142
15	98	142	1,550	540	940	940	765	725	508	300	275	142
16	118	168	895	344	765	1,790	648	1,790	475	300	250	142
17	118	108	2,440	300	610	1,550	610	1,030	445	475	240	131
18	108	92	1,180	311	610	1,180	540	808	475	344	311	124
19	92	108	725	328	610	1,130	508	685	415	300	260	124
20	92	92	575	344	540	895	475	1,230	385	275	225	131
21	92	92	475	328	475	765	475	940	367	260	225	367
22	87	92	367	328	445	725	415	1,550	355	250	225	168
23	142	92	311	415	403	850	415	1,550	355	250	475	142
24	160	92	290	508	355	765	575	1,030	355	225	328	142
25	98	78	275	540	355	648	475	850	367	367	260	142
26	92	78	250	540	415	610	445	765	367	240	250	124
27	92	87	275	850	685	540	445	685	344	225	210	142
28	92	98	290	1,330	475	540	508	765	685	275	210	124
29	92	87	275	808	-------	475	685	808	415	685	225	124
30	92	78	225	1,330	-------	475	648	850	415	355	250	124
31	92	-------	415	1,670	-------	415	-------	765	-------	250	180	-------

Monthly discharge of Oconaluftу River at Cherokee, N. C., for the year ending Sept. 30, 1923

[Drainage area, 133 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	180	78	105	0.789	0.91
November	168	78	90.6	.681	.76
December	2,440	118	487	3.66	4.22
January	1,670	250	545	4.10	4.73
February	2,300	355	847	6.37	6.63
March	1,790	385	846	6.36	7.33
April	1,130	385	557	4.19	4.68
May	1,790	445	777	5.84	6.73
June	725	344	480	3.61	4.03
July	685	225	337	2.53	2.92
August	540	180	298	2.24	2.58
September	367	124	159	1.20	1.34
The year	2,440	78	459	3.45	46.86

CHEOAH RIVER AT JOHNSON, N. C.

LOCATION.—One mile above store at Johnson, Graham County, 2 miles below mouth of Santeelah Creek, and 4 miles above Yellow Creek. Site of proposed dam for development No. 2 of Aluminum Co. of America is 1 mile above station.

DRAINAGE AREA.—175 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 1, 1912, to December 31, 1918, and December 29, 1920, to September 30, 1923.

GAGE.—Vertical staff fastened to large sycamore tree on right bank 100 feet upstream from W. O. Williams' house, installed December 30, 1920; read by W. O. Williams. Gage used 1912–13 by the Aluminum Co. of America was located about three-fourths mile downstream, and gage used 1914–1918 was half a mile downstream from present site.

DISCHARGE MEASUREMENTS.—Made from cable located three-fourths of a mile downstream from gage. Velocities are somewhat irregular owing to large boulders above.

CHANNEL AND CONTROL.—Bed of river is practically solid rock. Control formed by a series of rapids below gage; probably permanent. Left bank high and wooded; right bank is overflowed at a stage of about 8 feet for a distance of 50 feet back from river channel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.6 feet at 10 a. m. December 17 (discharge, 7,670 second-feet); minimum stage, 0.96 foot October 22, 23, and November 6 and 10–14 (discharge, 123 second-feet).

1912–1918; 1920–1923: Maximum mean daily discharge, 11,400 second-feet, March 4, 1917; minimum discharge, 108 second-feet, October 25–27, 1921.

ICE.—Ice forms on rocks during severe cold spells but it is seldom sufficient to affect stage-discharge relation.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 1,500 second-feet; extension above that point to 2,200 second-feet is based on a curve showing relation between readings of present gage and the one used 1914–1918 for which a rating curve was developed by the Aluminum Co. of America. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good below 2,200 second-feet; others fair.

Discharge measurements of Cheoah River at Johnson, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 7	P. E. Hanson	1.09	146	June 13	P. E. Hanson	2.74	1,200
June 13	do	2.76	1,190	Sept. 29	P. P. Livingston	1.02	142

Daily discharge, in second-feet, of Cheoah River at Johnson, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	159	132	156	1,630	1,240	702	595	630	1,090	442	470	193
2	153	135	1,190	862	1,510	630	595	630	950	470	390	193
3	147	138	2,410	740	2,700	595	702	595	820	442	342	193
4	141	132	1,090	665	2,000	780	1,140	595	820	415	306	221
5	135	129	780	595	2,850	665	995	595	820	442	342	251
6	147	123	530	562	1,870	630	820	562	702	500	302	232
7	207	162	442	530	1,510	1,630	740	562	862	442	500	224
8	442	150	530	820	1,240	1,240	820	995	740	630	342	198
9	200	132	820	630	1,090	950	740	702	630	415	530	182
10	165	126	665	562	1,090	905	665	630	595	390	390	168
11	156	123	530	470	950	2,000	630	562	950	365	320	165
12	153	123	630	442	905	1,340	595	530	1,400	342	365	159
13	156	123	500	442	3,480	1,630	2,000	1,090	1,240	342	390	153
14	147	123	530	442	1,750	1,290	1,630	780	950	365	320	147
15	153	156	3,000	820	1,340	1,090	1,140	862	780	342	293	141
16	150	320	1,400	562	1,140	2,270	950	2,270	702	390	271	141
17	176	176	5,090	530	995	2,000	862	1,190	665	740	255	141
18	156	159	2,000	500	905	1,510	820	950	630	442	390	135
19	141	196	1,240	530	820	1,630	740	820	562	365	342	138
20	135	165	950	562	780	1,190	702	1,630	530	320	259	150
21	129	150	780	595	740	1,040	862	1,090	630	306	239	280
22	123	141	665	665	702	950	740	905	530	302	267	162
23	390	135	595	1,340	630	1,140	746	1,040	530	342	302	144
24	288	138	530	2,410	630	1,040	905	1,090	500	280	275	138
25	172	138	500	1,340	595	905	780	950	530	470	239	135
26	156	126	470	1,040	702	820	702	950	530	293	224	182
27	144	132	470	1,510	1,190	780	665	950	470	275	214	221
28	141	159	702	1,510	780	740	740	1,240	780	390	243	156
29	138	150	530	995	-------	702	820	1,240	530	442	284	141
30	135	153	470	1,190	-------	665	702	2,000	470	390	224	132
31	129	-------	530	1,510	-------	630	-------	1,400	-------	302	207	-------

Monthly discharge of Cheoah River at Johnson, N. C., for the year ending Sept. 30 1923

[Drainage area, 175 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	442	123	173	0.989	1.14
November	320	123	148	.846	.94
December	5,090	156	991	5.66	6.52
January	2,410	442	871	4.98	5.74
February	3,480	595	1,290	7.37	7.68
March	2,270	595	1,100	6.29	7.25
April	2,000	595	851	4.86	5.42
May	2,270	530	969	5.54	6.39
June	1,400	470	731	4.18	4.66
July	740	275	400	2.29	2.64
August	530	207	317	1.81	2.09
September	280	132	174	.994	1.11
The year	5,090	123	665	3.80	51.58

CLINCH RIVER AT CLEVELAND, VA.

LOCATION.—At steel highway bridge in Cleveland, Russell County, a station on Norton branch of Norfolk & Western Railway.

DRAINAGE AREA.—536 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 28, 1920, to September 30, 1923.

GAGE.—Chain gage attached to upstream side of bridge; read by Odell Price.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Channel nearly straight for 1,000 feet above and below gage. Stream is a succession of pools and rock shoals and channel is believed to be permanent. Right bank high, not subject to overflow; left bank subject to overflow during floods. Control for low water is a long gravel and rock shoal about 300 feet below gage, reasonably permanent, except as noted under "Accuracy."

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.9 feet at 7.20 a. m. June 13 (discharge, 15,000 second-feet); minimum stage, 1.85 feet at 7.30 a. m. November 30 (discharge, 75 second-feet).

1920–1923: Maximum stage recorded, that of June 13, 1923; minimum stage, 1.80 feet at 7 p. m. September 9 and 8 a. m. September 10, 1922 (discharge, 55 second-feet).

ICE.—Stage-discharge relation not affected by ice.

ACCURACY.—Stage-discharge relation was seriously changed during the period May 25 to September 30 because of the construction of a fish-trap dam some distance below gage, the existence of which was not reported until after the close of the year. This dam was apparently constructed during the last part of May and first part of June, and was partly or wholly destroyed by high water about the middle of June. It was probably rebuilt during the last part of July and remained more or less stable until about September 8. After that date the extent of this backwater effect was increased until early in October, 1923, when the dam apparently was washed out. Rating curve well defined between 150 and 5,000 second-feet; extended beyond these limits. Gage read to hundredths twice daily. Daily discharge October 1 to May 31 and June 11 to July 22 ascertained by applying mean daily gage height to rating table; June 1–10 and July 23 to September 30 ascertained by shifting-control method, based upon comparative study with the station on Clinch River at Speer Ferry, Va. Records prior to May 25 are good below 5,000 second-feet; remainder of record only fair to poor owing to changes in the fish-trap dam.

The following discharge measurement was made by P. P. Livingston:
June 16, 1923: Gage height, 7.43 feet; discharge, 4,510 second-feet.

Daily discharge, in second-feet, of Clinch River at Cleveland, Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	89	95	91	2,720	2,220	620	592	915	420	1,050	398	250
2	89	101	93	2,940	9,980	592	465	702	442	915	420	232
3	89	105	95	1,600	14,100	540	465	592	442	626	420	215
4	93	112	99	1,200	7,240	540	490	515	420	490	375	200
5	89	101	232	915	4,040	490	565	465	330	490	330	185
6	89	99	420	760	2,620	790	620	465	330	442	270	185
7	93	97	375	675	2,040	5,610	540	420	565	490	250	155
8	93	87	515	760	1,680	2,620	540	420	465	515	515	142
9	108	103	702	1,760	1,430	1,680	442	592	310	980	565	270
10	330	95	1,270	1,350	1,680	1,430	375	565	330	1,120	565	620
11	850	89	1,350	915	1,680	1,430	375	540	2,940	980	1,050	565
12	310	91	790	850	1,760	2,220	375	490	8,240	915	1,600	515
13	179	87	592	675	8,610	1,860	420	1,860	14,400	790	1,600	465
14	135	91	442	592	7,610	1,430	540	3,370	8,110	592	1,050	465
15	105	91	5,480	790	2,940	1,050	730	2,620	3,820	515	915	420
16	101	132	5,740	730	1,860	1,510	790	1,200	1,680	465	915	375
17	105	158	3,590	648	1,350	4,630	730	1,200	1,200	442	980	375
18	142	164	4,160	592	980	2,830	648	980	1,050	420	675	420
19	130	152	2,420	565	850	2,420	515	730	980	398	675	375
20	128	142	1,120	540	850	2,320	490	675	1,050	375	620	375
21	118	135	790	540	760	1,860	465	592	915	330	565	420
22	108	128	648	915	702	1,430	398	540	790	375	565	375
23	99	122	565	1,430	620	1,510	375	540	675	442	515	330
24	103	112	442	1,680	540	3,480	330	790	1,200	420	465	330
25	138	103	420	1,940	465	2,420	310	915	2,420	490	398	290
26	158	108	375	1,600	442	1,510	290	790	2,830	465	330	290
27	155	91	375	1,350	465	1,200	290	675	1,430	442	352	270
28	138	99	398	5,610	702	915	375	565	1,200	398	398	250
29	108	91	352	3,820	-------	675	1,680	540	915	465	352	232
30	93	87	330	2,220	-------	702	1,200	565	592	465	330	200
31	99	-------	352	2,520	-------	648	-------	515	-------	465	290	-------

NOTE.—Gage out of commission Oct. 12–17; gage height estimated by observer.

Monthly discharge of Clinch River at Cleveland, Va., for the year ending Sept. 30, 1923

[Drainage area, 536 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	850	89	150	0.280	0.32
November	164	87	109	.203	.23
December	5,740	91	1,120	2.09	2.41
January	5,610	540	1,460	2.72	3.14
February	14,100	442	2,860	5.34	5.56
March	5,610	490	1,710	3.19	3.68
April	1,680	290	547	1.02	1.14
May	3,370	420	850	1.59	1.83
June	14,400	310	2,020	3.76	4.20
July	1,120	330	573	1.07	1.23
August	1,600	250	604	1.12	1.29
September	620	142	326	.607	.68
The year	14,400	87	1,010	1.88	25.71

CLINCH RIVER AT SPEER FERRY, VA.

LOCATION.—At Speer Ferry roller mills, 2,000 feet below mouth of Copper Creek, 1 mile from Speer Ferry railroad station, and 1½ miles from Clinchport, Scott County.

DRAINAGE AREA.—1,140 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1920, to September 30, 1923. Gage-height record obtained by the United States Weather Bureau since December 1, 1895.

GAGE.—Staff gage bolted to the concrete wheel pit wall of Venable's flour mill installed April 17, 1921. The wall has a batter of about 3 feet in 20 feet and hence gage readings do not give true vertical heights. Gage read by B. F. Venable and B. W. Price.

For description of gages used before April 17, 1921, see Water-Supply Paper 523.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge 500 feet above gage or by wading.

CHANNEL AND CONTROL.—Channel slightly curved at gage; bed composed of rock and coarse gravel. Both banks low and subject to overflow for short distances back from channel. Control is gravel shoal 500 feet downstream.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 24.35 feet at 11.30 p. m. February 3 (discharge, 37,200 second-feet); minimum stage, −0.28 foot at 8 a. m. December 5 (discharge, 98 second-feet).

1920–1923: Maximum and minimum stages recorded, same as given above.

The United States Weather Bureau reports a stage of 26.6 feet February 28, 1902.

ICE.—Stage-discharge relation not affected by ice during year.

REGULATION.—The Speer Ferry roller mill, located just above the gage, causes only slight regulation during low water because the flow is always more than sufficient to operate the mill. Several other small mills are located on the main stream and on tributaries above the station, but it is believed that no appreciable regulation is caused by operation of these mills.

ACCURACY.—Stage-discharge relation not permanent. Rating curve well defined between 250 and 12,000 second-feet; extended beyond these limits. Gage read to hundredths twice daily previous to July 1; read to tenths twice daily since that date. Daily discharge ascertained by applying mean daily gage height to rating table, except June 14 to August 27 when shifting-control method was used. Records prior to June 14 good between 250 and 12,000 second-feet, and fair outside those limits; records after June 14, fair.

COOPERATION.—Gage-height record, October 1 to June 30, furnished by B. F. Venable.

The following discharge measurement was made by P. P. Livingston:

June 12, 1923: Gage height, 4.63 feet; discharge, 4,150 second-feet.

Daily discharge, in second-feet, of Clinch River at Speer Ferry, Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	220	140	118	5,520	4,220	1,610	1,440	2,800	830	1,280	600	355
2	205	138	114	4,610	7,650	1,520	1,440	1,970	760	1,200	760	310
3	205	130	107	3,500	30,400	1,440	1,360	1,610	728	1,040	630	310
4	199	124	101	2,270	27,900	1,440	1,280	1,440	695	1,040	695	270
5	190	120	100	1,610	9,900	3,980	1,520	1,440	662	900	570	270
6	184	126	114	1,360	6,360	11,800	1,700	1,440	630	1,040	540	600
7	175	132	235	1,280	4,740	13,100	1,520	1,280	630	1,040	510	900
8	170	155	600	2,690	3,740	9,600	1,360	1,360	630	1,280	430	795
9	162	181	970	3,140	4,220	5,660	1,280	1,520	630	1,120	570	760
10	160	181	1,120	3,140	13,400	3,500	1,200	1,700	630	1,040	1,120	662
11	155	172	970	2,800	15,200	3,260	1,040	1,520	695	1,040	1,040	1,280
12	146	162	900	2,690	10,700	3,020	970	1,360	6,080	760	1,790	1,120
13	138	155	795	2,370	7,060	2,580	1,120	1,880	17,900	630	2,690	900
14	865	146	1,040	2,270	5,660	5,660	2,170	4,740	17,200	760	3,140	650
15	510	181	8,550	2,170	5,130	11,600	3,020	3,260	6,780	662	1,200	500
16	332	270	14,000	1,970	3,980	9,900	2,470	3,980	3,140	760	1,040	420
17	270	252	10,000	1,790	2,690	6,780	2,170	3,980	3,260	970	900	380
18	270	252	7,800	1,700	2,370	6,080	1,790	2,800	1,520	760	830	350
19	252	235	4,480	1,520	2,270	4,610	1,520	2,170	1,120	630	760	325
20	252	235	3,620	1,440	2,170	4,220	1,360	1,970	1,200	600	695	310
21	235	220	3,020	1,440	1,880	3,620	1,200	1,700	1,120	482	630	350
22	220	202	2,580	2,910	1,700	3,260	1,040	1,520	1,520	405	600	600
23	220	190	2,270	5,660	1,520	4,480	970	1,440	1,200	405	570	1,610
24	205	172	2,070	5,130	1,440	7,950	970	1,880	1,200	430	510	1,200
25	199	160	1,790	4,610	1,360	4,610	865	2,070	4,100	662	482	900
26	187	150	1,520	6,360	1,280	3,380	830	1,790	2,800	570	455	630
27	178	142	1,360	4,610	1,440	3,020	795	1,520	1,700	540	430	482
28	165	136	1,200	3,740	1,610	2,370	1,120	1,360	1,700	405	405	405
29	160	130	970	3,380	-------	1,970	7,060	1,280	1,280	430	405	355
30	155	124	3,020	2,800	-------	1,790	4,610	1,040	1,120	570	355	310
31	148	-------	4,610	1,610	-------	1,610	-------	970	-------	760	355	-------

NOTE.—Discharge estimated for period September 13–22 on basis of records for Lone Mountain and Clinton.

Monthly discharge of Clinch River at Speer Ferry, Va., for the year ending Sept. 30 1923

[Drainage area, 1,140 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	865	138	230	0.202	0.23
November	270	120	170	.149	.17
December	14,000	100	2,580	2.26	2.61
January	6,360	1,280	2,970	2.61	3.01
February	30,400	1,280	6,500	5.70	5.94
March	13,100	1,440	4,820	4.23	4.88
April	7,060	795	1,710	1.50	1.67
May	4,740	970	1,960	1.72	1.98
June	17,900	630	2,780	2.44	2.72
July	1,280	405	781	.685	.79
August	3,140	355	829	.727	.84
September	1,610	270	610	.535	.60
The year	30,400	100	2,140	1.88	25.44

CLINCH RIVER NEAR LONE MOUNTAIN, TENN.

LOCATION.—At Southern Railway bridge at Clinch River station, three-fourths mile below Dutch Creek, 1¼ miles above mouth of Big Sycamore Creek, and 3½ miles southeast of Lone Mountain, Claiborn County.

DRAINAGE AREA.—1,560 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 1, 1919, to September 30, 1923.

GAGE.—Chain gage attached to guardrail on top of ties on downstream side of bridge; read by S. K. Rosenbalm. Elevation of zero of gage 958.19 feet above mean sea level (Tennessee River Survey datum).

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed is rough and composed of solid rock and coarse gravel. Right bank is overflowed for a short distance during extreme high stages, but water is confined to bridge opening by high earth fill; left bank not subject to overflow. Control is formed by a series of rock ledges between which gravel collects, causing occasional changes in stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.3 feet at 8 a. m. February 4 (discharge, 39,700 second-feet); minimum stage, 2.80 feet at 8.30 a. m. October 4, 11, and 24 (discharge, 225 second-feet).

1919–1923: Maximum and minimum stages recorded, same as given above.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Operation of several small mills above the gage cause little, if any, fluctuation in stage at the gage.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 300 and 25,000 second-feet; extended beyond these limits. Gage read to half-tenths once daily; oftener during extreme high water. Daily discharge ascertained by applying daily gage height to rating table. Records good except those for high stages which are fair.

Discharge measurements of Clinch River near Lone Mountain, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 18	P. E. Hanson	3.08	332	Feb. 23	P. E. Hanson	4.96	1,730
Feb. 7	do	8.51	7,380	June 15	do	10.80	12,400
19	P. P. Livingston	6.06	3,310				

Daily discharge, in second-feet, of Clinch River near Lone Mountain, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	257	281	273	1,410	9,150	2,040	2,040	4,980	1,510	1,510	1,140	445
2	257	281	281	3,090	8,490	1,930	1,710	3,380	1,410	1,440	900	420
3	265	273	305	6,060	21,100	1,820	1,610	2,540	1,230	1,370	685	395
4	225	265	472	4,150	39,700	1,710	1,510	2,040	1,230	1,300	755	372
5	249	273	825	2,810	23,400	1,610	1,610	1,820	1,140	1,230	755	420
6	241	273	1,230	2,280	11,500	1,710	1,820	1,610	1,100	1,100	685	560
7	257	265	980	1,930	7,850	10,300	2,040	1,820	1,020	1,230	1,410	1,140
8	281	273	825	2,280	6,440	16,900	1,930	2,040	862	1,610	1,410	1,410
9	265	265	1,610	3,680	5,330	9,610	1,710	1,610	862	1,230	1,410	1,510
10	257	265	2,540	4,310	5,330	5,690	1,610	1,820	940	1,410	1,230	2,040
11	225	273	2,950	3,530	5,330	5,150	1,410	2,040	940	1,230	1,610	1,410
12	328	273	2,670	2,840	4,980	6,830	1,230	1,820	1,410	1,020	1,140	1,230
13	1,140	273	2,040	2,160	7,230	6,830	1,410	2,540	4,810	790	2,410	1,060
14	755	265	1,410	1,820	20,800	6,630	3,090	3,990	17,700	940	3,990	856
15	560	289	3,990	2,280	19,400	4,810	4,980	6,630	16,600	790	2,810	652
16	445	328	12,200	3,230	8,930	3,680	4,640	4,640	7,230	790	1,820	530
17	395	350	13,200	2,810	5,690	7,430	3,680	5,690	3,680	790	1,230	472
18	350	350	11,800	2,280	4,310	12,500	2,950	5,330	3,090	1,020	980	445
19	350	372	10,800	1,930	3,230	9,760	2,410	3,680	2,280	900	825	420
20	328	395	5,870	1,710	2,670	7,030	2,040	2,810	1,820	825	755	445
21	305	420	3,530	1,930	2,280	6,250	1,710	2,670	1,820	652	685	445
22	297	395	2,410	3,380	2,040	5,150	1,510	2,280	1,610	590	620	445
23	261	350	2,040	6,250	1,820	5,690	1,410	1,930	1,510	590	590	620
24	225	328	1,610	8,710	1,610	8,000	1,320	2,040	1,900	660	590	1,710
25	305	305	1,320	7,640	1,510	10,300	1,230	2,410	2,280	1,000	560	1,020
26	305	297	1,140	7,430	1,410	7,230	1,100	2,540	4,310	850	560	790
27	305	289	1,060	6,060	1,610	5,330	1,020	2,280	3,720	620	530	620
28	328	297	980	14,500	1,930	3,830	1,020	2,040	3,130	590	500	560
29	305	289	1,020	16,100	-------	3,090	1,410	1,610	2,540	620	472	500
30	305	281	1,140	12,000	-------	2,540	7,850	1,610	2,040	652	472	472
31	289	-------	1,100	9,380	-------	2,280	-------	1,610	-------	1,510	472	-------

NOTE.—Gage not read Oct. 23, Nov. 29, 30, Dec. 13, Jan. 12, Mar. 3, 19, 24, May 7, June 24, 27, 28, July 2–4, 16, Sept. 2 and 14; discharge interpolated. Discharge, July 23–27 estimated by comparison with record for Speer Ferry.

Monthly discharge of Clinch River near Lone Mountain, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 1,560 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,140	225	344	0.221	0.25
November	420	265	304	.195	.22
December	13,200	273	3,020	1.94	2.24
January	16,100	1,410	4,840	3.10	3.57
February	39,700	1,410	8,400	5.38	5.60
March	16,900	1,610	5,920	3.79	4.37
April	7,850	1,020	2,170	1.39	1.55
May	6,630	1,610	2,770	1.78	2.05
June	17,700	862	3,190	2.04	2.28
July	1,610	590	995	.638	.74
August	3,990	472	1,100	.705	.81
September	2,040	372	780	.500	.56
The year	39,700	225	2,780	1.78	24.24

CLINCH RIVER AT CLINTON, TENN.

LOCATION.—At highway bridge at Clinton, Anderson County, 1,000 feet below Southern Railway bridge and 15 miles below mouth of Powell River.

DRAINAGE AREA.—3,090 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1918, to September 30, 1923. Gage readings have been obtained by the United States Weather Bureau since December 1, 1884.

GAGE.—Chain gage bolted to downstream railing of highway bridge, used since July1, 1920; read by United States Weather Bureau observer. Previous to July 1, 1920, gage was a vertical staff attached to downstream end of center pier of railway bridge 1,000 feet upstream. Datum of chain gage is 0.10 foot lower than that of staff gage, but owing to slope of river both gages read practically the same at all stages. Elevation of zero of gage 776.61 feet above mean sea level (Tennessee River Survey datum).

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Left bank high; right bank is overflowed at gage height of about 30 feet. Bed composed of rock and gravel. Control formed by rock shoals about 1½ miles below gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 32.7 feet at noon February 5 (discharge, 61,000 second-feet); minimum stage, 2.7 feet October 3 and 6 (discharge, 470 second-feet).

1918–1923: Maximum stage recorded, that of February 5, 1923; minimum stage, 2.4 feet October 4 and 5, 1919 (discharge, 340 second-feet).

The United States Weather Bureau reports a stage of 45.0 feet March 31, 1886, which is the maximum since December 1, 1884. The next highest stage is 38.0 feet which occurred March 5, 1917.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—There are no developments above the gage sufficient to cause any appreciable regulation.

ACCURACY.—Stage-discharge relation permanent. Rating curve very well defined below 30,000 second-feet; extended above that point. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

49245—26†—WSP 563——13

Discharge measurements of Clinch River at Clinton, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 8	P. E. Hanson	13.76	14,400	June 21	P. P. Livingston	6.13	3,060
Feb. 25	do	6.43	3,320	Sept. 26	do	4.36	1,560

Daily discharge, in second-feet, of Clinch River at Clinton, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	520	570	570	2,370	22,100	4,370	4,730	12,900	4,250	3,680	2,280	925
2	520	570	570	3,140	22,300	4,610	4,250	8,880	3,790	3,040	2,100	860
3	470	570	740	5,120	24,600	4,490	3,900	6,210	3,350	2,740	1,620	860
4	520	520	1,550	8,540	42,800	3,900	3,570	4,860	2,940	2,280	1,700	680
5	520	520	1,260	6,210	59,800	3,680	4,370	4,250	2,840	2,190	1,330	800
6	470	570	1,940	4,730	47,600	3,460	4,860	3,680	2,840	2,190	1,260	860
7	520	520	2,550	3,900	22,300	21,000	4,610	3,460	3,240	2,020	1,480	860
8	520	520	2,640	3,900	15,500	26,000	4,730	3,350	2,460	2,190	1,700	1,700
9	625	570	2,190	3,900	13,000	32,000	4,370	4,490	2,370	2,020	2,280	2,020
10	625	520	3,460	5,120	11,500	18,900	4,130	3,680	2,190	2,840	1,860	2,280
11	625	520	4,610	5,930	10,800	12,100	3,570	3,790	2,280	2,550	2,460	2,640
12	570	520	4,490	5,120	10,300	16,800	3,240	4,130	2,740	2,280	2,280	2,280
13	520	520	4,010	4,130	12,300	18,900	3,240	4,860	3,460	2,370	2,370	1,700
14	570	520	3,040	3,570	22,100	16,100	4,730	8,710	10,600	2,020	4,250	1,480
15	1,260	520	4,490	3,350	37,300	13,800	12,300	10,300	24,200	2,020	5,380	1,060
16	990	570	10,800	4,130	32,000	11,000	13,600	13,600	19,600	1,780	4,370	1,260
17	860	740	22,600	5,650	15,900	15,300	13,600	9,910	8,370	1,780	2,840	990
18	740	680	24,600	5,250	10,300	16,800	9,220	9,910	5,250	1,780	2,100	990
19	680	800	21,200	4,490	8,050	21,200	6,800	9,390	5,250	1,780	1,780	800
20	625	860	18,900	4,370	6,350	15,900	5,790	6,800	3,570	1,860	1,550	800
21	625	740	9,730	3,900	5,250	12,900	4,730	6,650	3,040	1,550	1,400	1,330
22	570	740	5,930	6,500	4,730	11,700	4,130	6,210	2,840	1,330	1,190	1,060
23	570	740	4,490	9,390	4,130	11,000	3,790	4,990	3,040	1,330	1,330	990
24	570	680	3,460	19,400	3,680	16,800	3,680	7,250	3,350	1,120	1,190	990
25	625	570	3,040	21,900	3,350	24,600	3,350	10,600	3,790	1,190	1,190	2,280
26	625	570	2,640	16,300	3,040	23,000	3,140	8,370	3,460	1,260	990	1,700
27	570	570	2,190	14,200	3,350	15,300	2,840	6,950	5,250	1,260	1,060	1,330
28	570	570	2,190	19,400	3,570	10,400	2,550	6,210	5,930	1,260	990	1,120
29	570	625	2,100	29,400	-------	8,050	3,460	4,990	6,210	1,400	740	1,060
30	625	570	1,940	31,100	-------	6,500	4,370	4,730	4,860	1,400	990	925
31	570	-------	2,020	27,500	-------	5,510	-------	4,490	-------	1,480	925	-------

Monthly discharge of Clinch River at Clinton, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 3,090 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,260	470	621	0.201	0.23
November	800	520	600	.194	.22
December	24,600	570	5,680	1.84	2.12
January	31,100	2,370	9,420	3.05	3.52
February	59,800	3,040	17,100	5.53	5.76
March	32,000	3,460	13,700	4.43	5.11
April	13,600	2,550	5,190	1.68	1.87
May	13,600	3,350	6,730	2.18	2.51
June	24,200	2,190	5,250	1.70	1.90
July	3,680	1,120	1,940	.628	.72
August	5,380	740	1,900	.615	.71
September	2,640	680	1,290	.417	.47
The year	59,800	470	5,720	1.85	25.14

POWELL RIVER NEAR PENNINGTON, VA.

LOCATION.—At highway bridge on main road between Pennington and Big Stone Gap, 1,000 feet below mouth of North Fork and 3 miles southeast of Pennington, Lee County.

DRAINAGE AREA.—304 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 27, 1920, to September 30, 1923.

GAGE.—Chain gage attached to bridge; read by Vernon L. Tritt and Fred Myers.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Channel practically straight for 1,000 feet above and below gage. Bed composed of solid rock and boulders. Control is rocky shoal at head of small island 2,000 feet downstream; remains of old fish-trap dam at this point may cause slight change during high stages. Right bank high and wooded; not subject to overflow. Left bank subject to overflow during extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 19.46 feet at 10.30 a. m. February 3 (discharge not determined); minimum stage, 1.52 feet at 4.30 p. m. September 5 (discharge, 15 second-feet).

1920–1923: Maximum stage recorded, that of February 3, 1923; minimum stage, 1.52 feet afternoon readings of September 29 and 30, 1922, and September 5, 1923 (discharge, 15 second-feet).

REGULATION.—Two small mills on main stream above gage cause considerable diurnal fluctuation.

ICE.—Stage-discharge relation not affected by ice.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 30 and 1,000 second-feet; extended beyond these limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good below 1,000 second-feet; fair above that point.

The following discharge measurement was made by P. P. Livingston:
June 18, 1923: Gage height, 2.61 feet; discharge, 274 second-feet.

Daily discharge, in second-feet, of Powell River near Pennington, Va., for the year ending September 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb	Mar.	Apr.	May	June	July	Aug.	Sept.
1	18	20	36	715	2,610	765	390	715	230	226	98	30
2	30	21	32	820	3,270	565	208	665	208	187	60	33
3	26	24	148	615	16,700	452	390	330	212	172	48	23
4	21	37	175	475	3,670	475	520	292	190	240	45	24
5	23	32	498	350	1,780	498	390	475	157	292	62	17
6	20	32	330	330	1,500	715	240	452	240	330	75	24
7	34	29	154	820	1,110	7,840	212	565	275	390	50	42
8	52	24	475	765	875	2,340	715	665	219	330	47	33
9	88	34	565	765	820	1,290	565	820	178	275	62	33
10	90	33	498	520	765	875	665	820	138	175	52	72
11	70	36	330	430	990	1,050	665	665	350	132	39	108
12	56	30	216	410	930	1,860	292	1,360	2,520	128	56	47
13	48	29	330	350	13,300	1,940	1,710	2,340	1,640	105	108	64
14	42	21	226	330	2,880	1,110	2,100	1,570	1,110	112	50	56
15	36	36	5,670	410	1,500	820	1,290	1,170	715	138	54	40
16	32	40	1,940	765	1,230	1,430	715	1,110	565	169	48	33
17	29	58	4,330	565	640	1,780	350	1,050	350	219	50	32
18	28	40	2,180	498	615	1,860	452	930	275	122	50	30
19	24	56	930	430	590	1,170	410	715	230	98	47	33
20	26	40	542	475	565	1,050	275	565	1,050	72	42	33
21	23	34	475	765	542	930	230	565	1,110	66	32	95
22	21	37	370	3,470	452	1,780	230	640	184	60	36	105
23	24	40	310	2,430	350	6,580	190	765	169	52	40	54
24	37	42	275	1,940	258	4,920	196	930	148	44	36	54
25	36	40	212	1,710	202	1,940	196	820	105	37	37	50
26	30	30	154	1,290	275	1,110	205	715	765	40	27	44
27	26	22	154	1,570	615	820	212	370	452	44	22	44
28	22	37	184	4,680	990	640	565	498	590	48	28	30
29	19	32	258	2,100	-------	475	2,520	258	350	108	36	28
30	18	24	199	1,940	-------	390	1,050	275	275	110	28	26
31	21	-------	169	3,070	-------	310	-------	330	-------	102	24	-------

Monthly discharge of Powell River near Pennington, Va., for the year ending Sept. 30, 1923

Month	Discharge in second-feet		
	Maximum	Minimum	Mean
October	90	18	34.5
November	58	20	33.7
December	5,670	32	721
January	4,680	330	1,150
February	16,700	202	2,140
March	7,840	310	1,610
April	2,520	190	605
May	2,340	258	756
June	2,520	105	500
July	390	37	149
August	108	22	48.0
September	108	17	44.6
The year	16,700	17	641

POWELL RIVER NEAR ARTHUR, TENN.

LOCATION.—At county highway bridge at McHenry's ford on Dixie Highway. 3½ miles east of Arthur, Claiborne County, and 6 miles north of Tazewell. Indian Creek enters 3½ miles above gage.

DRAINAGE AREA.—685 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1919, to September 30, 1923. Gage-height record obtained by United States Weather Bureau since September 1, 1904.[1]

GAGE.—Chain gage attached to upstream side of bridge; read by B. M. Richardson. Previous to August 6, 1920, gage was vertical staff fastened to a large tree 100 feet downstream from bridge. Datum not changed. Elevation of zero of gage 1,045.93 feet above mean sea level (Tennessee River survey datum).

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge at gage.

CHANNEL AND CONTROL.—Right bank rises gradually; left bank is steep up to gage height 20 feet; then flattens out. Banks subject to overflow above gage height of 20 feet. Channel straight for 500 feet above and below gage; bed composed of rock and gravel. Control is a rock and gravel shoal at the old McHenry's ford, 500 feet downstream; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.7 feet at about noon February 4 (discharge, 18,300 second-feet); minimum stage, 0.17 foot October 22 and 7.30 a. m. October 23 (discharge, 101 second-feet).

1919–1923: Maximum and minimum stages recorded, same as given above.

The United States Weather Bureau reports a stage of 27.2 feet January 29, 1918.

ICE.—Stage-discharge relation not affected by ice.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 150 and 6,000 second-feet; extended beyond these limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good below 6,000 second-feet; fair above that point.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

[1] Published as Powell River at Tazewell in publications of United States Weather Bureau.

Discharge measurements of Powell River near Arthur, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 23	Hanson and Livingston	1.68	881	Feb. 24	P. E. Hanson	1.59	780
Feb. 17	P. P. Livingston	4.10	2,600	June 20	P. P. Livingston	1.13	539
17	do	4.02	2,480				

Daily discharge, in second-feet, of Powell River near Arthur, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	107	107	104	880	5,840	1,600	1,050	2,430	825	688	379	169
2	107	107	149	1,280	5,950	1,400	940	1,600	770	605	415	161
3	107	110	245	1,600	11,900	1,220	880	1,280	660	522	308	153
4	104	107	495	1,280	17,200	1,050	825	1,100	632	468	216	145
5	107	107	770	1,050	8,810	995	940	995	605	495	265	142
6	107	107	880	880	5,400	1,220	1,160	940	550	468	255	161
7	120	120	770	770	3,400	6,500	1,220	1,400	578	660	335	153
8	134	120	715	825	2,940	10,200	1,160	1,670	578	770	352	291
9	149	110	1,460	995	2,510	4,630	1,050	1,340	522	770	330	368
10	138	107	1,400	1,220	2,430	2,670	940	1,340	550	688	578	495
11	128	104	1,100	1,100	2,270	3,030	825	1,340	605	605	357	390
12	142	104	825	940	2,190	4,300	770	1,160	825	468	302	280
13	142	107	632	770	5,510	4,520	940	2,350	2,510	440	940	235
14	134	110	605	825	13,100	3,900	2,270	3,600	3,300	415	632	230
15	128	145	2,940	1,340	7,380	2,430	4,630	3,030	1,950	368	495	194
16	124	181	7,490	1,670	3,500	2,590	4,740	2,350	1,160	368	390	165
17	120	185	5,400	1,530	2,430	3,600	2,760	2,270	940	368	313	149
18	114	173	6,720	1,220	1,880	4,100	1,880	2,190	770	379	270	142
19	110	212	5,400	1,050	1,530	3,300	2,270	1,740	632	468	240	134
20	107	198	2,270	940	1,280	2,850	1,220	1,400	578	384	212	134
21	104	165	1,400	1,050	1,100	2,510	995	1,340	578	286	185	173
22	101	142	1,100	2,940	995	2,110	940	1,160	1,100	235	212	265
23	104	134	880	5,730	880	3,400	880	1,600	715	235	212	245
24	124	128	770	6,280	825	9,470	825	2,430	605	226	177	221
25	117	120	632	4,960	770	7,600	770	2,350	550	275	161	190
26	114	117	550	3,800	715	3,900	715	1,810	825	291	173	161
27	114	114	495	2,940	995	2,760	660	1,530	1,050	216	181	145
28	110	107	522	8,260	1,280	2,030	715	1,280	1,460	245	181	131
29	110	107	495	9,360	-------	1,600	1,400	1,160	1,220	374	221	134
30	110	104	495	5,400	-------	1,400	3,900	1,160	940	286	203	124
31	110	-------	550	5,180	-------	1,220	-------	995	-------	296	185	-------

Monthly discharge of Powell River near Arthur, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 685 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	149	101	118	0.172	0.20
November	212	104	129	.188	.21
December	7,490	104	1,560	2.28	2.63
January	9,360	770	2,520	3.68	4.24
February	17,200	715	4,110	6.00	6.25
March	10,200	995	3,360	4.91	5.66
April	4,740	660	1,480	2.16	2.41
May	3,600	940	1,690	2.47	2.85
June	3,300	522	953	1.39	1.55
July	770	216	431	.629	.73
August	940	161	312	.455	.52
September	495	124	203	.296	.33
The year	17,200	101	1,390	2.03	27.58

EMERY RIVER AT DEERMONT, TENN.

LOCATION.—At county highway bridge at Deermont siding on Cincinnati, New Orleans & Texas Pacific Railway, 3.2 miles north of Oakdale, Morgan County, and 8 miles northwest of Harriman. Crab Orchard Creek enters 500 feet below and Obed River 5 miles above station.

DRAINAGE AREA.—702 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 15, 1920, to September 30, 1923.

GAGE.—Chain gage bolted to upstream railing of bridge; read by Mrs. Ina Laymance and Miss Ruby Davis.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed of river at gage is composed of boulders. Right bank subject to overflow at gage height of about 10 feet, flooding land for about 400 feet back from river; left bank not subject to overflow. Control consists of a series of boulder shoals, the location depending upon the stage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.27 feet at 4 p. m. March 11 (discharge, 19,000 second-feet); minimum stage, 0.20 foot October 28–31 (discharge, 4.0 second-feet).

1920–1923: Maximum stage recorded, 15.6 feet at 3.30 p. m. March 1, 1922 (discharge, 26,400 second-feet); minimum stage, that of October 28–31, 1922.

ICE.—Stage-discharge relation not affected by ice.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 15 and 8,000 second-feet; extended beyond these limits. Gage read twice daily to hundredths previous to April 1; read to tenths since that date. Daily discharge ascertained by applying mean daily gage height to rating table. Records good between 15 and 6,000 second-feet; others fair.

Discharge measurements of Emery River at Deermont, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 9	P. P. Livingston	4.63	3,600	June 22	P. P. Livingston	1.26	194
9	do	4.63	3,620	July 10	Livingston and Clawson	1.68	355
Mar. 13	do	6.66	7,420	Sept. 24	J. P. Clawson	.54	30.8

Daily discharge, in second-feet, of Emery River at Deermont, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	16	13	132	988	8,130	1,590	1,030	2,050	2,310	475	1,160	135
2	12	19	179	1,200	9,940	1,390	945	1,390	1,590	362	1,030	110
3	11	16	2,310	1,300	14,200	1,200	785	1,070	1,390	335	785	88
4	9.4	13	2,880	1,160	8,730	1,120	1,390	825	905	335	505	79
5	8.8	15	2,730	1,070	6,230	988	4,470	865	825	335	445	70
6	7.0	13	2,050	1,200	6,230	2,880	4,130	785	748	285	310	150
7	18	16	1,300	1,120	4,470	15,100	2,590	640	675	240	240	220
8	29	13	1,120	1,160	3,490	5,330	2,050	785	605	538	220	240
9	38	12	1,200	1,120	3,180	4,470	1,700	675	505	445	825	262
10	36	12	1,390	988	3,650	2,450	1,200	710	585	362	825	262
11	46	13	1,300	945	3,180	9,940	1,120	538	645	262	640	165
12	65	13	945	825	7,360	14,000	988	475	725	200	475	135
13	81	12	1,120	748	11,400	7,740	1,120	3,810	825	165	785	110
14	67	19	988	675	8,130	4,130	3,490	3,810	710	135	1,120	99
15	53	33	9,730	640	5,150	3,330	3,810	2,310	505	122	825	88
16	44	44	7,170	570	3,810	4,130	2,590	4,130	390	110	570	70
17	40	70	10,800	640	1,930	6,600	1,810	2,450	335	710	418	54
18	36	135	7,930	710	1,810	4,300	1,590	1,590	285	605	418	47
19	32	236	6,230	785	1,700	2,730	1,200	1,300	200	418	640	34
20	25	390	5,510	1,200	1,490	2,050	1,070	1,300	165	262	825	34
21	16	168	4,470	1,300	1,390	1,810	865	2,310	135	200	538	40
22	11	153	1,390	2,050	1,390	2,310	945	1,810	165	150	418	40
23	8.8	128	1,200	2,590	1,300	3,490	825	5,870	135	110	310	40
24	9.4	72	1,120	7,930	1,200	6,050	1,030	6,410	262	122	262	40
25	8.2	70	988	5,510	1,200	3,810	1,120	3,490	1,160	135	200	23
26	6.4	65	945	3,490	1,300	3,030	825	2,310	675	99	165	14
27	5.2	72	905	2,880	1,390	2,730	865	2,590	475	135	122	10
28	4.0	99	1,070	8,530	1,590	1,810	988	2,590	1,070	150	110	10
29	4.0	147	1,590	6,230	-------	1,300	2,450	2,310	1,300	418	122	10
30	4.6	132	1,590	4,470	-------	1,200	2,880	2,310	865	475	220	10
31	4.0	-------	865	8,930	-------	1,070	-------	3,490	-------	310	182	-------

NOTE.—Gage not read June 10–12; discharge interpolated.

Monthly discharge of Emery River at Deermont, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 702 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	81	4.0	24.4	0.035	0.04
November	390	12	73.8	.105	.12
December	10,800	132	2,680	3.82	4.40
January	8,930	570	2,350	3.35	3.86
February	14,200	1,200	4,460	6.35	6.61
March	15,100	988	4,000	5.70	6.57
April	4,470	785	1,730	2.46	2.74
May	6,410	475	2,160	3.08	3.55
June	2,310	135	706	1.01	1.13
July	710	99	290	.413	.48
August	1,160	110	507	.722	.83
September	262	10	89.6	.128	.14
The year	15,100	4.0	1,580	2.25	30.47

HIWASSEE RIVER NEAR HAYESVILLE, N. C.

LOCATION.—At Barnard's Bridge, a steel highway bridge on road from Hayesville to Hiwassee, Ga., 1 mile below mouth of Shooting Creek and 2½ miles east of Hayesville, Clay County.

DRAINAGE AREA.—190 square miles (measured on topographic map).

RECORDS AVAILABLE.—May 20, 1907, to December 31, 1909, and August 16, 1922, to September 30, 1923, when station was discontinued.

GAGE.—Standard chain gage attached to downstream lower chord of bridge; read by Mrs. V. A. Barnard. Original gage used to December 31, 1909, was a vertical staff attached to a maple tree on left bank about 200 feet above bridge; same datum.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge until falsework of the construction of a new concrete bridge just above interfered with the distribution of the current at the measuring section. The construction was discontinued before bridge was completed. Since this interference measurements have been made from a steel highway bridge 1 mile below.

CHANNEL AND CONTROL.—Bed of stream is composed largely of rock and some sand; fairly permanent. Channel is straight for 500 feet above and 800 feet below station; current is swift. Banks are high, but left bank may be subject to overflow during extreme floods. Control is a rock riffle about 50 feet below gage; fairly permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year ending September 30, 1923, 11.0 feet at noon December 17; minimum stage, 0.75 foot at 5 p. m. November 5 and 7 a. m. November 15.

1907–1909 and 1922–1923: Maximum stage recorded, 11.9 feet at noon March 13, 1909; minimum stage recorded, 0.72 foot October 8, 1908.

ICE.—Stage discharge relation probably never affected by ice.

REGULATION.—Negligible.

ACCURACY.—The record of discharge prepared on basis of the available data was found to be erratic and is therefore withheld from publication. The cofferdams for the new bridge confined the water to a narrow channel and frequent changes in stage-discharge relation must have occurred.

Discharge measurements of Hiwassee River near Hayesville, N. C., during the years ending Sept. 30, 1922 and 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1922		*Feet*	*Sec.-ft.*	1923		*Feet*	*Sec.-ft.*
Aug. 17	L. J. Hall	1.22	290	June 8	L. J. Hall	1.94	693
				Aug. 30[a]	L. J. and W. E. Hall	1.35	321

[a] Measured from highway bridge 1 mile below gage.

Daily gage height, in feet, of Hiwassee River near Hayesville, N. C., for the period Aug. 16, 1922, to Sept. 30, 1923

Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.
1922			1922			1922		
1		1.0	11		2.4	21	1.05	1.6
2		1.0	12		1.2	22	1.1	1.05
3		.95	13		1.05	23	1.1	.95
4		1.0	14		.95	24	1.1	.95
5		1.05	15		.95	25	1.1	.95
6		1.0	16	1.2	1.0	26	1.2	1.1
7		.95	17	1.2	.95	27	1.1	1.0
8		.95	18	1.2	.95	28	1.05	1.0
9		.95	19	1.1	.95	29	1.05	.95
10		.95	20	1.1	.95	30	1.05	.95
						31	1.0	

Daily gage height, in feet, of Hiwassee River near Hayesville, N. C., for the period Aug. 16, 1922, to Sept. 30, 1923—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922–23												
1	0.9	0.85	0.8	3.4	1.8	1.55	1.5	1.65	2.8	1.55	1.8	1.3
2	.95	.9	1.85	2.2	2.15	1.5	1.5	1.6	2.4	1.6	1.55	1.3
3	.9	.9	2.35	1.95	2.1	1.45	1.55	1.55	2.2	1.6	1.5	1.35
4	.9	.8	1.7	1.65	2.15	1.5	1.7	1.55	2.05	1.55	1.45	1.55
5	.8	.8	1.3	1.55	3.8	1.45	1.6	1.7	2.15	1.55	1.45	1.4
6	1.0	.8	1.15	1.5	3.3	1.5	1.5	1.55	2.0	1.5	1.65	1.3
7	1.25	.8	1.1	1.5	2.3	1.95	1.5	1.55	2.05	2.05	1.8	1.45
8	1.5	.8	1.2	1.45	2.05	1.7	1.65	1.7	2.0	1.75	1.65	1.35
9	1.15	.8	1.95	1.4	1.9	1.6	1.55	1.6	1.85	1.9	1.95	1.25
10	1.0	.8	1.45	1.3	1.9	1.6	1.5	1.55	1.75	1.6	1.75	1.25
11	.95	.8	1.25	1.25	1.8	1.75	1.45	1.5	1.8	1.45	1.65	1.2
12	.95	.8	1.3	1.2	1.75	1.8	1.45	1.45	2.8	1.45	1.55	1.2
13	.9	.8	1.25	1.2	4.9	2.8	3.4	1.6	2.2	2.4	1.55	1.2
14	.9	.8	1.1	1.3	2.55	2.25	2.8	1.5	1.95	1.55	1.45	1.2
15	.9	.8	3.5	1.5	2.15	1.9	2.1	1.6	1.85	1.9	1.4	1.15
16	.9	.95	1.8	1.3	1.95	3.2	1.85	2.3	1.7	1.55	1.35	1.15
17	.9	.85	8.1	1.25	1.9	3.1	1.75	1.95	1.7	3.0	1.35	1.15
18	.85	.8	2.9	1.2	1.75	2.5	1.7	1.75	1.65	1.35	1.65	1.15
19	.8	1.2	2.0	1.3	1.7	2.4	1.6	1.65	1.65	1.65	1.4	1.15
20	.9	.95	1.75	1.3	1.7	2.05	1.55	2.5	2.1	1.55	1.35	1.15
21	.85	.85	1.7	1.25	1.65	2.05	1.65	2.3	1.7	1.55	1.35	2.15
22	.85	.85	1.45	1.35	1.5	1.9	1.55	2.0	1.7	1.5	1.3	1.25
23	1.05	.85	1.3	1.75	1.45	2.15	1.55	2.2	1.75	1.55	2.45	1.2
24	1.1	.8	1.25	2.5	1.45	1.85	1.75	2.0	2.3	1.5	1.55	1.15
25	.9	.8	1.25	1.85	1.4	1.8	1.6	1.9	1.75	1.8	1.4	1.15
26	.9	.8	1.15	1.65	1.6	1.75	1.55	2.0	1.75	1.5	1.35	1.15
27	.85	.85	1.3	1.8	1.9	1.7	1.6	2.15	1.6	1.5	1.3	1.15
28	.85	.9	2.3	2.0	1.65	1.65	1.75	2.4	2.5	2.7	1.7	1.15
29	.85	.8	1.65	1.8	-------	1.65	2.0	3.6	1.85	1.85	1.5	1.1
30	.8	.85	1.5	1.9	-------	1.6	1.8	4.8	1.7	1.6	1.4	1.1
31	.8	-------	1.7	1.9	-------	1.6	-------	3.4	-------	1.5	1.3	-------

HIWASSEE RIVER AT MURPHY, N. C.

LOCATION.—At highway bridge 300 feet west of Louisville & Nashville Railroad station, four blocks west of courthouse in Murphy, Cherokee County, and half a mile above mouth of Valley River.

DRAINAGE AREA.—410 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 26, 1896, to June 30, 1917; October 27, 1918, to September 30, 1923.

GAGE.—Chain gage attached to downstream handrail of new concrete highway bridge, installed January 30, 1921. Prior to that date a chain gage was attached to downstream side of steel bridge immediately below concrete bridge. Datum of gage raised 2 feet on January 30, 1921.

DISCHARGE MEASUREMENTS.—Made from new concrete bridge to which gage is attached.

CHANNEL AND CONTROL.—Channel straight for several hundred feet above and below gage. Bed is mostly solid rock and river is confined by concrete abutments. Control formed by rock, boulder, and gravel riffle and by masonry piers of railroad bridge; fairly permanent. A fish trap about 400 feet downstream, constructed about August, 1922, has become a part of the control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.85 feet evening reading December 17 (discharge, 13,400 second-feet); minimum stage, 3.48 feet at 4 p. m. November 10 and 26 (discharge, 225 second-feet).

1896–1923: Maximum stage recorded, 18.4 feet (old gage) March 19, 1899 (discharge, 22,400 second-feet); minimum stage, 4.8 feet (old gage) September 18, 1914 (discharge, 140 second-feet).

ICE.—None during year.

REGULATION.—Negligible.

49245—26†—WSP 563——14

ACCURACY.—Stage-discharge relation changed October 6, 1922. Rating curve used from October 7 to September 30 well defined below 5,000 second-feet. There were no discharge measurements to define the stage-discharge relation from August 23 to October 6, 1922, but a comparison of hydrographs of this station with those for Hayesville, N. C., and Reliance, Tenn., shows that there were three shifts in the relation caused by the fish trap. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in footnote to daily-discharge table. Records good.

Discharge measurements of Hiwassee River at Murphy, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 2	L. J. Hall	5.38	1,950	Aug. 29	L. J. Hall and W. R. King	4.34	818
June 11	do	4.78	1,300	29	Charlton and King	4.34	804
12	do	6.79	4,450				
Aug. 28	L. J. and W. E. Hall	4.06	586				
28	W. R. King and W. E. Hall	4.06	592				

Daily discharge, in second-feet, of Hiwassee River at Murphy, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	340	275	270	4,360	1,520	1,170	1,060	1,280	2,500	1,010	780	540
2	340	275	1,010	2,050	2,350	1,060	1,060	1,170	2,200	1,170	780	470
3	330	285	2,050	1,640	2,200	1,060	1,120	1,120	1,770	1,060	695	505
4	305	275	1,520	1,280	2,350	1,060	1,220	1,120	1,640	1,060	615	578
5	305	265	1,010	1,170	4,360	1,060	1,340	1,120	1,640	870	615	615
6	340	265	738	1,060	2,820	1,010	1,220	1,060	1,520	870	615	540
7	615	285	540	960	2,200	2,200	1,170	1,010	1,640	870	1,910	470
8	825	303	780	960	1,910	1,520	1,400	1,460	1,520	960	1,120	470
9	399	265	1,520	870	1,640	1,340	1,170	1,220	1,340	1,280	870	457
10	327	250	615	870	1,520	1,280	1,060	1,060	1,220	825	1,060	405
11	291	275	825	780	1,400	1,910	1,010	1,010	1,220	780	870	375
12	291	265	915	780	1,400	1,910	960	960	2,990	738	695	418
13	280	265	915	695	5,080	3,330	3,160	1,400	2,050	870	915	405
14	291	275	870	695	3,500	2,500	3,500	1,120	1,520	960	695	345
15	291	275	4,180	1,340	2,350	1,910	2,200	1,640	1,400	870	615	357
16	291	444	2,200	960	1,910	3,330	1,770	3,160	1,220	780	615	357
17	309	275	9,940	870	1,640	4,010	1,520	2,050	1,120	1,910	540	345
18	291	275	3,670	825	1,460	2,820	1,400	1,520	1,060	1,280	1,010	345
19	270	540	2,050	825	1,340	2,660	1,280	1,340	1,060	960	695	345
20	280	444	1,400	825	1,280	2,050	1,170	1,770	1,280	870	615	345
21	270	333	1,170	780	1,220	1,910	1,220	2,200	1,120	780	540	615
22	280	285	960	870	1,170	1,640	1,170	1,640	1,060	695	540	438
23	431	285	870	1,280	1,060	1,770	1,060	1,910	1,220	695	1,400	393
24	578	285	780	3,670	1,010	1,770	1,120	2,050	1,170	655	870	357
25	351	265	738	2,050	1,010	1,640	1,120	1,520	1,170	870	655	345
26	303	250	695	1,640	1,060	1,520	1,060	1,640	960	655	615	393
27	333	275	655	1,520	1,640	1,400	1,120	1,770	1,060	615	578	345
28	303	345	1,640	1,770	1,280	1,340	1,340	2,350	2,350	655	615	333
29	285	280	1,060	1,520	-------	1,220	1,640	3,330	1,520	1,280	780	297
30	303	280	915	1,460	-------	1,220	1,460	4,180	1,170	780	615	285
31	285	-------	915	1,770	-------	1,120	-------	2,990	-------	695	578	-------

NOTE.—Discharge Oct. 1 to 6 estimated from a comparison of hydrographs with Hiwassee River at Hayesville, N. C.

Monthly discharge of Hiwassee River at Murphy, N. C., for the year ending Sept. 30, 1923

[Drainage area, 410 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	825	270	346	0.844	0.97
November	540	250	299	.729	.81
December	9,940	270	1,530	3.73	4.30
January	4,360	695	1,360	3.32	3.83
February	5,080	1,010	1,920	4.68	4.87
March	4,010	1,010	1,800	4.39	5.06
April	3,500	960	1,400	3.41	3.80
May	4,180	960	1,720	4.20	4.84
June	2,990	960	1,490	3.63	4.05
July	1,910	615	915	2.23	2.57
August	1,910	540	778	1.90	2.19
September	615	285	416	1.01	1.13
The year	9,940	250	1,160	2.83	38.42

HIWASSEE RIVER AT RELIANCE, TENN.

LOCATION.—At county highway bridge at Reliance, Polk County, one-fourth mile below Louisville & Nashville Railroad bridge, 1¼ miles below mouth of Lost Creek, and 1¾ miles above mouth of Spring Creek.

DRAINAGE AREA.—1,180 square miles.

RECORDS AVAILABLE.—August 17, 1900, to December 31, 1913; and February 1, 1919, to September 30, 1923.

GAGE.—Chain gage attached to downstream railing of bridge, installed November 10, 1921; read by Warner Smith. Previous to this date gage was vertical staff in two sections, located 150 feet upstream from the Louisville & Nashville Railroad bridge. New gage was set so as to read about the same as the staff gage at a stage of 1.5 feet.

DISCHARGE MEASUREMENTS.—Made from 5-span highway bridge during high and medium stages and from railroad bridge during low stages. Section at highway bridge is too rocky and shallow for accurate measurements below a stage of 2.0 feet. Railroad bridge makes a decided angle with the current making corrections for angle necessary.

CHANNEL AND CONTROL.—Channel is wide and shallow, bed composed of coarse gravel and boulders. Right bank subject to overflow at stages above 8 feet; left bank high and is not overflowed. Control is coarse gravel and rock shoal at head of island 100 feet downstream from gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.0 feet at 5 p. m. December 17 (discharge, 28,000 second-feet); minimum stage, 1.15 feet at 7 a. m. November 27 (discharge, 798 second-feet).

1900–1913; 1919–1923: Maximum stage recorded, 15.2 feet November 19, 1906 (discharge, not determined); minimum stage, 0.70 foot October 19–26, 1904 (discharge, 380 second-feet).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—None of any consequence.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 12,000 second-feet; extended above that point. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good below 12,000 second-feet; fair above that point.

Discharge measurements of Hiwassee River at Reliance, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 27	L. J. Hall	1.72	1,790	Apr. 14	P. E. Hanson	4.58	9,480
Jan. 12	P. E. Hanson	1.73	1,760	May 30	Warren Withee	4.51	9,420
Feb. 4	do	3.61	6,610	Aug. 25	Duncan Charlton	1.89	1,930
Mar. 4	do	2.15	2,770	30	King and Charlton	1.68	1,690
Apr. 11	do	2.20	2,810				

Daily discharge, in second-feet, of Hiwassee River at Reliance, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	848	822	848	7,140	4,110	3,110	2,870	3,360	6,260	2,870	2,390	1,430
2	822	822	1,320	5,980	4,630	2,750	2,750	3,110	4,890	2,630	2,510	1,320
3	810	822	5,980	4,110	6,260	2,630	2,750	2,870	4,370	2,750	2,160	1,250
4	810	822	4,890	3,360	6,550	2,750	3,480	2,870	3,860	2,750	1,820	1,720
5	810	822	3,240	2,870	9,030	2,870	4,110	2,990	3,860	2,630	1,720	1,520
6	810	822	2,040	2,510	10,400	2,870	3,610	2,990	3,860	2,510	1,820	1,520
7	888	874	1,520	2,390	6,550	7,140	3,110	2,750	3,860	2,630	2,630	1,430
8	1,060	848	1,430	2,510	5,160	4,890	3,240	3,110	4,110	2,750	2,160	1,340
9	1,930	848	1,820	2,160	4,370	3,860	3,480	3,610	3,610	3,480	3,360	1,320
10	1,110	835	3,110	2,040	4,370	3,860	2,990	2,870	3,240	2,630	2,510	1,250
11	958	822	2,390	1,820	4,110	5,430	2,870	2,750	3,480	2,160	2,510	1,200
12	916	822	2,040	1,820	3,860	5,160	2,750	2,630	5,160	2,040	2,040	1,160
13	902	822	2,390	1,720	11,500	6,260	4,890	3,860	5,980	2,040	2,280	1,140
14	888	822	2,280	1,720	10,400	6,550	11,500	3,480	4,110	3,480	2,280	1,110
15	888	860	7,140	2,630	6,260	4,890	5,980	3,110	3,480	2,390	1,820	1,080
16	916	1,060	10,700	2,390	4,890	6,260	4,630	9,700	3,240	2,510	1,720	1,060
17	902	1,050	25,200	1,930	4,370	14,500	4,110	6,260	2,990	4,890	1,620	1,030
18	888	958	16,600	1,820	3,860	7,440	3,860	4,370	2,990	5,430	2,990	1,030
19	902	874	5,980	1,720	3,480	6,550	3,480	4,110	2,630	2,870	3,360	1,050
20	848	848	4,110	1,930	3,240	5,700	3,240	4,630	2,510	2,390	1,930	1,060
21	848	916	3,110	1,820	2,990	4,890	3,240	4,110	2,870	2,160	1,620	1,230
22	835	860	2,630	2,040	2,870	4,370	3,480	4,110	2,630	2,040	1,520	1,520
23	848	860	2,390	3,480	2,750	4,370	3,110	5,160	2,510	2,390	2,510	1,210
24	1,340	835	2,040	13,000	2,630	5,430	3,860	4,370	3,360	1,930	3,860	1,060
25	1,110	822	1,930	6,260	2,510	4,370	3,360	4,110	3,240	1,820	1,930	1,050
26	916	822	1,820	4,370	2,630	3,860	2,870	4,110	3,110	2,040	1,620	1,030
27	874	822	1,720	3,860	3,610	3,610	2,870	4,370	2,750	1,720	1,520	1,030
28	835	902	3,610	4,370	3,610	3,610	3,240	4,890	6,840	2,160	1,620	1,030
29	822	916	3,110	4,110	-------	3,360	3,860	7,440	4,890	5,700	2,040	986
30	822	860	2,390	3,610	-------	3,110	4,110	9,030	3,480	3,110	1,820	930
31	822	-------	2,160	4,630	-------	2,990	-------	9,030	-------	2,040	1,520	-------

Monthly discharge of Hiwassee River at Reliance, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 1,180 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,930	810	935	0.792	0.91
November	1,060	822	863	.732	.82
December	25,200	848	4,260	3.61	4.16
January	13,000	1,720	3,420	2.90	3.34
February	11,500	2,510	5,040	4.27	4.45
March	14,500	2,630	4,820	4.09	4.72
April	11,500	2,750	3,790	3.21	3.58
May	9,700	2,630	4,390	3.72	4.29
June	6,840	2,510	3,810	3.22	3.59
July	5,700	1,720	2,740	2.32	2.68
August	3,860	1,520	2,170	1.84	2.12
September	1,720	930	1,200	1.02	1.14
The year	25,200	810	3,110	2.64	35.80

HIWASSEE RIVER AT CHARLESTON, TENN.

LOCATION.—At Southern Railway bridge at Charleston, Bradley County, 12 miles below confluence with Ocoee River.

DRAINAGE AREA.—2,300 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1899, to December 31, 1902; and October 1, 1920, to September 30, 1923. Gage-height record has been obtained by the United States Weather Bureau since 1893.

GAGE.—Chain gage bolted to ties on dowstream side of railroad bridge; installed September 29, 1922; read by J. T. Weeks and Neil Parkinson. Gage used previous to September 29, 1922, is a vertical staff located on the middle pier of the railroad bridge. Elevation of zero of gage 667.08 feet above mean sea level (Tenessee River survey datum).

CHANNEL AND CONTROL.—Bed composed of rock and gravel; slightly shifting. Left bank high and not subject to overflow; right bank low and is overflowed during high stages. River is confined to one channel at all stages. Channel straight for 500 feet above and below gage. Control for ordinary stages is formed by several spur dikes about one mile downstream; fairly permanent. Stage-discharge relation may be affected by backwater from Tennessee River during high stages.

DISCHARGE MEASUREMENTS.—Made from downstream side of four-span highway bridge, 500 feet upstream from gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.4 feet at 7 a. m. December 18 (discharge, 29,500 second-feet); minimum stage, —0.5 foot at 7 a. m. November 26 (discharge, 860 second-feet).

1920–1923: Maximum stage recorded, 26.7 feet at 1 p. m. January 22, 1922 (discharge, 49,500 second-feet); minimum stage, that of November 26, 1922.

The United States Weather Bureau reports a stage of 32.5 feet March 31, 1886.

REGULATION.—The Tennessee Electric Power Co.'s hyrdroelectric plants on Ocoee River cause considerable regulation of flow during low-water periods. The first of these plants was put in operation in 1912.

ACCURACY.—Stage-discharge relation fairly permanent; possibly affected by backwater from Tennessee River during high stages. Rating curve fairly well defined between 1,200 and 15,000 second-feet; poorly defined between 15,000 and 40,000 second-feet. Gage read to tenths once daily prior to September 7; read to hundredths twice daily since that date. Daily discharge ascertained by applying daily or mean daily gage height to rating table. Records fair below 15,000 second-feet; subject to considerable error above that point.

COOPERATION.—Gage-height record prior to September 7, 1923, furnished by United States Weather Bureau.

Discharge measurements of Hiwassee River at Charleston, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 21	P. E. Hanson	0.93	1,620	Apr. 10	P. E. Hanson	4.26	5,360
Jan. 11	do	2.43	3,360	May 29	Withee and Livingston	10.10	14,400
Feb. 3	do	7.47	10,100	Aug. 31	Duncan Charlton	1.83	2,500
27	do	4.03	5,680				

Daily discharge, in second-feet, of Hiwassee River at Charleston, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,230	1,440	1,370	8,450	8,450	4,720	4,860	6,960	12,200	4,860	4,200	2,890
2	1,000	1,300	1,230	9,950	7,850	3,940	4,720	6,120	9,350	4,200	3,460	2,680
3	1,510	1,230	6,120	6,680	9,650	3,940	5,420	5,000	8,150	6,680	3,340	2,680
4	1,590	1,230	9,350	5,560	13,000	3,820	5,840	4,590	7,250	5,700	3,000	3,220
5	1,050	1,300	5,560	3,940	14,100	3,700	7,700	5,280	5,840	4,200	3,000	2,680
6	1,370	1,370	3,700	3,700	17,500	4,720	7,250	5,420	6,120	3,460	2,890	3,000
7	1,510	1,670	2,680	3,460	17,500	12,500	5,280	5,000	7,250	3,940	3,700	2,780
8	2,680	1,670	2,380	3,220	13,100	13,800	4,330	5,000	8,750	5,140	3,220	3,000
9	2,480	1,510	2,680	3,700	9,050	9,950	5,840	6,120	6,680	6,120	5,140	2,100
10	2,280	1,370	4,200	3,220	8,450	8,300	4,590	5,000	5,560	3,700	9,500	2,190
11	1,590	1,170	3,460	2,580	8,150	9,200	5,280	4,590	7,850	3,340	8,750	2,780
12	1,300	1,000	2,480	2,580	5,840	9,950	5,140	4,590	9,650	3,110	4,860	2,580
13	950	950	2,680	2,480	9,350	9,650	5,700	5,420	13,800	3,460	4,460	2,480
14	900	1,000	2,680	2,480	23,600	10,900	16,100	7,100	8,150	4,330	5,000	2,100
15	1,230	900	4,720	2,680	16,800	9,350	15,400	6,120	6,400	4,070	5,280	2,100
16	1,230	1,370	16,800	2,680	11,500	9,500	12,000	11,400	5,840	3,700	3,460	1,590
17	1,370	1,370	11,800	3,220	8,300	20,700	7,850	18,700	5,000	6,400	3,110	1,750
18	1,510	1,370	29,500	3,000	6,820	18,900	7,250	10,200	3,940	19,400	3,700	2,190
19	1,370	1,440	19,200	2,680	5,840	14,900	6,540	8,000	4,720	11,500	6,120	2,190
20	1,300	1,300	10,600	2,890	6,680	13,100	6,120	7,400	5,700	7,550	4,860	2,190
21	1,230	1,230	7,850	2,890	6,120	10,600	5,840	9,800	4,330	5,700	3,220	1,830
22	1,170	1,110	5,000	3,700	5,000	8,450	5,840	9,650	4,070	4,590	3,340	1,510
23	1,230	1,050	3,940	4,200	4,330	9,950	5,000	8,750	3,940	4,200	3,110	1,370
24	2,010	950	3,700	16,100	3,940	11,200	6,680	9,050	4,460	3,700	3,580	1,230
25	2,480	900	3,220	16,800	3,700	9,950	6,400	8,750	6,120	3,940	5,000	1,440
26	1,830	860	2,780	10,200	3,460	8,750	5,840	8,000	6,120	3,700	2,890	1,670
27	1,750	1,000	2,580	9,350	4,720	7,400	5,000	8,000	4,590	3,460	2,580	1,920
28	1,590	1,230	3,220	9,350	7,700	6,400	4,720	8,450	6,120	2,580	2,580	2,190
29	1,590	1,170	3,700	7,250	-------	5,140	5,420	13,600	13,100	4,070	3,220	2,280
30	1,050	1,110	3,220	6,960	-------	5,420	8,000	14,200	5,280	9,350	3,000	1,920
31	900	-------	6,400	8,150	-------	5,000	-------	16,100	-------	6,400	2,680	-------

Monthly discharge of Hiwassee River at Charleston, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 2,300 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,680	900	1,490	0.648	0.75
November	1,670	860	1,220	.530	.59
December	29,500	1,230	6,090	2.65	3.06
January	16,800	2,480	5,620	2.44	2.81
February	23,600	3,460	9,300	4.04	4.21
March	20,700	3,700	9,150	3.98	4.59
April	16,100	4,330	6,730	2.93	3.27
May	18,700	4,590	8,140	3.54	4.08
June	13,800	3,940	6,880	2.99	3.34
July	19,400	2,580	5,370	2.33	2.69
August	9,500	2,580	4,070	1.77	2.04
September	3,220	1,230	2,220	.965	1.08
The year	29,500	860	5,510	2.40	32.51

SHOOTING CREEK NEAR HAYESVILLE, N. C.

LOCATION.—At steel highway bridge on new road being built from Hayesville to Franklin, N. C., 100 feet downstream from new concrete highway bridge, 5 miles from Hiwassee River and 7½ miles southeast of Hayesville, Clay County.

DRAINAGE AREA.—37.9 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 15, 1922, to September 30, 1923.

GAGE.—Chain gage attached to upstream handrail of bridge; read by Mrs. Lena Kitchens.

DISCHARGE MEASUREMENTS.—Made from downstream side of the bridge.

CHANNEL AND CONTROL.—Bed of stream composed of gravel and sand; probably shifting. Left bank is high, rocky, and not subject to overflow. Right bank is fairly high and is seldom overflowed. Control is a gravel and boulder shoal 75 feet below gage; probably permanent.

EXTREMES OF DISCHARGE.—1922–1923: Maximum stage recorded, 6.80 feet, morning reading December 17, 1922 (discharge, 2,380 second-feet); minimum stage, 1.72 feet, evening reading October 5, 1922 (discharge, 20 second-feet).

ICE.—Stage-discharge relation probably never affected by ice.

REGULATION.—Probably negligible.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 40 and 300 second-feet; extended above 300 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records goods.

Discharge measurements of Shooting Creek near Hayesville, N. C., during the years ending Sept. 30, 1922 and 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1922		*Feet*	*Sec.-ft.*	1923		*Feet*	*Sec.-ft.*
Aug. 15	L. J. Hall	2.00	44.0	June 9	L. J. Hall	2.72	145
15	do	2.12	54.4	Aug. 30	L. J. and W. E. Hall	2.17	55.3

Daily discharge, in second-feet, of Shooting Creek near Hayesville, N. C., for the years ending Sept. 30, 1922 and 1923

Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.
1922			1922			1922		
1		35	11		195	21	34	62
2		32	12		50	22	35	37
3		32	13		38	23	38	30
4		50	14		33	24	38	28
5		41	15	49	31	25	41	28
6		32	16	49	28	26	52	25
7		29	17	43	41	27	39	31
8		27	18	41	31	28	35	28
9		28	19	38	25	29	32	26
10		28	20	38	25	30	31	25
						31	31	

Daily discharge, in second-feet, of Shooting Creek near Hayesville, N. C., for the years ending Sept. 30, 1922 and 1923—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922–23												
1	24	24	27	329	162	124	115	120	243	98	74	49
2	24	24	243	206	256	119	113	113	195	104	68	49
3	24	24	299	184	256	113	113	111	173	113	66	51
4	23	24	152	133	256	133	133	110	152	108	65	60
5	21	24	97	124	393	113	133	108	162	96	62	52
6	34	24	79	119	270	142	120	102	206	88	329	47
7	47	28	66	110	206	184	113	115	173	86	108	46
8	38	25	82	103	184	162	162	120	152	94	111	46
9	32	24	102	94	184	142	119	110	133	79	195	41
10	29	24	117	88	184	142	111	104	124	75	133	39
11	28	24	94	86	162	184	108	102	133	71	97	39
12	27	24	91	84	152	195	106	98	206	69	85	40
13	24	24	82	80	745	314	314	122	184	152	82	38
14	29	24	98	79	329	230	256	106	152	133	72	38
15	29	33	562	124	243	195	195	218	133	120	70	37
16	26	38	344	108	218	329	162	206	124	102	63	35
17	27	26	1,470	97	184	344	152	162	117	173	60	35
18	26	26	344	96	162	270	152	133	108	152	108	35
19	25	88	218	100	152	256	142	120	102	111	64	38
20	24	38	162	100	142	206	142	206	142	100	63	38
21	24	36	173	86	133	195	122	173	119	88	54	142
22	23	31	110	113	124	184	115	142	98	78	57	38
23	54	26	97	173	119	230	133	162	162	75	92	36
24	34	28	92	314	117	173	133	142	162	71	64	33
25	27	28	85	218	117	162	115	124	115	110	59	33
26	24	25	79	173	152	152	110	142	100	71	57	31
27	23	27	117	173	173	142	110	173	100	65	56	31
28	23	33	162	173	142	133	133	162	173	184	92	30
29	23	26	122	152	-------	124	133	446	124	100	71	29
30	23	27	108	162	-------	124	124	376	108	78	57	28
31	24	-------	162	184	-------	122	-------	299	-------	71	51	-------

Monthly discharge of Shooting Creek near Hayesville, N. C., for the years ending Sept. 30, 1922 and 1923

[Drainage area, 37.9 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1922					
August 15–31	52	31	39.1	1.03	0.65
September	195	25	38.4	1.01	1.13
1922–23					
October	54	21	27.8	.734	.85
November	88	24	29.2	.770	.86
December	1,470	27	195	5.15	5.94
January	329	79	141	3.72	4.29
February	745	117	211	5.57	5.80
March	344	113	182	4.80	5.53
April	314	106	140	3.69	4.12
May	446	98	159	4.20	4.84
June	243	98	146	3.85	4.30
July	184	65	100	2.64	3.04
August	329	51	86.5	2.28	2.63
September	142	28	42.8	1.13	1.26
The year	1,470	21	121	3.19	43.46

VALLEY RIVER AT TOMOTLA, N. C.

LOCATION.—At steel highway bridge 600 feet from Tomotla post office, Cherokee County, half a mile upstream from mouth of Rodgers Creek and 5 miles northeast of Murphy.

DRAINAGE AREA.—106 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 29, 1904, to December 31, 1909; January 21, 1914, to April 30, 1917; October 29, 1918, to September 30, 1923.

GAGE.—Chain gage on upstream side of bridge, installed August 19, 1922; read by J. T. Hayes. For history of gage used prior to August 19, 1922, see Water-Supply Paper 543.

DISCHARGE MEASUREMENTS.—Made from lower side of bridge.

CHANNEL AND CONTROL.—Channel straight for 50 feet above and below gage. Bed is composed of rock, gravel, and boulders; fairly permanent. Banks are high, but left side is subject to overflow at extremely high stages. Control is a rock, gravel, and boulder riffle just below bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.35 feet at 5.30 p. m. December 17, 1922 (discharge, 3,820 second-feet); minimum stage, 0.88 foot frequently during October and November (discharge, 56 second-feet).

1904–1909, 1914–1917, and 1918–1923: Maximum stage recorded, 17.3 feet November 19, 1906 (discharge, 7,780 second-feet); minimum discharge 22 second-feet October 28 to November 2, 1904.

ICE.—None during year.

REGULATION.—Negligible.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 3,500 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Valley River at Tomotla, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 3	L. J. Hall	2.56	420	Aug. 28	W. R. King and W. E. Hall	1.94	262
June 12	do	3.37	715	28	Duncan Charlton and W. E. Hall	1.91	259
12	do	3.23	666				
Aug. 28	L. J. and W. E. Hall	2.01	277				

Daily discharge, in second-feet, of Valley River at Tomotla, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	62	58	68	1,210	590	322	308	294	488	218	144	102
2	59	59	488	590	732	294	364	280	394	196	144	98
3	58	59	984	488	1,020	280	364	267	364	185	134	107
4	56	58	424	350	1,020	322	456	267	322	174	144	104
5	56	56	242	308	1,410	294	456	254	336	456	134	114
6	66	59	196	308	1,020	336	424	242	308	267	144	102
7	98	70	164	267	732	804	364	230	336	242	280	98
8	121	62	207	254	624	556	394	350	322	218	230	98
9	79	60	424	230	522	456	350	294	294	196	174	92
10	70	59	308	218	590	424	336	267	267	164	164	88
11	64	59	242	207	488	804	308	242	556	154	164	84
12	64	59	254	196	522	660	294	230	522	154	154	84
13	65	59	218	185	2,620	1,250	912	488	488	164	174	79
14	70	58	267	185	1,330	840	984	350	379	154	144	77
15	66	116	1,580	394	804	624	660	488	322	144	134	74
16	70	107	840	280	660	1,100	456	876	280	144	123	72
17	74	66	2,700	242	556	1,290	732	590	254	218	120	72
18	65	65	1,060	230	488	1,020	379	456	242	218	230	74
19	60	87	556	230	424	876	379	379	218	164	164	74
20	59	76	424	242	394	660	336	488	218	154	134	74
21	59	72	336	218	364	590	364	424	207	144	121	102
22	58	66	294	280	336	522	322	394	207	134	134	74
23	118	62	254	556	308	590	336	379	196	134	164	71
24	90	62	218	1,540	280	590	336	364	207	125	144	72
25	71	60	207	768	280	522	308	336	196	164	134	74
26	70	58	207	456	336	456	294	364	185	123	120	80
27	65	74	218	522	456	424	308	336	196	120	111	79
28	60	77	308	768	350	379	350	456	488	456	144	70
29	59	68	254	522	------	364	336	522	336	242	125	70
30	59	68	230	556	------	350	308	696	242	174	109	62
31	59	------	294	696	------	322	------	660	------	154	102	------

NOTE.—Discharge Dec. 2, 15–17, Feb. 12–14, and Apr. 13 were determined from mean daily gage heights ascertained from graph constructed on basis of two daily gage readings and a third reading on Dec. 15 and Feb. 13.

Monthly discharge of Valley River at Tomotla, N. C., for the year ending Sept. 30, 1923

[Drainage area, 106 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	121	56	69.4	0.655	0.76
November	116	56	67.3	.635	.71
December	2,700	68	467	4.41	5.08
January	1,540	185	435	4.10	4.73
February	2,620	280	688	6.49	6.76
March	1,290	280	591	5.58	6.43
April	984	294	417	3.93	4.38
May	876	230	396	3.74	4.31
June	556	185	312	2.94	3.28
July	456	120	192	1.81	2.09
August	280	102	150	1.42	1.64
September	114	62	84.0	.792	.88
The year	2,700	56	320	3.02	41.0

NOTTELY RIVER NEAR RANGER, N. C.

LOCATION.—At steel highway bridge half a mile downstream from Ranger, Cherokee County, which is on Louisville & Nashville Railroad, 7½ miles southwest of Murphy.

DRAINAGE AREA.—272 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 16, 1901, to December 31, 1905; January 22, 1914, to April 30, 1917; October 20, 1918, to September 30, 1923.

GAGE.—Chain gage attached to downstream side of steel highway bridge; read by A. D. Kilpatrick. Gage used 1901–1905 was a vertical staff attached to old wooden bridge which was destroyed by fire in 1913. Gage used January 22, 1914, to October 28, 1918, was a vertical staff on left bank 75 feet upstream from bridge. All gages referred to same datum.

DISCHARGE MEASUREMENTS.—Made from downstream side of the bridge.

CHANNEL AND CONTROL.—Channel straight for 50 feet above and below bridge. Current somewhat irregular owing to action of a sharp riffle 100 feet above gage. Bed composed of gravel, sand, and boulders. Right bank high and not subject to overflow; left bank is overflowed above 18-foot stage. Control is a rock riffle 300 feet downstream; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.0 feet at 4 p. m. December 17 (discharge, 6,100 second-feet); minimum stage, 2.74 feet November 12–14 (discharge, 205 second-feet).

1901–1905, 1914–1917, and 1918–1923: Maximum stage recorded, 21.0 feet February 28, 1902 (discharge, not determined); minimum stage, 2.1 feet several periods in 1914 (discharge, 89 second-feet).

ICE.—None during year.

REGULATION.—Negligible.

ACCURACY.—Stage-discharge relation changed during flood of December 17, 1922. Rating curve used before the change well defined below 2,500 second-feet and extended above that point; curve used after the change well defined below 1,000 second-feet and extended above that point. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Nottely River near Ranger, N. C., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 2	L. J. Hall	5.46	978	Aug. 29	Duncan Charlton	4.20	514
June 11	do	4.97	796	29	L. J. Hall	4.20	545

Daily discharge, in second-feet, of Nottely River near Ranger, N. C., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	216	226	216	953	545	604	545	836	1,380	604	574	387
2	216	216	326	765	635	545	517	800	1,120	574	545	387
3	216	216	1,210	698	698	517	489	731	953	731	489	364
4	216	216	806	604	1,200	489	765	731	874	698	411	698
5	207	216	587	545	2,480	489	731	666	874	604	387	462
6	278	216	378	545	1,380	489	604	604	731	545	462	387
7	460	216	378	545	993	1,290	545	731	993	635	462	387
8	732	226	404	489	765	731	574	800	953	765	436	364
9	326	216	1,290	436	731	666	604	698	800	731	411	341
10	290	216	1,180	387	666	604	545	666	666	545	874	341
11	256	216	732	387	604	765	545	604	874	517	545	341
12	246	207	460	341	574	635	489	574	1,650	489	517	341
13	236	207	432	319	1,920	1,380	1,600	635	1,030	731	1,290	319
14	236	207	432	319	1,290	1,120	2,240	604	800	993	517	319
15	226	236	1,530	462	913	874	1,030	635	731	666	436	319
16	246	216	1,570	387	698	1,880	836	1,600	666	666	411	319
17	246	216	3,500	364	635	2,190	731	1,030	604	1,700	364	297
18	236	216	2,240	341	574	1,740	698	800	604	1,120	666	297
19	236	460	1,080	341	545	1,240	666	731	574	731	489	297
20	226	267	604	341	545	913	635	1,120	545	666	462	297
21	226	226	545	341	517	874	635	1,200	517	545	436	341
22	216	226	436	341	489	993	635	913	489	489	411	341
23	267	226	411	364	489	800	604	765	731	489	1,700	319
24	378	216	387	1,650	462	800	731	1,080	1,160	489	666	319
25	352	216	387	874	436	731	604	993	800	462	517	319
26	236	216	387	489	436	698	604	1,120	666	436	462	319
27	236	226	387	517	765	666	545	1,650	574	436	436	297
28	226	236	1,470	604	765	635	800	1,830	2,100	913	436	297
29	226	226	800	545	-------	604	1,380	2,100	1,120	800	574	276
30	226	216	489	545	-------	574	1,030	1,380	731	545	604	276
31	226	-------	1,200	635	-------	574	-------	1,880	-------	462	411	-------

NOTE.—Discharge for Dec. 3, 15–18, and Aug. 23 determined from mean daily gage heights ascertained from graph constructed on basis of two daily gage readings.

Monthly discharge of Nottely River near Ranger, N. C., for the year ending Sept. 30, 1923

[Drainage area, 272 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	732	207	270	0.985	1.14
November	460	207	229	.836	.93
December	3,500	216	847	3.09	3.56
January	1,650	319	531	1.94	2.24
February	2,480	436	812	2.96	3.08
March	2,190	489	875	3.19	3.68
April	2,240	489	765	2.79	3.11
May	2,100	574	984	3.59	4.14
June	2,100	489	877	3.20	3.57
July	1,700	436	670	2.45	2.82
August	1,700	364	561	2.05	2.36
September	698	276	346	1.26	1.41
The year	3,500	207	647	2.36	32.04

TOCCOA RIVER NEAR DIAL, GA.

LOCATION.—Half a mile above Shallow Ford, 1 mile above Stanley Creek, 2½ miles below Big Creek, 3½ miles below Noontootley Creek, and 4 miles northwest of Dial, Fannin County.

DRAINAGE AREA.—175 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1913, to September 30, 1923. Records were obtained at Butts Bridge, about 2 miles above Dial, May 17, 1907, to June 30, 1908.

GAGE.—Bristol water-stage recorder. Sea-level elevation of auxiliary staff gage, 1,781.13 feet (Tennessee Electric Power Co.).

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet upstream from gage.

CHANNEL AND CONTROL.—Bed of stream consists of gravel and boulders; fairly smooth. Left bank is overflowed at a stage of about 12 feet. Control is formed by the head of rapids just below gage; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.5 feet the afternoon of December 17 (discharge, 3,550 second-feet); minimum stage, 0.85 foot October 4–6 and December 1 and 2 (discharge, 152 second-feet).

1913–1923: Maximum stage recorded, 10.0 feet at 6 p. m. July 9, 1916 (discharge, 9,200 second-feet); minimum stage, 0.55 foot October 13, 29, and 30, 1914 (discharge, 109 second-feet).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—There are slight diurnal fluctuations due to operation of small mills upstream.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 4,000 second-feet. Operation of water-stage recorder satisfactory throughout year. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage-height graph, except for days of considerable fluctuation in stage, for which it was ascertained by averaging hourly discharge. Records good.

COOPERATION.—Gage-height record furnished by Tennessee Electric Power Co.

Discharge measurements of Toccoa River near Dial, Ga., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Dec. 21	L. J. Hall	1.60	409
Apr. 12	P. E. Hanson	1.90	487
Aug. 27	Duncan Charlton	1.54	339

Daily discharge, in second-feet, of Toccoa River near Dial, Ga., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	162	172	155	986	444	540	525	962	1,300	722	484	379
2	160	172	182	680	595	512	507	865	1,130	740	480	367
3	160	168	249	565	585	502	575	800	1,030	788	419	407
4	160	165	439	498	615	502	734	832	995	698	480	630
5	158	165	363	453	1,260	484	686	852	995	728	458	471
6	324	162	341	435	995	575	590	800	962	689	471	423
7	400	168	310	411	758	858	565	728	1,510	674	458	411
8	401	170	344	391	652	625	625	930	1,340	669	466	387
9	229	165	430	379	600	560	575	846	1,060	620	633	348
10	211	165	327	363	580	550	550	764	930	590	651	334
11	199	162	271	355	560	560	535	728	962	575	489	334
12	190	162	347	344	545	555	516	680	1,160	555	453	330
13	178	160	344	330	1,440	746	1,320	728	962	933	498	327
14	175	160	299	338	1,060	652	1,440	674	898	813	453	306
15	178	172	677	379	806	600	962	840	839	642	440	292
16	175	185	514	324	710	1,200	832	1,200	782	605	419	299
17	178	170	2,810	313	625	1,270	776	930	734	1,040	411	302
18	175	165	1,050	310	575	962	746	800	716	962	545	302
19	168	223	580	306	540	930	692	806	680	704	444	302
20	165	190	453	320	525	800	669	1,200	698	625	423	306
21	165	170	395	306	512	746	734	1,130	692	585	419	391
22	160	165	379	338	494	704	647	930	669	560	453	296
23	185	162	320	538	471	746	636	1,050	748	555	745	264
24	214	160	296	898	466	704	652	1,060	1,070	502	550	327
25	180	160	282	610	444	630	630	930	728	520	458	288
26	165	158	271	525	545	610	610	962	680	498	427	268
27	165	160	423	480	776	590	800	1,240	772	484	411	257
28	168	172	741	471	625	575	951	1,870	1,370	794	512	244
29	170	165	435	427	-------	565	1,800	1,980	1,030	725	595	254
30	170	160	415	435	-------	565	1,200	1,660	800	498	431	247
31	170	-------	475	476	-------	575	-------	1,420	-------	466	403	-------

Monthly discharge of Toccoa River near Dial, Ga., for the year ending Sept. 30, 1923

[Drainage area, 175 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	401	158	195	1.11	1.28
November	223	160	168	.960	1.07
December	2,810	155	481	2.75	3.17
January	986	306	451	2.58	2.97
February	1,440	444	672	3.84	4.00
March	1,270	484	677	3.87	4.46
April	1,800	507	769	4.39	4.90
May	1,980	674	1,010	5.77	6.65
June	1,510	669	941	5.38	6.00
July	1,040	466	663	3.79	4.37
August	745	403	483	2.76	3.18
September	630	244	336	1.92	2.14
The year	2,810	155	570	3.26	44.19

TOCCOA RIVER NEAR MORGANTON, GA.

LOCATION.—At highway bridge on road from Blueridge to Morganton, half a mile downstream from mouth of Star Creek, and 2 miles west of Morganton, Fannin County.

DRAINAGE AREA.—231 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 25, 1898, to March 31, 1903; and April 1, 1913, to September 30, 1923. Records 1898 to 1903 published in Water Supply Paper 197, under "Toccoa River near Blueridge, Ga."

GAGE.—Bristol water-stage recorder installed in 1914 on right bank 1,000 feet downstream from new bridge and 150 feet downstream from old vertical staff which was used from 1898 to 1903. Zero of both gages, 1,544.5 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from cable 1,800 feet downstream from gage, or from bridge.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Banks high; left bank subject to overflow at about gage height of 15 feet; right bank is not subject to overflow. Low-water control is a low shoal just below gage; high-water control is combination of shoal and banks. Control subject to small shifts.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year from water-stage recorder, 8.6 feet at noon December 17 (discharge, 6,850 second-feet); minimum mean daily stage, 2.30 feet November 22, 23, 25, 26, 29, and 30, and December 1 (discharge, 190 second-feet).

1913–1923: Maximum stage recorded, 13.0 feet at 9 p. m. July 9, 1916 (discharge, 13,900 second-feet); minimum stage, 1.8 feet September 10, 14–17, 23, 29, 30, and October 1, 1914 (discharge, 129 second-feet).

REGULATION.—Slight diurnal fluctuations, probably caused by operation of small mills upstream.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 200 and 3,500 second-feet. Operation of water-stage recorder satisfactory throughout the year. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage-height graph, except for days of considerable fluctuation in stage, for which it is ascertained by averaging hourly discharge, and except as indicated in footnote to table of daily discharge. Records good below 3,500 second-feet; fair above that point.

COOPERATION.—Gage-height record furnished by Tennessee Electric Power Co.

Discharge measurements of Toccoa River near Morganton, Ga., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 23	L. J. Hall	2.82	413	Apr. 13	P. E. Hanson	3.90	960
Apr. 12	P. E. Hanson	3.36	594	Aug. 27	Duncan Charlton	3.05	475

NOTE.—Measurements made Apr. 12 and 13 are of doubtful accuracy as meter bearing was badly worn.

Daily discharge, in second-feet, of Toccoa River near Morganton, Ga., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	238	222	190	1,190	541	726	713	1,190	1,500	858	652	465
2	238	222	236	791	646	664	688	1,040	1,340	935	700	455
3	238	218	346	612	682	646	746	970	1,260	970	629	490
4	236	222	571	546	739	652	970	1,000	1,150	865	612	706
5	232	222	364	500	1,770	634	1,000	1,040	1,190	830	607	530
6	349	218	280	465	1,230	739	830	1,080	1,120	810	652	480
7	529	218	272	445	1,040	1,120	778	970	1,690	791	612	510
8	541	211	336	430	865	798	844	1,120	1,680	804	624	505
9	320	207	510	403	784	726	752	1,040	1,260	752	676	480
10	268	204	398	385	791	700	700	935	1,150	700	804	460
11	253	200	324	380	752	758	682	900	1,190	676	634	426
12	250	204	375	385	713	765	658	900	1,500	658	602	421
13	246	204	398	367	1,710	1,040	1,590	970	1,190	965	634	421
14	246	200	349	398	1,300	900	1,860	879	1,080	1,100	602	412
15	238	207	811	440	970	791	1,190	970	1,000	784	574	421
16	222	225	637	376	865	1,470	1,040	1,500	970	765	546	416
17	222	204	3,470	349	798	1,680	900	1,120	935	1,270	530	416
18	214	200	1,320	349	746	1,230	879	1,000	900	1,200	1,360	408
19	204	268	706	344	720	1,190	817	970	851	844	612	421
20	214	236	558	372	700	1,040	810	1,380	830	765	585	421
21	238	204	505	385	658	935	935	1,420	858	726	541	552
22	232	190	421	403	640	900	872	1,150	817	726	585	455
23	256	190	394	718	607	970	810	1,180	865	765	998	421
24	276	194	385	1,080	596	970	851	1,260	1,330	676	752	480
25	238	190	376	706	590	858	778	1,120	935	658	585	460
26	236	190	349	585	720	865	746	1,190	865	634	563	430
27	232	197	401	552	1,080	837	970	1,500	830	618	530	403
28	232	204	858	558	804	798	1,040	2,050	1,620	862	590	394
29	232	190	536	505	-------	798	2,050	2,200	1,230	1,150	746	394
30	232	190	450	480	-------	772	1,500	1,930	970	720	568	385
31	228	-------	430	541	-------	739	-------	1,680	-------	652	505	-------

NOTE.—Gage not operating Dec. 30, 31, Jan. 1-5; discharge ascertained by using mean of morning and afternoon readings of staff gage.

Monthly discharge of Toccoa River near Morganton, Ga., for the year ending Sept. 30, 1923

[Drainage area, 231 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	541	204	262	1.13	1.30
November	268	190	208	.900	1.00
December	3,470	190	566	2.45	2.82
January	1,190	344	517	2.24	2.58
February	1,770	541	859	3.72	3.87
March	1,680	634	894	3.87	4.46
April	2,050	658	967	4.19	4.68
May	2,200	879	1,210	5.24	6.04
June	1,690	817	1,140	4.94	5.51
July	1,270	618	824	3.57	4.12
August	1,360	505	652	2.82	3.25
September	706	385	455	1.97	2.20
The year	3,470	190	712	3.08	41.83

OCOEE RIVER AT COPPERHILL, TENN.

LOCATION.—At Tennessee Copper Co.'s pump house half a mile below highway bridge in Copperhill, Polk County, one-eighth mile above mouth of Fightingtown Creek.

DRAINAGE AREA.—374 square miles.

RECORDS AVAILABLE.—March 21, 1903, to December 31, 1913; and October 1, 1918, to September 30, 1923.

GAGE.—Staff gage on right bank at pump house, installed November 23, 1914; read to hundredths twice daily by L. V. Curran.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed of stream is not permanent at gage. Control is practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 6.0 feet at 5 p. m. December 17; minimum stage, 0.65 foot November 25 and 26.

1903–1913; 1919–1923: Maximum stage recorded, 18.5 feet November 19, 1906.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—There is a slight diurnal fluctuation during extremely low stages, caused by operation of a few small water-power plants above the gage.

COOPERATION.—Gage-height record furnished by L. V. Curran.

Data inadequate for determination of discharge.

No discharge measurements were made at this station during year.

Daily gage height, in feet, of Ocoee River at Copperhill, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.71	0.75	0.72	2.3	1.4	1.6	1.5	2.0	2.6	1.85	1.65	1.3
2	.70	.74	1.3	1.75	1.45	1.5	1.5	1.95	2.4	2.5	1.75	1.25
3	.71	.72	2.0	1.45	1.7	1.45	1.6	1.9	2.2	2.1	1.6	1.25
4	.71	.72	1.9	1.35	1.85	1.4	1.9	1.95	2.1	1.9	1.5	1.5
5	.71	.75	1.4	1.25	2.8	1.4	1.95	2.0	2.2	1.9	1.5	1.45
6	.82	.75	1.05	1.2	2.4	1.6	1.7	2.0	2.1	1.8	1.55	1.3
7	1.5	.75	.90	1.15	2.0	2.3	1.6	1.85	2.6	1.9	1.6	1.3
8	1.9	.75	1.0	1.2	1.8	1.8	1.8	2.1	2.7	1.8	2.0	1.3
9	1.05	.72	2.1	1.1	1.65	1.6	1.65	2.0	2.2	1.75	1.9	1.25
10	.88	.71	1.4	1.35	1.6	1.5	1.6	1.9	2.1	1.65	2.0	1.2
11	.84	.70	1.2	1.0	1.6	1.7	1.55	1.8	2.6	1.6	1.55	1.2
12	.81	.68	1.35	1.0	1.5	1.6	1.4	1.7	3.2	1.55	1.5	1.1
13	.80	.67	1.45	.97	3.0	2.3	3.0	2.0	2.4	2.3	1.8	1.1
14	.75	.67	1.3	1.0	2.4	1.9	3.0	1.8	2.1	2.3	1.5	1.7
15	.74	.71	2.7	1.3	2.0	1.75	2.3	2.0	2.0	1.8	1.4	1.05
16	.78	.78	1.95	1.1	1.8	2.6	2.0	2.8	2.0	1.6	1.3	1.05
17	.80	.76	5.0	1.0	1.65	2.9	1.8	2.2	1.95	2.8	1.3	1.05
18	.76	.76	2.6	1.0	1.7	2.4	1.85	2.0	1.85	2.5	1.8	1.05
19	.75	1.1	1.7	1.0	1.5	2.3	1.75	1.9	1.8	1.95	1.6	1.05
20	.75	.95	1.45	1.05	1.5	2.0	1.7	2.4	1.8	1.75	1.4	1.1
21	.74	.82	1.3	1.7	1.5	1.85	1.85	2.4	1.75	1.7	1.3	1.5
22	.76	.75	1.2	1.15	1.45	1.85	1.8	2.1	1.75	1.6	1.3	1.15
23	.84	.70	1.1	1.95	1.4	1.85	1.7	2.0	1.75	1.9	2.4	1.05
24	.96	.67	1.05	2.7	1.4	1.9	1.85	2.2	2.4	1.6	1.8	1.05
25	.81	.65	1.0	1.85	1.35	1.7	1.65	2.1	2.1	1.65	1.45	1.05
26	.76	.65	.98	1.6	1.4	1.7	1.6	2.2	1.85	1.6	1.4	1.15
27	.74	.67	.98	1.45	2.1	1.7	1.8	2.5	2.1	1.5	1.35	1.05
28	.75	.68	1.8	1.5	1.75	1.65	2.0	3.1	3.7	2.4	1.4	1.0
29	.75	.76	1.35	1.4	-------	1.6	3.0	3.3	2.4	2.6	1.7	1.0
30	.74	.72	1.2	1.35	-------	1.6	2.4	3.2	1.95	1.75	1.4	.98
31	.74	-------	1.15	1.5	-------	1.6	-------	2.8	-------	1.8	1.3	-------

OCOEE RIVER AT McHARGE, TENN.

LOCATION.—At county highway bridge, half a mile downstream from McHarge railroad siding, Polk County, and 2½ miles downstream from Copperhill, Tenn. Potato Creek enters half a mile above gage.

DRAINAGE AREA.—451 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 1, 1917, to September 30, 1923.

GAGE.—Vertical staff bolted to left downstream side of concrete bridge pier on left bank; read by Leslie Rogers.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Right bank high; left bank subject to overflow at extreme stages, but all water is confined to bridge. Control consists of solid rock riffle about 300 feet below gage; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.48 feet at 4.30 p. m. December 17 (discharge, 6,680 second-feet); minimum stage, 0.28 foot November 25–27 and December 1 (discharge, 311 second-feet).

1917–1923: Maximum stage recorded, 11.4 feet at 3.30 p. m. January 21, 1922 (discharge, 13,100 second-feet); minimum stage, that of November 25–27 and December 1, 1922.

ICE.—Stage-discharge relation not affected by ice.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined between 500 and 5,000 second-feet; extended above 5,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by Tennessee Electric Power Co.

Discharge measurements of Ocoee River at McHarge, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 26	L. J. Hall	0.90	643	Apr. 14	P. E. Hanson	3.89	3,310
Apr. 11	P. E. Hanson	1.57	1,050	Aug. 27	Duncan Charlton	1.30	863
13	do	5.01	4,880				

Daily discharge, in second-feet, of Ocoee River at McHarge, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	470	420	311	2,150	1,020	1,160	1,020	1,670	2,250	1,320	1,090	725
2	395	420	788	1,160	1,240	1,090	1,020	1,400	2,150	3,620	1,090	725
3	395	395	885	1,020	1,320	1,020	1,020	1,320	1,760	1,950	1,020	725
4	395	395	1,090	885	1,400	950	1,320	1,400	1,670	1,580	950	950
5	395	395	725	755	2,460	950	1,400	1,580	1,580	1,320	950	820
6	445	395	635	755	2,150	2,460	1,240	1,580	1,490	1,240	950	820
7	950	420	580	820	1,400	1,850	1,160	1,400	2,250	1,160	885	788
8	788	395	635	788	1,400	1,320	1,320	1,760	2,350	1,160	885	755
9	635	395	608	695	1,320	1,240	1,320	1,490	2,250	1,090	1,160	725
10	635	395	725	695	1,320	1,160	1,160	1,400	1,400	1,090	1,240	695
11	525	370	665	695	1,320	1,320	1,090	1,240	1,950	1,020	1,240	725
12	498	370	695	695	1,240	1,320	950	1,160	2,900	1,020	1,240	725
13	420	370	635	635	3,980	3,260	2,680	1,580	2,150	1,580	1,240	695
14	395	370	635	665	4,240	1,400	2,900	1,320	2,050	2,050	1,160	635
15	420	395	2,050	695	1,950	1,400	1,950	2,150	1,950	1,950	1,160	580
16	470	420	1,320	695	1,400	3,020	1,490	2,150	1,490	2,050	1,160	695
17	498	420	6,190	665	1,320	2,150	1,400	1,400	1,400	2,460	2,790	695
18	445	420	3,380	695	1,320	1,950	1,400	1,400	1,400	1,850	1,400	695
19	420	445	3,020	695	1,240	2,150	1,320	1,400	1,400	1,670	1,320	695
20	395	420	2,570	695	1,240	1,580	1,240	2,250	1,320	1,320	1,240	695
21	445	420	885	695	1,090	1,400	1,320	2,050	1,240	1,240	1,020	725
22	370	420	788	695	1,090	1,400	1,320	1,760	1,240	3,260	885	725
23	635	420	695	2,570	1,020	1,400	1,240	1,400	1,160	2,790	2,900	695
24	608	370	695	2,680	1,020	1,400	1,320	1,400	1,240	1,400	1,320	725
25	445	311	695	1,400	950	1,320	1,160	1,670	1,580	2,250	1,020	695
26	420	311	695	1,160	950	1,320	1,160	1,850	1,400	1,850	885	695
27	395	345	695	1,020	2,570	1,240	1,090	2,350	1,240	1,670	820	695
28	395	420	1,320	1,160	1,320	1,240	1,580	2,790	3,860	1,400	950	695
29	420	370	820	1,020	-------	1,160	2,790	3,500	3,020	1,320	1,090	695
30	420	395	695	1,090	-------	1,160	2,050	3,260	2,790	1,240	885	695
31	420	-------	725	1,160	-------	1,160	-------	2,350	-------	1,160	820	-------

Monthly discharge of Ocoee River at McHarge, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 451 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	950	370	483	1.07	1.23
November	445	311	394	.874	.98
December	6,190	311	1,190	2.64	3.04
January	2,680	635	1,010	2.24	2.58
February	4,240	950	1,580	3.50	3.64
March	3,260	950	1,510	3.35	3.86
April	2,900	950	1,450	3.22	3.59
May	3,500	1,160	1,790	3.97	4.58
June	3,860	1,160	1,860	4.12	4.60
July	3,620	1,020	1,680	3.73	4.30
August	2,900	820	1,190	2.64	3.04
September	950	580	720	1.60	1.78
The year	6,190	311	1,240	2.75	37.22

OCOEE RIVER AT EMF, TENN.

LOCATION.—About 600 feet below Tennessee Electric Power Co.'s plant No. 2, known as the Caney Creek plant, half a mile upstream from Emf, Polk County, and 1½ miles downstream from mouth of Goforth Creek.

DRAINAGE AREA.—530 square miles (determined by Tennsesee Electric Power Co.).

RECORDS AVAILABLE.—January 1, 1913, to September 30, 1923.

GAGE.—Bristol water-stage recorder on left bank; checked daily with a staff gage bolted to a rock near the recorder. Sea-level elevation of zero of staff gage, 830.00 feet. Inspected by W. J. Copeland.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge 1,000 feet downstream from gage.

CHANNEL AND CONTROL.—Bed of stream for several hundred feet below gage is composed of boulders, gravel, and solid rock. Banks high; subject to small overflow. Control is a shoal and island 700 feet downstream from gage; permanent for long periods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.0 feet the afternoon of December 17 (discharge, 10,700 second-feet); minimum mean daily stage, 3.25 feet November 6 (discharge, 360 second-feet).

1913–1923: Maximum stage recorded, 13.7 feet at 12.30 a. m. July 10, 1916 (discharge, 21,400 second-feet); minimum stage, 2.77 feet September 15–17, 1914 (discharge, 285 second-feet).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—The operation of plant No. 2 causes considerable fluctuation at times, but as a rule, this plant runs on a steady load, the quantity of water used depending largely on the stage of river. Storage at diversion dam is very small. When plant is shut down water overflows the dam in a short time so that periods of fluctuation will be short.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined between 400 and 4,000 second-feet; extended above 4,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting gage-height graph, except for days of considerable fluctuation in stage, for which it was ascertained by averaging hourly discharge. Records good below 4,000 second-feet; fair to poor above that point.

COOPERATION.—Gage-height record furnished by Tennessee Electric Power Co.

Discharge measurements of Ocoee River at Emf, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 21	W. R. King	3.39	449	May 30	P. P. Livingston	6.08	3,530
Mar. 5	P. E. Hanson	4.31	1,190	Aug. 24	Duncan Charlton	4.62	1,510
Apr. 16	do	4.98	1,950				

Daily discharge, in second-feet, of Ocoee River at Emf, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	455	422	390	2,210	1,300	1,360	1,100	2,030	2,600	1,580	1,410	920
2	390	390	1,130	1,910	1,520	1,250	1,250	1,680	2,280	2,090	1,410	83 5
3	390	422	1,710	1,300	1,800	1,250	1,360	1,460	2,090	1,940	1,300	1,010
4	390	390	1,250	1,100	1,910	1,200	1,740	1,410	2,030	1,580	1,200	1,060
5	390	390	1,100	1,010	2,880	1,150	1,910	1,740	1,970	1,630	1,150	1,150
6	422	360	710	965	2,600	1,510	1,580	1,850	1,800	1,520	1,100	920
7	1,010	455	560	920	1,970	2,480	1,460	1,680	2,290	1,630	1,300	878
8	1,580	422	632	920	1,680	1,680	1,520	1,680	2,880	1,630	1,300	920
9	670	422	1,100	878	1,580	1,460	1,410	1,670	2,090	1,460	3,170	835
10	525	390	1,060	835	1,630	1,460	1,250	1,520	1,850	1,300	1,970	792
11	525	390	878	792	1,520	1,800	1,200	1,300	2,860	1,250	1,410	750
12	490	422	835	792	1,460	1,630	1,250	1,250	3,630	1,200	1,200	750
13	490	390	1,060	750	3,770	1,740	2,950	1,800	2,540	2,020	1,360	750
14	455	390	920	750	2,920	1,680	3,860	1,630	2,030	2,480	1,200	710
15	455	490	2,740	1,010	1,970	1,680	2,540	2,010	1,850	1,630	1,150	670
16	455	525	2,150	878	1,680	2,610	1,970	3,660	1,800	1,460	1,060	670
17	490	455	9,670	792	1,580	3,180	1,630	2,210	1,630	3,960	1,010	632
18	490	422	3,630	792	1,410	2,400	1,800	1,680	1,630	3,360	1,850	670
19	455	490	1,970	750	1,360	2,150	1,630	1,740	1,520	1,910	1,410	670
20	455	595	1,300	792	1,360	1,800	1,520	2,150	1,460	1,580	1,150	670
21	422	455	1,100	750	1,300	1,740	1,630	2,280	1,460	1,410	1,010	792
22	455	455	965	920	1,250	1,740	1,520	1,850	1,460	1,560	1,010	792
23	455	455	878	1,800	1,200	1,800	1,520	1,800	1,460	1,940	1,360	670
24	595	422	835	3,710	1,150	1,740	1,520	2,400	1,910	1,360	1,740	710
25	525	390	750	1,910	1,200	1,630	1,460	1,970	1,740	1,360	1,150	670
26	490	390	750	1,410	1,250	1,580	1,410	1,910	1,630	1,250	1,060	750
27	455	455	792	1,360	1,850	1,520	1,360	2,470	1,970	1,150	965	632
28	422	490	1,250	1,410	1,630	1,460	1,740	3,630	4,310	1,960	1,010	632
29	422	455	1,100	1,250	-------	1,410	2,400	3,870	2,560	2,600	1,300	595
30	455	422	920	1,250	-------	1,410	2,210	3,550	1,800	1,630	1,060	595
31	455	-------	878	1,410	-------	1,200	-------	3,170	-------	1,520	965	-------

NOTE.—Gage did not operate Jan. 23–28, Feb. 1–7, May 24, 25, 27; discharge determined from mean of morning and afternoon readings of staff gage.

Monthly discharge of Ocoee River at Emf, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 530 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,580	390	520	0.981	1.13
November	595	360	434	.819	.91
December	9,670	390	1,450	2.74	3.16
January	3,710	750	1,200	2.26	2.61
February	3,770	1,150	1,740	3.28	3.42
March	3,180	1,150	1,700	3.21	3.70
April	3,860	1,100	1,720	3.25	3.63
May	3,870	1,250	2,100	3.96	4.56
June	4,310	1,460	2,100	3.96	4.42
July	3,960	1,150	1,770	3.34	3.85
August	3,170	965	1,310	2.47	2.85
September	1,150	595	770	1.45	1.62
The year	9,670	360	1,400	2.64	35.86

OCOEE RIVER AT PARKSVILLE, TENN.

LOCATION.—1,500 feet downstream from dam and power plant No. 1 of Tennessee Electric Power Co. at Parksville, Polk County, and 6 miles east of Ocoee station on main line of Louisville & Nashville Railroad.

DRAINAGE AREA.—600 square miles (measured by Tennessee Electric Power Co.).

RECORDS AVAILABLE.—January 1, 1911, to September 30, 1916; March 22, 1921, to September 30, 1923.

GAGE.—Prior to December 31, 1922, gage was a Bristol 24-hour water-stage recorder in concrete well 1,500 feet downstream from dam; inspected by employees of the power company. From January 1, 1923, to March 2, 1923, readings were obtained from a Bristol seven-day water-stage recorder in tailrace from power house. Readings were reduced to datum of original gage by use of curve showing relationship between readings at the two sites. Subsequent to March 2, 1923, a Stevens long distance sender and indicator was used. The sender is located at the same site as original gage and is set to same datum. The indicator is located in the power house and is read hourly to half-tenths by power-house operators.

DISCHARGE MEASUREMENTS.—Made from county highway bridge 1½ miles below gage or by wading at a section 800 feet downstream.

CHANNEL AND CONTROL.—Bed of stream for several hundred feet above and below gage is composed of rock. Both banks high but right bank is overflowed at extremely high stages. Control formed by a rock and gravel riffle and two islands 800 feet downstream. Control for low and medium stages probably permanent; for high stages may be variable, as the islands are mostly sand.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage indicator, 9.4 feet at 10 a. m. and 8 p. m. May 16 (discharge, 6,510 second-feet); minimum mean daily stage, 2.74 feet November 26 (discharge, 24 second-feet).

1911–1916; 1921–1923: Maximum stage recorded, 15.75 feet at 3 a. m. July 10, 1916 (discharge, 17,000 second-feet); minimum mean daily stage, 2.70 feet September 17, 1922 (discharge, 13 second-feet), caused by closing down plant.

REGULATION.—Very great diurnal fluctuation caused by operation of power plant at No. 1.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 150 and 5,500 second-feet; extended beyond these limits. Operation of water-stage recorders and indicator fairly satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by averaging hourly discharge. Records good above 150 second-feet except for period January 1 to March 2 and for days of missing gage height, which are fair.

COOPERATION.—Gage-height record furnished by Tennessee Electric Power Co.

Discharge measurements of Ocoee River at Parksville, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 12	P. E. Hanson	5.12	1,550	Apr. 15	P. E. Hanson	6.56	3,120
Feb. 4	do	5.54	1,930	17	do	6.39	2,900
Mar. 3	do	5.39	1,740	May 31	Livingston and Withee	8.33	5,250
6	do	5.73	2,080	Aug. 25	Duncan Charlton	5.51	1,980

Daily discharge, in second-feet, of Ocoee River at Parksville, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	61	437	382	1,190	1,620	1,140	944	2,270	2,940	833	1,490	879
2	675	531	302	1,870	1,690	1,270	1,660	2,010	2,450	1,960	1,100	570
3	1,120	600	30	1,850	1,420	424	1,510	1,870	1,730	2,680	1,300	1,280
4	684	360	819	1,370	1,660	594	1,540	1,860	2,790	2,400	888	1,390
5	742	40	895	1,300	2,170	1,430	1,750	1,450	2,290	1,840	224	1,340
6	884	619	768	1,020	2,540	1,620	1,960	1,610	2,500	1,440	1,940	1,230
7	341	507	1,040	400	2,710	2,910	1,520	2,050	2,690	671	1,620	1,310
8	47	575	834	1,120	2,410	2,560	1,070	1,930	2,400	870	1,160	970
9	993	541	324	1,090	2,300	2,220	1,770	2,130	1,630	1,730	3,320	309
10	837	445	47	1,020	2,010	1,980	1,820	2,130	1,360	1,560	3,290	1,300
11	788	150	1,300	1,030	1,480	1,600	1,750	1,830	2,890	1,500	1,820	1,250
12	867	37	1,230	778	1,600	1,570	1,840	1,130	4,020	1,710	871	1,250
13	936	725	966	463	2,690	1,720	1,920	1,540	3,130	2,340	1,290	1,250
14	281	932	1,150	341	4,310	1,920	3,830	2,360	2,320	2,790	1,220	1,130
15	102	875	1,280	945	3,290	2,230	3,290	2,320	2,110	1,690	1,230	762
16	1,160	445	500	1,040	2,840	2,410	2,720	5,570	1,990	2,010	1,290	202
17	929	438	1,010	1,040	2,130	4,130	2,090	5,320	1,120	3,380	1,130	958
18	891	302	3,340	1,080	1,200	3,320	2,530	4,490	2,400	5,180	1,190	1,160
19	647	35	2,800	1,020	2,010	2,880	2,090	3,200	2,450	3,050	1,650	1,300
20	1,040	699	2,290	984	2,250	2,690	1,850	2,250	2,270	2,280	1,670	1,330
21	528	360	1,540	765	1,960	2,460	1,210	2,710	1,640	1,210	1,400	1,290
22	220	241	1,310	1,250	1,130	1,940	332	2,570	906	229	1,360	340
23	600	726	270	590	1,270	1,800	1,840	2,510	650	1,510	1,300	282
24	1,080	354	287	2,520	899	1,380	1,920	2,550	652	1,570	1,770	567
25	910	181	255	2,670	101	658	1,670	2,500	1,900	1,550	1,330	441
26	1,100	24	275	2,240	1,040	2,160	1,660	2,340	2,040	1,370	802	621
27	1,120	691	878	2,060	1,130	1,900	1,630	1,400	1,920	1,400	1,220	889
28	593	589	1,140	1,410	1,020	1,680	1,070	3,130	3,640	1,800	1,010	1,130
29	44	596	1,530	1,500	-------	1,380	1,780	4,380	3,660	2,730	1,120	429
30	588	30	1,130	1,830	-------	1,220	2,860	4,060	2,340	2,450	1,340	75
31	1,020	-------	1,030	1,810	-------	1,040	-------	4,320	-------	1,880	1,190	-------

NOTE.—Recorder did not operate Oct. 9, 10, 16, Jan. 5–8, 23, 24, Mar. 1, 2, Apr. 14–19, July 10, 11, 17–20, Sept. 8–18, 22, 24; discharge estimated on basis of records for Ocoee River at Emf, Tenn.

Monthly discharge of Ocoee River at Parksville, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 600 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,160	44	704	1.17	1.35
November	932	24	436	.727	.81
December	3,340	30	998	1.66	1.91
January	2,670	341	1,280	2.13	2.46
February	4,310	101	1,890	3.15	3.28
March	4,130	424	1,880	3.13	3.61
April	3,830	332	1,850	3.08	3.44
May	5,570	1,130	2,640	4.40	5.07
June	4,020	650	2,230	3.72	4.15
July	5,180	229	1,920	3.20	3.69
August	3,320	224	1,400	2.33	2.69
September	1,390	75	908	1.51	1.68
The year	5,570	24	1,510	2.52	34.14

SEQUATCHIE RIVER NEAR WHITWELL, TENN.

LOCATION.—At highway bridge on Nashville branch of Dixie Highway, 2 miles east of Whitwell, Marion County.

DRAINAGE AREA.—389 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 7, 1920, to September 30, 1923.

GAGE.—Vertical staff in two sections spiked to trees on right bank; lower section is 15 feet downstream from bridge and upper section 10 feet upstream from bridge; read by Andrew J. Bailey.

CHANNEL AND CONTROL.—Stream bed is principally hard clay. Right bank not subject to overflow; left bank subject to overflow at stage of about 15 feet, covering wide valley. There are very abrupt bends in the river about 300 feet above and below gage. Control for low water is gravelly shoal about 300 feet below gage, fairly permanent.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.4 feet at 7.30 a. m. December 16 (discharge, 5,480 second-feet); minimum stage, 0.8 foot November 6, 7, 30, and December 1 (discharge, 40 second-feet).

1920–1923: Maximum stage recorded, 15.5 feet at 7.45 a. m. March 2, 1922 (discharge, 6,740 second-feet); minimum stage, same as given above.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—There are two small mills located above the gage but as they have little or no storage, regulation is negligible.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 5,500 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Sequatchie River near Whitwell, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 24	Warren Withee	10.89	3,980	May 18	Warren Withee	3.58	881
26	do	6.80	1,980	18	do	3.54	849
Mar. 9	P. E. Hanson	7.77	2,450	Aug. 22	Clawson and Withee	1.86	232

Daily discharge, in second-feet, of Sequatchie River near Whitwell, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	90	60	40	900	2,960	795	720	600	2,860	335	260	160
2	90	60	75	1,030	2,590	760	640	560	1,820	260	260	160
3	90	60	865	1,000	2,230	760	520	520	1,360	260	245	160
4	90	60	1,060	865	4,590	640	680	475	1,120	260	230	140
5	90	50	1,260	760	4,420	600	1,620	475	935	245	218	140
6	82	40	760	680	3,260	520	1,820	520	830	230	205	205
7	75	40	475	600	2,320	4,260	1,500	475	795	230	295	230
8	75	45	380	560	1,980	3,880	1,220	475	720	218	260	230
9	75	50	520	520	1,900	2,720	1,060	640	720	335	475	218
10	75	50	865	520	1,900	1,700	900	600	600	295	720	205
11	75	50	900	520	1,940	1,620	830	475	520	245	475	180
12	75	50	680	475	1,700	2,280	680	475	1,460	218	430	160
13	75	50	600	430	2,410	3,110	1,030	475	935	205	380	140
14	68	50	520	380	4,150	2,640	2,140	1,320	680	192	335	140
15	68	55	2,360	475	3,460	1,740	2,060	1,150	560	180	260	140
16	68	55	5,480	600	2,230	1,820	1,700	1,060	475	180	260	120
17	68	50	4,320	600	1,660	4,820	1,290	1,030	430	335	260	120
18	60	50	4,370	600	1,220	3,660	1,150	935	380	1,150	230	120
19	60	45	2,910	520	1,060	2,540	1,000	760	335	680	230	120
20	60	45	1,780	560	935	1,900	865	935	295	520	430	120
21	60	50	1,260	680	830	1,580	865	3,060	260	430	335	140
22	55	50	1,030	900	720	1,320	1,000	1,700	230	295	295	140
23	55	50	865	1,820	680	1,500	795	1,150	230	230	260	130
24	60	50	680	3,930	600	2,770	720	2,460	218	205	230	120
25	60	50	640	3,210	560	2,410	680	2,680	205	260	205	120
26	60	50	560	2,140	520	1,820	640	1,740	260	230	180	120
27	60	50	475	1,580	640	1,430	600	3,310	295	192	170	112
28	60	50	1,400	1,660	760	1,180	560	4,700	335	205	160	105
29	60	50	1,290	1,980	-------	1,030	560	4,100	680	640	295	98
30	60	40	1,030	1,740	-------	900	640	3,760	475	680	205	90
31	60	-------	830	2,460	-------	830	-------	3,260	-------	430	170	-------

Monthly discharge of Sequatchie River near Whitwell, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 389 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	90	55	69.6	0.179	0.21
November	60	40	50.2	.129	.14
December	5,480	40	1,300	3.34	3.85
January	3,930	380	1,120	2.88	3.32
February	4,590	520	1,940	4.99	5.20
March	4,820	520	1,920	4.94	5.70
April	2,140	520	1,020	2.62	2.92
May	4,700	475	1,480	3.80	4.38
June	2,860	205	701	1.80	2.01
July	1,150	180	335	.861	.99
August	720	160	289	.743	.86
September	230	90	146	.375	.42
The year	5,480	40	859	2.21	30.00

ELK RIVER AT ESTILL SPRINGS, TENN.

LOCATION.—At county highway bridge 400 feet downstream from Nashville, Chattanooga & St. Louis Railway bridge, 800 feet downstream from Estill Springs plant of Public Light & Power Co. and three-fourths of a mile southeast of Estill Springs, Franklin County. Rock Creek enters about 1½ miles below gage.

DRAINAGE AREA.—263 square miles (measured on map compiled by United States Geological Survey; scale, 1 : 500,000).

RECORDS AVAILABLE.—December 9, 1920, to September 30, 1923.

GAGE.—Vertical staff in three sections fastened to trees on left bank, 100 feet below highway bridge; read by Albert Gillian.

CHANNEL AND CONTROL.—Channel straight for 300 feet above and 100 feet below gage. Bed composed of rock and gravel. Banks subject to overflow for short distances back from channel. Control is rock and gravel shoal 50 feet downstream from gage; fairly permanent.

DISCHARGE MEASUREMENTS.—Made from two-span steel highway bridge 100 feet above gage or by wading.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.2 feet at 8 a. m. February 4 (discharge, 5,320 second-feet); minimum stage, 0.55 foot October 22–24 and 26–29 (discharge, 25 second-feet).

1920–1923: Maximum stage recorded, 13.5 feet at 9 a. m. March 2, 1922 (discharge, 8,890 second-feet); minimum stage, that of October 22–24 and 26–29, 1922.

REGULATION.—Large diurnal fluctuation during August and September, 1923, caused by operation of power plant 800 feet upstream. This plant was completed and placed in operation about August 1, 1923.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 30 and 6,500 second-feet. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair previous to August 1; subject to error since that date owing to regulation caused by power plant.

Discharge measurements of Elk River at Estill Springs, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
May 12	P. P. Livingston	1.70	305	Aug. 21	Withee and Clawson	1.47	212

Daily discharge, in second-feet, of Elk River at Estill Springs, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	48	48	65	890	1,750	640	482	360	690	160	65	160
2	48	48	145	1,000	1,450	550	440	360	550	132	95	145
3	48	48	528	840	3,720	528	400	305	482	160	160	108
4	48	55	1,000	690	5,160	482	640	322	420	160	65	175
5	55	48	690	595	3,560	440	1,220	340	360	205	95	220
6	48	48	505	528	1,930	690	1,110	400	380	175	160	190
7	85	48	440	482	1,630	3,400	890	360	322	190	220	190
8	65	48	340	440	1,510	2,560	790	400	322	190	175	235
9	65	55	360	420	1,390	1,330	690	400	288	175	205	190
10	75	48	840	380	1,330	1,000	550	400	288	132	640	205
11	65	48	690	340	1,390	1,690	505	360	252	132	572	190
12	65	48	595	322	1,220	3,080	440	322	400	322	205	145
13	65	48	528	322	3,960	1,870	1,110	1,220	482	270	528	95
14	65	55	640	288	2,630	1,280	1,930	640	380	270	640	85
15	55	75	3,400	420	1,630	1,060	1,450	690	340	322	790	48
16	48	75	4,200	482	1,220	2,070	1,000	690	252	270	572	48
17	48	65	3,640	420	1,000	2,770	840	640	270	305	528	95
18	40	65	2,630	380	840	1,570	690	528	252	505	400	120
19	35	75	1,750	340	690	1,280	640	482	220	340	305	85
20	40	65	1,000	420	690	1,110	618	528	220	205	235	75
21	35	65	790	890	595	945	690	1,110	190	205	270	288
22	25	48	690	1,000	550	790	595	790	175	175	145	120
23	25	48	572	1,160	505	890	505	550	190	175	175	48
24	25	48	505	1,330	440	1,870	505	460	288	175	205	160
25	30	48	440	1,110	440	1,220	420	400	235	528	145	400
26	25	48	400	890	460	1,110	400	440	190	190	108	305
27	25	48	482	840	572	890	380	618	145	175	108	132
28	25	48	790	2,140	740	740	340	790	220	205	205	132
29	25	48	945	2,000	-------	640	400	790	175	340	400	40
30	55	48	740	1,160	-------	595	380	1,000	190	120	220	85
31	48	-------	790	2,070	-------	460	-------	890	-------	160	190	-------

Monthly discharge of Elk River at Estill Springs, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 263 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	85	25	46.9	0.178	0.21
November	75	48	53.7	.204	.23
December	4,200	65	1,000	3.80	4.38
January	2,140	288	793	3.02	3.48
February	5,160	440	1,540	5.86	6.10
March	3,400	440	1,280	4.87	5.62
April	1,930	340	702	2.67	2.98
May	1,220	305	567	2.16	2.49
June	690	145	306	1.16	1.29
July	528	120	228	.867	1.00
August	790	65	285	1.08	1.24
September	400	40	150	.570	.64
The year	5,160	25	574	2.18	29.66

49245—26†—WSP 563——15

ELK RIVER NEAR ELKMONT, ALA.

LOCATION.—At steel highway bridge half a mile east of Wilson's store, 3 miles below Louisville & Nashville Railroad bridge (near Tennessee-Alabama boundary line), and 5 miles northwest of Elkmont, Limestone County.

DRAINAGE AREA.—1,700 square miles.

RECORDS AVAILABLE.—July 1, 1904, to February 2, 1908; January 20, 1919, to September 30, 1923.

GAGE.—Chain gage attached to upstream side of bridge; read by Dr. W. E. Maples.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed composed chiefly of rock. Banks are subject to overflow at stages above 16 feet. Control is well-defined rock and gravel ledge about 400 feet below gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.5 feet at 4 p. m. February 14 (discharge, 25,200 second-feet); minimum stage, 1.35 feet November 3 and 8 (discharge, 200 second-feet).

1904–1908; 1919–1923: Maximum stage recorded, 26.5 feet March 13, 1920, estimated by observer (discharge, 33,300 second-feet); minimum stage, 1.2 feet several days in September, October, and November, 1904 (discharge, 165 second-feet).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Some regulation during low water caused by water-power plants at Estill Springs and Winchester.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 24,000 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

The following discharge measurement was made by J. P. Clawson:
October 29, 1922: Gage height, 1.50 feet; discharge, 247 second-feet.

Daily discharge, in second-feet, of Elk River near Elkmont, Ala., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	280	225	280	3,520	11,300	3,260	2,750	2,750	4,700	950	1,460	950
2	280	225	448	4,170	11,600	2,750	2,500	2,380	4,170	850	1,220	850
3	280	200	1,110	3,780	14,600	2,620	3,000	2,620	3,260	800	1,000	800
4	280	225	1,760	3,390	23,900	2,500	5,920	4,570	2,500	800	900	702
5	280	225	2,000	3,000	23,200	2,380	5,780	4,840	2,250	1,110	900	4,840
6	280	225	2,000	2,500	16,900	3,130	5,380	5,780	3,130	950	800	2,000
7	280	225	1,760	2,500	11,000	11,900	4,570	3,520	4,040	900	1,460	1,760
8	280	200	1,280	2,000	10,900	10,800	4,440	3,390	4,040	900	1,060	1,760
9	410	252	1,280	1,880	9,970	8,480	3,520	2,880	2,500	850	1,060	1,400
10	448	280	2,000	1,760	9,160	5,780	3,000	2,500	2,250	800	6,600	1,160
11	375	280	2,120	1,580	7,810	7,000	2,750	2,500	3,910	950	4,980	1,460
12	340	280	2,250	1,520	8,890	15,600	2,500	2,250	8,080	800	2,250	1,160
13	310	252	2,250	1,400	23,500	17,100	8,350	15,600	5,920	610	3,910	950
14	280	280	2,380	1,580	25,200	9,560	10,400	9,700	3,260	610	7,270	850
15	280	340	18,100	1,640	18,600	6,190	9,700	9,160	2,500	610	5,110	750
16	280	565	18,300	1,760	9,160	14,300	7,140	14,400	2,120	655	6,460	702
17	280	565	18,900	1,700	5,920	14,200	6,730	8,350	1,760	525	4,570	655
18	280	485	19,300	1,580	4,700	12,900	4,300	5,380	2,000	610	2,500	610
19	252	485	12,900	1,520	3,910	10,800	3,526	4,570	1,640	800	2,000	565
20	280	448	7,000	1,520	3,260	8,480	3,260	4,300	1,520	900	1,700	610
21	280	410	5,110	2,000	3,000	7,000	5,650	5,380	1,460	850	1,340	655
22	252	375	3,650	4,570	2,000	6,190	4,300	4,300	1,220	750	1,460	610
23	252	310	2,750	9,840	2,500	14,000	4,840	3,650	1,160	950	1,280	565
24	225	310	2,500	19,200	2,380	18,100	5,780	3,260	1,110	800	1,160	525
25	252	310	2,250	11,000	2,250	12,700	4,300	3,000	1,400	11,600	1,060	485
26	280	280	2,000	7,000	2,380	7,540	3,260	2,750	1,340	3,780	900	448
27	280	280	1,700	5,380	3,780	5,780	3,000	7,540	1,060	1,760	850	410
28	280	252	2,880	7,000	3,520	4,700	2,880	7,810	1,110	7,140	800	375
29	225	280	4,300	8,620	-------	4,040	3,520	6,320	1,460	4,840	2,500	565
30	252	280	3,650	10,500	-------	3,520	3,000	6,860	1,220	3,260	1,880	525
31	252	-------	3,260	13,500	-------	3,000	-------	5,920	-------	2,000	1,400	-------

Monthly discharge of Elk River near Elkmont, Ala., for the year ending Sept. 30, 1923

[Drainage area, 1,700 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	448	225	287	0.169	0.19
November	565	200	312	.184	.21
December	19,300	280	4,890	2.88	3.32
January	19,200	1,400	4,610	2.71	3.12
February	25,200	2,000	9,830	5.78	6.02
March	18,100	2,380	8,270	4.86	5.60
April	10,400	2,500	4,670	2.75	3.07
May	15,600	2,250	5,430	3.19	3.68
June	8,080	1,060	2,600	1.53	1.71
July	11,600	525	1,730	1.02	1.18
August	7,270	800	2,320	1.36	1.57
September	4,840	375	990	.582	.65
The year	25,200	200	3,800	2.24	30.32

DUCK RIVER AT NORMANDY, TENN.

LOCATION.—At county highway bridge half a mile north of Normandy, Bedford County, and 2 miles above Nashville, Chattanooga & St. Louis Railway bridge.

DRAINAGE AREA.—214 square miles (measured on map compiled by United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—December 10, 1920, to September 30, 1923.

GAGE.—Vertical staff in two sections fastened to large pine tree on right bank, 200 feet downstream from bridge; read by W. E. Russell.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading. Current very irregular at bridge section.

CHANNEL AND CONTROL.—River bed composed of rock and gravel; uniform bottom. Right bank is not overflowed; left bank is overflowed at a stage of about 9 feet, covering a wide stretch of bottom land. Control for low water is gravel shoal 800 feet downstream. High-water control probably formed by Cortner Mills dam 2 miles downstream.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.0 feet at 5 a. m. July 23 (discharge, 6,880 second-feet); minimum stage, 0.8 foot October 1–6, 13, 14, 16, 19–21, November 13, 14, 22, 24, and 25 (discharge, 50 second-feet).

1920–1923: Maximum stage recorded, 13.5 feet probably on March 2, 1922, determined from high-water mark on gage (discharge not determined); minimum stage, 0.8 foot several periods in 1921 and 1922 (discharge, 50 second-feet).

REGULATION.—Operation of the Manchester hydroelectric plant 15 miles upstream causes some diurnal fluctuation during low water. Storage capacity however is small so that no great error in records results from this.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined below 4,000 second-feet; extended above that point. Gage read to half-tenths once daily except Sundays and holidays; oftener during high water. Daily discharge ascertained by applying daily gage height to rating table except as indicated in footnote to table of daily discharge. Records good below 5,000 second-feet; others fair.

Discharge measurements of Duck River at Normandy, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
May 12	P. P. Livingston	1.75	304	Aug. 21	Clawson and Withee	1.29	162

Daily discharge, in second-feet, of Duck River at Normandy, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	50	70	60	743	1,020	510	315	285	580	122	140	115
2	50	60	405	790	940	390	285	240	405	115	140	128
3	50	60	672	580	5,340	315	315	255	330	115	140	140
4	50	60	940	475	3,300	300	405	345	255	940	140	140
5	50	60	475	390	1,250	285	940	510	375	255	128	1,370
6	50	60	285	330	1,200	270	940	755	345	255	115	475
7	60	60	285	352	1,100	2,090	580	615	345	195	165	475
8	65	70	195	375	1,100	980	510	510	545	140	140	510
9	70	90	315	360	1,060	650	440	510	405	140	255	398
10	70	60	300	315	1,020	510	375	375	360	140	285	285
11	90	60	285	255	888	1,500	315	315	315	115	195	255
12	60	55	255	225	755	2,090	315	285	860	115	210	225
13	50	50	195	195	4,680	1,910	860	3,580	790	115	225	195
14	50	50	195	255	2,480	900	2,880	1,310	405	102	1,020	140
15	50	90	6,220	315	1,020	650	1,100	755	315	102	900	140
16	50	70	2,480	300	720	1,200	720	1,200	255	102	345	140
17	90	60	2,280	285	615	1,730	580	860	225	225	390	140
18	70	60	2,090	255	528	1,220	510	580	195	315	255	115
19	50	75	825	225	440	720	440	510	195	140	210	102
20	50	90	580	225	390	650	405	440	165	115	165	102
21	50	60	440	438	375	510	650	475	195	102	140	140
22	55	50	375	650	345	475	755	375	165	115	140	115
23	60	60	315	1,020	315	2,090	510	315	140	2,280	128	108
24	70	50	255	1,650	285	2,780	405	285	146	475	115	102
25	70	50	225	980	285	940	375	255	152	1,430	115	90
26	90	55	225	720	285	685	345	315	140	580	115	90
27	90	60	210	580	510	580	270	580	152	315	115	115
28	70	70	1,370	800	580	510	255	1,150	152	255	720	102
29	65	70	1,060	1,020	-------	440	300	940	140	225	900	90
30	60	70	650	790	-------	405	345	755	128	195	285	90
31	60	-------	697	1,570	-------	345	-------	940	-------	165	195	-------

NOTE.—Gage not read Oct. 8, 15, 22, 29, Nov. 5, 12, 19, 26, Dec. 3, 10, 17, 31, Jan. 1, 7, 14, 21, 28, Feb. 4, 11, 18, 25, Mar. 4, 18, Apr. 1, 8, 29, June 3, 10, 24, July 1, 15, 29, Aug. 5, 12, 19, 26, Sept. 2, 9, 16, 23, and 30; discharge interpolated.

Monthly discharge of Duck River at Normandy, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 214 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	90	50	61.8	0.289	0.33
November	90	50	63.5	.297	.33
December	6,220	60	812	3.79	4.37
January	1,650	195	563	2.63	3.03
February	5,340	285	1,170	5.47	5.70
March	2,780	270	924	4.32	4.98
April	2,880	255	581	2.71	3.02
May	3,580	240	665	3.11	3.58
June	860	128	306	1.43	1.60
July	2,280	102	322	1.50	1.73
August	1,020	115	275	1.29	1.49
September	1,370	90	221	1.03	1.15
The year	6,220	50	495	2.31	31.31

DUCK RIVER AT COLUMBIA, TENN.

LOCATION.—At highway bridge two blocks north of public square at Columbia, Maury County, and three-fourths mile below Mount Pleasant Electric Co.'s dam and power plant.

DRAINAGE AREA.—1,210 square miles (measured on map compiled by United States Geological Survey; scale, 1 : 500,000).

RECORDS AVAILABLE.—October 21, 1904, to December 31, 1908; April 27, 1920, to September 30, 1923.

GAGE.—Chain gage bolted to railing on downstream side of bridge, installed April 1, 1922, to replace former Mott tape gage in use since April 28, 1920; read by F. J. Beard. Both gages are practically in the same position and were referred to the same datum For description of gages used 1904–1908 see Water-Supply Paper 503.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Both banks high and fringed with trees. Right bank subject to overflow above gage height 32 feet; left bank not subject to overflow. Bed of stream composed of solid rock and gravel. Low-water control is a rocky shoal 1,000 feet below gage; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 21.6 feet at 8.30 a. m. December 17 (discharge, 18,300 second-feet); minimum stage, −0.03 foot at 9 a. m. October 22 (no flow).

1904–1908; 1920–1923: Maximum stage recorded, 32.05 feet at 7 a. m. March 3, 1922 (discharge, 27,800 second-feet); minimum stage, that of October 22, 1922.

The United States Weather Bureau reports a stage of 45.6 feet March 30, 1902 (discharge not determined).

REGULATION.—Operation of power plant above gage causes considerable diurnal fluctuation during low-water season. The flow is almost completely cut off at times, owing to ponding water at this dam.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 250 and 20,000 second-foot. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as indicated in footnote to table of daily discharge. Records good above 250 second-feet; fair to poor below that point.

Discharge measurements of Duck River at Columbia, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 23	P. P. Livingston	0.63	[a] 87.8	Feb. 1	P. P. Livingston	10.96	8,970
Nov. 3	do	.36	[b] 55.6	Aug. 18	Clawson and Withee	3.49	2,240
Jan. 31	do	12.40	10,100				

[a] Accuracy doubtful on account of extremely low velocities.
[b] Measurement by wading.

Daily discharge, in second-feet, of Duck River at Columbia, Tenn., for the year ending Sept. 30, 1923

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	76	2,190	6,380	1,850	1,280	1,200	2,870	465	405	795
2	108	2,870	11,600	1,520	1,130	1,060	2,100	331	336	495
3	4,230	2,620	15,300	1,200	1,060	942	1,650	282	320	435
4	7,540	2,280	15,800	1,090	1,680	2,100	1,200	342	265	375
5	5,840	1,850	13,100	980	5,250	2,360	1,060	465	252	3,550
6	3,040	1,520	6,640	1,850	4,740	1,130	2,190	905	240	3,980
7	1,850	1,280	6,460	8,350	3,300	3,120	2,100	560	215	1,940
8	1,440	1,130	7,000	7,540	2,440	2,190	2,700	405	830	1,850
9	1,680	1,060	6,280	5,160	1,760	2,190	2,100	465	5,760	3,720
10	2,620	980	5,420	3,550	1,520	1,600	1,600	435	5,930	1,440
11	2,780	868	4,400	4,740	1,280	1,280	3,380	405	1,940	980
12	1,680	760	3,800	11,400	1,560	1,060	5,590	331	2,870	830
13	1,200	690	8,980	13,500	1,850	4,700	4,910	270	3,800	658
14	1,360	875	17,200	8,440	5,840	8,350	2,960	260	2,530	528
15	7,990	1,060	11,800	4,140	5,500	7,270	1,850	220	2,440	405
16	16,400	1,440	4,820	8,350	4,230	11,300	1,280	235	2,190	320
17	18,300	1,130	3,210	12,800	2,620	7,720	1,070	270	3,800	282
18	16,600	1,020	2,360	6,370	1,520	4,140	868	1,060	2,780	270
19	9,790	868	1,940	4,140	1,520	2,700	795	1,130	1,130	298
20	4,480	868	1,600	2,960	1,360	2,020	658	690	868	240
21	2,870	905	1,360	2,190	3,210	3,210	560	465	795	210
22	2,280	3,460	1,200	5,250	2,530	2,620	495	336	1,020	200
23	1,680	8,530	1,060	10,600	2,190	1,760	495	298	560	314
24	1,360	15,100	980	13,800	2,360	1,360	435	1,440	405	220
25	1,130	10,600	868	10,200	1,680	1,280	375	2,100	364	210
26	942	4,560	905	5,680	1,280	1,130	370	2,190	339	185
27	905	4,760	1,600	3,640	1,130	2,100	375	1,440	314	195
28	2,530	5,780	1,940	2,700	1,200	5,250	405	905	592	190
29	4,480	5,260	-------	2,100	1,360	5,760	342	560	3,120	314
30	3,640	6,800	-------	1,760	1,200	4,740	405	495	1,850	.270
31	2,530	8,220	-------	1,360	-------	3,460	-------	495	1,130	-------

NOTE.—Gage not read Jan. 14, 26–31, Feb. 1–5, Mar. 4, Apr. 12, May 13, June 3, 17, Aug. 5, 12, and 26, Discharge estimated on basis of records for Duck River at Centerville, Jan. 26–31, and Feb. 1–5. Discharge interpolated Jan. 14, Mar. 4, Apr. 12, May 13, June 3, 17, Aug. 5, 12, and 26. Discharge for October and November not determined because the mean daily gage heights obtained from twice-daily readings of gage are seriously in error owing to diurnal fluctuations in stage caused by operation of power plant one-fourth mile upstream. The flow during the greater part of these months was below 200 second-feet.

Monthly discharge of Duck River at Columbia, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 1,210 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
December	18,300	76	4,300	3.55	4.09
January	15,100	690	3,270	2.70	3.11
February	17,200	868	5,860	4.84	5.04
March	13,800	980	5,460	4.51	5.20
April	5,840	1,060	2,320	1.92	2.14
May	11,300	942	3,260	2.69	3.10
June	5,590	342	1,570	1.30	1.45
July	2,190	220	653	.540	.62
August	5,930	215	1,590	1.31	1.51
September	3,980	185	857	.708	.79

DUCK RIVER AT CENTERVILLE, TENN.

LOCATION.—At old county highway bridge half a mile from Courthouse at Centerville, Hickman County, and 1 mile above Nashville, Chattanooga & St. Louis Railroad bridge. Swan Creek enters from south 5 miles above gage.

DRAINAGE AREA.—2,070 square miles (measured on State geological map).

RECORDS AVAILABLE.—March 6 to December 31, 1919; March 2, 1920, to September 30, 1923.

GAGE.—Chain gage bolted to floor on downstream side of old highway bridge, installed March 2, 1920; read by D. J. Hudspeth. A chain gage at different datum on new highway bridge three-fourths of a mile downstream from present location was used March 6 to December 31, 1919.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Right bank high, steep and wooded; left bank low and fringed with trees, subject to overflow above gage height 22 feet, covering the flat to a distance of 400 feet. Control is gravel and rock shoal 600 feet below gage. During low water an island is formed here and at extremely low stages all water flows to right bank. Control is reasonably permanent.

EXTREME OF DISCHARGE.—Maximum stage recorded during year, 17.0 feet the afternoon of February 5 (discharge, 25,900 second-feet); minimum stage, −0.27 foot the morning of October 17 (discharge, 227 second-feet).

1919–1923: Maximum stage, estimated 28.0 feet April 2, 1920 (discharge about 50,000 second-feet); minimum stage, 198 second-feet September 20, 1919.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Possibly slight regulation during periods of low-water flow caused by operation of small water-power plants upstream.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined below 35,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Duck River at Centerville, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 19	P. P. Livingston	−0.20	240	Aug. 16	Withee and Clawson	3.83	3,880
Jan. 27	do	6.34	7,930	Aug. 18	do	5.46	6,050
31	do	8.12	11,500				

Daily discharge, in second-feet, of Duck River at Centerville, Tenn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	318	318	318	3,740	13,400	3,220	2,490	2,270	5,300	740	770	1,460
2	275	275	362	3,350	10,400	2,850	2,380	1,940	4,020	710	680	970
3	275	275	3,880	3,880	19,000	2,490	2,270	1,940	3,220	680	622	900
4	295	275	7,440	3,610	25,000	1,940	2,850	2,730	2,610	595	568	1,640
5	295	275	8,750	3,090	25,700	2,050	14,600	8,240	2,160	770	1,840	1,460
6	275	318	6,050	2,610	21,400	2,610	11,300	5,150	2,270	770	1,040	7,120
7	318	460	3,610	2,160	11,700	10,800	7,760	4,720	4,440	1,280	770	4,160
8	275	410	2,490	2,050	9,770	12,700	5,900	5,150	3,740	1,200	568	7,120
9	275	318	2,270	1,840	9,600	8,920	4,440	4,020	4,160	802	5,600	5,300
10	295	318	2,850	1,640	8,580	6,350	3,740	3,610	2,850	770	11,500	3,880
11	275	295	4,160	1,550	7,280	8,580	3,090	2,970	2,970	740	5,750	2,490
12	275	318	3,220	1,370	6,350	17,200	2,730	2,490	6,050	680	3,880	1,840
13	251	340	2,380	1,280	6,960	17,500	5,300	2,160	5,450	650	8,750	1,550
14	243	318	1,840	1,200	15,100	17,000	7,280	6,500	5,150	595	7,120	1,280
15	243	410	6,800	1,640	19,500	9,430	9,090	9,090	3,610	540	5,150	1,040
16	243	680	14,900	1,940	11,100	12,900	7,760	13,000	2,610	512	3,880	900
17	235	595	21,600	2,270	6,050	16,100	5,750	14,400	2,050	680	3,610	802
18	275	540	22,100	1,940	4,440	14,600	4,160	8,410	1,840	900	6,050	710
19	255	485	19,000	1,740	3,740	8,920	3,480	5,450	1,460	1,940	2,610	680
20	255	485	9,430	1,550	3,220	6,050	2,850	3,880	1,280	1,460	1,940	650
21	255	435	5,300	1,460	2,730	4,720	3,480	3,480	1,200	970	1,460	650
22	251	435	3,880	2,160	2,380	9,770	5,900	4,300	1,040	835	1,370	595
23	247	435	3,090	7,120	2,160	19,200	4,440	3,350	970	650	1,840	568
24	255	385	2,490	18,500	1,940	19,700	4,160	2,610	900	595	1,200	512
25	295	340	2,050	19,500	1,640	17,000	3,740	2,380	900	1,840	970	540
26	295	340	1,740	12,200	1,840	12,200	2,970	2,160	900	2,270	770	512
27	385	340	1,640	7,440	2,380	7,600	2,610	2,160	835	3,090	740	485
28	362	340	2,490	7,760	3,090	5,750	2,270	4,300	770	1,640	740	460
29	295	410	3,880	9,430	-------	4,580	2,380	9,940	740	1,370	1,200	485
30	275	362	5,000	8,580	-------	3,880	2,380	8,080	740	900	3,880	568
31	318	-------	4,160	11,100	-------	3,220	-------	6,800	-------	770	2,160	-------

Monthly discharge of Duck River at Centerville, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 2,070 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	385	235	280	0.135	0.16
November	680	275	384	.186	.21
December	22,100	318	5,780	2.79	3.22
January	19,500	1,200	4,830	2.33	2.69
February	25,700	1,640	9,160	4.43	4.61
March	19,700	1,940	9,350	4.52	5.21
April	14,600	2,270	4,780	2.31	2.58
May	14,400	1,940	5,090	2.46	2.84
June	6,050	740	2,540	1.23	1.37
July	3,090	512	1,030	.498	.57
August	11,500	568	2,870	1.39	1.60
September	7,120	460	1,710	.826	.92
The year	25,700	235	3,960	1.91	25.98

BUFFALO RIVER NEAR FLATWOODS, TENN.

LOCATION.—At Belsha's farm, 1½ miles northwest of Flatwoods, Wayne County, and 1 mile north of Wayne-Perry County line. Little Opossum Creek enters half a mile above gage.

DRAINAGE AREA.—439 square miles (measured on map compiled by United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—May 29, 1920, to September 30, 1923.

GAGE.—Vertical staff in two sections spiked to large trees on right bank, 300 feet downstream from ranch house of W. N. Belsha, and a quarter of a mile upstream from county bridge on Flatwoods-Linden road; read by W. N. Belsha.

DISCHARGE MEASUREMENTS.—Made from highway bridge a quarter of a mile below gage or by wading.

CHANNEL AND CONTROL.—Control is a gravel bar a third of a mile downstream from gage; not permanent. Water is at right side of channel at control section, and some brush and willows have grown up on the gravel bar at the other side.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.15 feet at 6.30 a. m. August 15 (discharge, 11,000 second-feet); minimum stage, 1.19 feet October 3–6 (discharge, 138 second-feet).

1920–1923: Maximum stage recorded, 18.0 feet at 7 a. m. March 11, 1922 (discharge, 12,500 second-feet); minimum stage, 1.14 feet August 12–14, 1922 (discharge, 135 second-feet).

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined between 150 and 1,600 second-feet; extended beyond these limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair below 2,000 second-feet; above that point they are subject to considerable error owing to lack of high-water measurements.

Discharge measurements of Buffalo River near Flatwoods, Tenn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 20	P. P. Livingston	1.30	159	Jan. 29	P. P. Livingston	4.18	1,510
Jan. 29	do	4.27	1,600	29	do	4.16	1,550
29	do	4.22	1,560	Aug. 17	Clawson and Withee	3.48	1,160

Daily discharge, in second-feet, of Buffalo River near Flatwoods, Tenn., for the year ending September 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	142	185	205	645	3,350	465	695	895	695	275	245	292
2	140	192	365	695	2,160	445	600	795	600	260	230	275
3	140	195	1,120	645	5,910	425	600	1,060	488	260	230	260
4	138	195	1,290	645	7,350	425	1,060	3,190	465	260	245	260
5	138	195	1,120	600	3,830	425	6,310	2,710	425	260	260	345
6	138	205	745	578	2,550	555	4,070	1,950	425	275	292	532
7	158	215	578	532	1,950	1,530	2,090	1,410	555	260	260	488
8	178	230	578	510	1,670	1,670	1,530	1,230	745	275	260	1,230
9	180	215	645	465	1,670	1,350	1,230	1,060	555	275	1,060	695
10	185	202	695	425	1,670	1,120	1,000	895	465	275	1,290	488
11	185	200	645	385	1,530	2,020	895	795	465	260	695	385
12	185	200	555	365	1,410	5,270	845	695	578	245	532	345
13	178	200	510	345	1,600	3,510	3,510	695	645	230	1,290	328
14	170	210	488	365	1,670	2,230	3,270	745	532	230	5,110	292
15	165	345	2,630	645	1,350	1,530	2,020	2,090	488	245	7,830	275
16	165	488	3,350	645	1,120	4,310	1,470	5,830	445	245	1,740	260
17	170	365	2,710	600	950	4,230	1,170	3,350	405	310	1,120	260
18	170	310	2,630	578	845	2,390	1,000	1,880	385	310	950	245
19	165	345	1,670	532	745	1,670	845	1,350	365	275	745	245
20	165	310	1,170	532	695	1,290	745	1,120	345	260	600	245
21	165	260	950	532	600	1,060	950	950	328	245	510	245
22	170	230	745	645	555	3,110	1,350	795	310	230	532	245
23	182	230	645	1,000	510	7,030	1,120	745	292	230	488	230
24	200	215	555	4,630	465	5,190	950	645	365	230	425	215
25	202	210	510	3,270	445	2,950	1,060	600	425	215	365	215
26	192	210	445	1,880	465	1,950	895	555	365	215	345	215
27	185	210	488	1,470	555	1,470	795	555	328	215	310	215
28	185	210	600	1,530	510	1,170	745	600	310	292	345	215
29	185	210	600	1,600	-------	1,000	845	645	292	488	445	215
30	185	205	578	1,950	-------	845	1,060	645	275	385	365	215
31	185	-------	578	4,630	-------	745	-------	645	-------	275	310	-------

Monthly discharge of Buffalo River near Flatwoods, Tenn., for the year ending Sept. 30, 1923

[Drainage area, 439 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	202	138	171	0.390	0.45
November	488	185	240	.547	.61
December	3,350	205	980	2.23	2.57
January	4,630	345	1,090	2.48	2.86
February	7,350	445	1,720	3.92	4.08
March	7,030	425	2,040	4.65	5.36
April	6,310	600	1,490	3.39	3.78
May	5,830	555	1,330	3.03	3.49
June	745	275	445	1.01	1.13
July	488	215	268	.610	.70
August	7,830	230	949	2.16	2.49
September	1,230	215	332	.756	.84
The year	7,830	138	918	2.09	28.36

49245—26†—WSP 563——16

CACHE RIVER BASIN

CACHE RIVER AT FORMAN, ILL.

LOCATION.—In NE. ¼ sec. 31, T. 13 S., R. 3 E., at Chicago, Burlington & Quincy Railroad bridge at Forman, Johnson County, 1 mile below mouth of Dutchman Creek.

RECORDS AVAILABLE.—October 26, 1922, to September 30, 1923.

DRAINAGE AREA.—240 square miles.

GAGE.—Chain gage attached to bridge; read by A. A. Burris.

CHANNEL AND CONTROL.—Bed is heavy clay; banks wooded. Right bank subject to overflow; left bank leveed. Low-water control is small loose rock dam about 30 feet below gage.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

EXTREMES OF DISCHARGE.—Maximum stage during period of record 13.30 feet February 3 (discharge, 3,820 second-feet); no flow July 31 and August 1.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined between 325 and 1,000 second-feet; fairly well defined below 300 second-feet and extended above 1,000 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records fair for low and medium stages and poor for high stages.

Discharge measurements of Cache River at Forman, Ill., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 26	H. E. Grosbach	1.11	[a] 2	May 22	H. E. Grosbach	8.09	785
Mar. 13	do	8.85	907	Sept. 19	do	6.02	484

[a] Estimated.

Daily discharge, in second-feet, of Cache River at Forman, Ill., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		2.8	7.0	450	1,050	364	163	143	215	125	0.0	125
2		8.5	5.5	378	2,090	299	143	153	153	22	.2	237
3		5.5	4.5	325	3,820	215	143	163	312	15	.6	312
4		4.5	4.5	299	3,550	183	435	173	261	13	1.9	183
5		3.5	4.5	226	3,460	249	833	540	193	9.6	237	134
6		2.8	5.5	193	2,090	600	975	143	163	11	338	102
7		2.0	5.5	183	1,510	765	1,180	134	94	29	585	226
8		5.5	4.5	98	1,180	750	1,350	116	67	22	630	226
9		10	4.5	30	833	540	1,180	107	41	15	540	204
10		10	3.5	25	750	378	833	102	67	9.6	435	183
11		12	16	20	600	435	615	82	125	5.1	351	134
12		14	14	18	480	816	750	78	364	3.2	299	94
13		16	14	18	600	850	910	60	273	2.4	125	56
14		20	14	16	799	1,000	1,300	50	125	2.4	82	25
15		30	12	28	750	1,450	1,400	850	86	2.4	19	18
16		20	12	67	675	1,780	1,450	2,010	56	1.9	7.3	18
17		16	10	107	585	1,850	930	2,570	163	1.9	299	16
18		12	8.5	74	480	2,170	660	2,410	312	1.5	782	261
19		30	8.5	60	351	1,850	510	2,090	392	29	930	570
20		47	5.5	35	261	1,710	435	1,400	392	11	799	833
21		53	4.5	660	237	1,450	338	1,020	273	5.1	870	1,180
22		47	4.5	1,350	226	1,180	299	750	173	2.4	930	2,170
23		35	3.5	1,710	193	910	261	645	98	1.9	1,000	1,850
24		16	5.5	1,260	143	799	215	600	74	1.2	910	1,710
25		12	7.0	1,080	204	675	183	435	41	.7	799	1,050
26	2.0	8.5	5.5	890	312	540	143	392	24	.6	585	870
27	1.6	7.0	30	799	392	406	125	364	17	.4	338	735
28	1.3	7.0	98	833	495	338	116	338	47	.2	261	510
29	1.3	8.5	143	910	-------	273	125	435	273	.1	226	420
30	1.3	8.5	193	910	-------	226	134	351	273	.1	183	351
31	1.3	-------	273	890	-------	193	-------	273	-------	.0	153	-------

Monthly discharge of Cache River at Forman, Ill., for the year ending Sept. 30, 1923

[Drainage area, 240 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
November	53	2.0	15.8	0.066	0.07
December	273	3.5	30.0	.125	.14
January	1,710	16	450	1.87	2.16
February	3,820	143	1,000	4.17	4.34
March	2,170	183	814	3.39	3.91
April	1,450	116	604	2.52	2.81
May	2,570	50	612	2.55	2.94
June	392	17	172	.717	.80
July	125	0	11.1	.046	.05
August	1,000	0	424	1.77	2.04
September	2,170	16	493	2.05	2.29

MISCELLANEOUS DISCHARGE MEASUREMENTS

Discharge measurements of streams in the Ohio River basin at points other than regular gaging stations are listed in the following table:

Miscellaneous discharge measurements in Ohio River basin during the year ending Sept. 30, 1923

Date	Stream	Tributary to or diverting from—	Locality	Gage height	Discharge
				Feet	*Sec.-ft.*
Oct. 10	Ohio Canal	Tuscarawas River	Crystal Spring, Ohio		18.9
Nov. 10	do	do	do		15.3
Aug. 24	do	do	do		20.0
Sept. 9	do	do	do		15.8
Oct. 3	Elk Eye millrace	Muskingum River	McConnelsville, Ohio		96.4
Aug. 21	do	do	do		96.8
Sept. 6	do	do	do		127
Apr. 14	Buckskin Creek	Paint Creek	Bainbridge, Ohio		188
Aug. 1	Miami and Erie Canal feeder.	Miami River	Sidney, Ohio		16.3
22	do	do	do		11.6
July 26	Miami and Erie Canal	do	Warren Street Bridge, Dayton, Ohio.		80.5
Aug. 24	do	do	do		70.9
July 25	do	do	Lindenwald, Ohio		60.7
Aug. 27	do	do	do		60.1
May 15	Mill Creek	Mad River	Springfield, Ohio		55.6
Oct. 1	Cumberland River	Ohio River	Pineville, Ky		16.7
Nov. 4	Obey River	Cumberland River	Celina, Tenn	0.75	81.2
Oct. 14	Caney Fork	do	Lancaster, Tenn		396
17	Sulphur Forks Creek	Red River	Port Royal, Tenn		7.2
Nov. 14	French Broad River	Tennessee River	Redmond, N. C., below Marshall power plant.		813
Aug. 21	Mills River	French Broad River	Near Mills River, N. C., 1¼ miles below junction of North and South forks of Mills River.		82.2
21	do	do	do		90.1
Nov. 9	Swannanoa River	do	At old gaging station at Swannanoa, N. C.	.87	23.1
9	Chunns Branch Creek	Swannanoa River	At mouth, Biltmore, N. C.		.7
Aug. 5	Beaver Creek	South Fork of Holston River.	Bristol, Va		[a]1,060
7	do	do	do		47.5
8	do	do	do		242
Nov. 16	Watauga River	do	Elizabethton, Tenn	3.04	750
Feb. 17	do	do	do	4.49	1,990
June 9	do	do	do	3.68	1,090
Oct. 9	Emery River	Clinch River	Harriman, Tenn		41.4
Feb. 13	Chicamauga Creek	Tennessee River	Chattanooga, Tenn		4,390
13	Chattanooga Creek	do	Rossville, Ga		1,020
Aug. 20	Duck River	do	Howards Bridge, 12 miles above Columbia, Tenn.		921

[a] Flood crest, computed by Kutter's formula.

INDEX

STREAM-GAGING STATIONS AND PUBLICATIONS RELATING TO WATER RESOURCES

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 (St. John River to York River).
II. South Atlantic slope and eastern Gulf of Mexico basins (James River to the Mississippi).
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 parts:
A. Pacific slope basins in Washington and upper Columbia River basin.
B. Snake River basin.
C. Lower Columbia River basin and Pacific slope basins in Oregon.

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

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

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

Boston, Mass., 2500 Customhouse.
Albany, N. Y., 704 Journal Building.
Trenton, N. J., Statehouse.
Asheville, N. C., 316 Jackson Building.
Chattanooga, Tenn., 37 Municipal Building.
Columbus, Ohio, Brown Hall, Ohio State University.
Chicago, Ill., 950 Transportation Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
Ames, Iowa, State Highway Commission Building.
Rolla, Mo., Rolla Building, School of Mines and Metallurgy.
Topeka, Kans., 23 Federal Building.
Helena, Mont., 45–46 Federal Building.
Denver, Colo., 403 Post Office Building.
Salt Lake City, Utah, 313 Federal Building.
Idaho Falls, Idaho, 228 Federal Building.
Boise, Idaho, Federal Building.
Tacoma, Wash., 406 Federal Building.
Portland, Oreg., 606 Post Office Building.
San Francisco, Calif., 328 Customhouse.
Los Angeles, Calif., 600 Federal Building.
Tucson, Ariz., 210 Agricultural Building, University of Arizona.
Austin, Tex., State Capitol.
Honolulu, Hawaii, 25 Capitol Building.

A list of the Geological Survey's publications may be obtained by applying to the Director of the United States Geological Survey, Washington, D. C.

Stream-flow records have been obtained at about 5,600 points in the United States, and the data obtained have been published in the reports tabulated on following page.

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

[A=Annual Report; B=Bulletin; W=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 September, 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	1895.
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	
W 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.
W 15	Decriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	1905.
W 201 to 214	do	1906.
W 241 to 252	do	1907–8.
W 261 to 272	do	1909.
W 281 to 292	do	1910.
W 301 to 312	do	1911.
W 321 to 332	do	1912.
W 351 to 362	do	1913.
W 381 to 394	do	1914.
W 401 to 414	do	1915.
W 431 to 444	do	1916.
W 451 to 464	do	1917.
W 471 to 484	do	1918.
W 501 to 514	do	1919–20.
W 521 to 534	do	1921.
W 541 to 554	do	1922.
W 561 to 574	do	1923.

NOTE.—No data regarding stream flow are given in the fifteenth and seventeenth 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 1923. The data for any particular station will, as a rule, be found

in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Maine, 1903 to 1921, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, 401, 431, 451, 471, 501, and 521, which contain records for the New England streams from 1903 to 1921. Results of miscellaneous measurements are published by drainage basins.

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 lake surfaces and local changes in name 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.

In exception to this rule the records for Mississippi River are given in four parts, as indicated on page 235, and the records for large lakes are taken up in order of streams around the rim of the lake.

Numbers of water-supply papers containing results of stream measurements, 1899–1923

[For basins included see p. 235]

Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
												A	B	C
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	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
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414
1916	431	432	433	434	435	436	437	438	439	440	441	442	443	444
1917	451	452	453	454	455	456	457	458	459	460	461	462	463	464
1918	471	472	473	474	475	476	477	478	479	480	481	482	483	484
1919–20	501	502	503	504	505	506	507	508	509	510	511	512	513	514
1921	521	522	523	524	525	526	527	528	529	530	531	532	533	534
1922	541	542	543	544	545	546	547	548	549	550	551	552	553	554
1923	561	562	563	564	565	566	567	568	569	570	571	572	573	574

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Tables of monthly discharge 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 Kerns rivers and south Pacific slope 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. Tables of monthly discharge 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.

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, Maryland, 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.

GAGING STATIONS

NOTE.—Dash following a date indicates that the station was being maintained September 30, 1923. Period after date indicates discontinuance.

Allegheny River (head of Ohio River) near Larabee, Pa., 1920–21.
Allegheny River at Red House, N. Y., 1903–
Allegheny River at Franklin, Pa., 1918–1921.
Allegheny River at Kittanning, Pa., 1904–1913; 1918–1921.
Ohio River at Wheeling, W. Va., 1905–6.
Conewango Creek:
Chadakoin River (Chatauqua Lake outlet) near Jamestown, N. Y., 1904–5.
Brokenstraw Creek at Youngsville, Pa., 1919–1921.
Tionesta Creek at Butler Bridge, Pa., 1919–1921.
Oil Creek near Rouseville, Pa., 1918–1921.
French Creek at Kimmeytown, Pa., 1919–20.
French Creek at Saegerstown, Pa., 1921.
French Creek at Carlton, Pa., 1919–20.
Cussewago Creek near Meadville, Pa., 1918–1920.
Clarion River near Clarion, Pa., 1919–1921.
Red Bank Creek at St. Charles, Pa., 1918–1921.
Mahoning Creek near Dayton, Pa., 1920–21.
Crooked Creek at Hileman's Farm, Pa., 1918–1921.
Stony Creek (head of Conemaugh River) at Johnstown, Pa., 1918–1921.
Kiskiminitas River at Avonmore, Pa., 1907–1913; 1918–1921.
Kiskiminitas River at Salina, Pa., 1904–5.
Blacklick Creek at Blacklick, Pa., 1904–1906; 1907–1913; 1918–1921.
Loyalhanna Creek at New Alexandria, Pa., 1919–1921.
Tygart River (head of Monongahela River) near Dailey, W. Va., 1915–
Tygart River at Belington, W. Va., 1907–
Tygart River at Fetterman, W. Va., 1907–
Monongahela River at Lock 15, Hoult, W. Va., 1914–
Monongahela River at Morgantown, W. Va., 1914–15.

Ohio River—Continued.
Monongahela River at Lock No. 4, Pa., 1886–1905. Flood-stage record only.
Middle Fork at Midvale, W. Va., 1915–
Buckhannon River at Hall, W. Va., 1907–1909; 1915–
West Fork at Butcherville, W. Va., 1915–
West Fork at Clarksburg, W. Va., 1923–
West Fork at Enterprise, W. Va., 1907–1918.
Elk Creek near Clarksburg, W. Va., 1910–1918.
Buffalo Creek at Barracksville, W. Va., 1907–8; 1915–
Deckers Creek at Morgantown, W. Va., 1914–15.
Cheat River near Parsons, W. Va., 1913–
Cheat River at Rowlesburg, W. Va., 1912–
Cheat River near Morgantown, W. Va., 1899–1900; 1902–1905; 1908–1917; 1922–
Blackwater River at Davis, W. Va., 1921–
Blackwater River at Hendricks, W.-Va., 1911–1918.
Shavers Fork at Cheat Bridge, W. Va., 1922–
Shavers Fork at Bemis, W. Va., 1922–
Shavers Fork at Parsons, W. Va., 1910–
Big Sandy Creek at Rockville, W. Va., 1909–1918; 1921–
Youghiogheny River at Friendsville, Md., 1898–1904.
Youghiogheny River at Confluence, Pa., 1904–1913.
Youghiogheny River at Connellsville, Pa., 1918–1921.
Casselman River at Markleton, Pa., 1913; 1920–21.
Casselman River at Confluence, Pa., 1904–1913.
Laurel Hill Creek at Ursina, Pa., 1913; 1918–1921.
Laurel Hill Creek at Confluence, Pa., 1904–1913.
Indian Creek in Westmoreland County, Pa., 1892–93.
Turtle Creek at Trafford, Pa., 1920–21.
Chartiers Creek at Carnegie, Pa., 1919–1921.
Mahoning River (head of Beaver River), at Youngstown, Ohio, 1903–1906; 1921–
Mahoning River near New Castle, Pa., 1918–19.
Beaver River at Wampum, Pa., 1914.
Shenango River near Turnerville, Pa., 1918–1921.
Shenango River near Jamestown, Pa., 1920–21.
Shenango River at Sharon, Pa., 1918–1921.
Shenango River at New Castle, Pa., 1918–1921.
Little Shenango River at Greenville, Pa., 1920–21.
Pymatuning Creek near Orangeville, Pa., 1918–1921.
Neshannock Creek at East Brook, Pa., 1919–1921.
Connoquenessing Creek near Hazen, Pa., 1919–1921.
Connoquenessing Creek near Ellwood, Pa., 1914.
Slippery Rock Creek at Wurtemburg, Pa., 1918–1920.
Little Beaver Creek near Liverpool, Ohio, 1915–
Yellow Creek at Hammondsville, Ohio, 1915–
Cross Creek near Mingo Junction, Ohio, 1903.
McMahon River at Steel, Ohio, 1903.
Middle Island Creek at Little, W. Va., 1915–1922.
Little Muskingum River at Fay, Ohio, 1915–1922.
Tuscarawas River (head of Muskingum River) at Crystal Spring, Ohio, 1921–
Tuscarawas River at Newcomerstown, Ohio, 1921–
Muskingum River at Dresden, Ohio, 1921–

Ohio River—Continued.
Muskingum River at Zanesville, Ohio, 1905–1912.
Muskingum River at Frazier, Ohio, 1915–1920.
Muskingum River at McConnelsville, Ohio, 1921–
Muskingum River at Beverly, Ohio, 1915–1920.
Sandy Creek:
Nimishillen Creek at North Industry, Ohio, 1921–
Stillwater Creek at Uhrichsville, Ohio, 1922–
Mohican River (head of Walhonding River) at Greer, Ohio, 1921–
Walhonding River at Pomerene, Ohio, 1910–1913;[1] 1921–
Kokosing River near Millwood, Ohio, 1921–
Licking River at Toboso, Ohio, 1921–
Licking River at Pleasant Valley, Ohio, 1902–1906.
Jonathan Creek at Powells, Ohio, 1902–3.
Little Kanawha River at Glenville, W. Va., 1915–1922.
Little Kanawha River at Lock 4, Palestine, W. Va., 1915–1922.
South Fork of Hughes River at Macfarlan, W. Va., 1915–1922.
Hughes River at Cisko, W. Va., 1915–1922.
Hocking River near Lancaster, Ohio, 1923–
Hocking River at Athens, Ohio, 1915–
New River, South Fork (head of New River, which in turn is head of Kanawha River) at New River, N. C., 1900–1901.
New River, South Fork, near Crumpler, N. C., 1908–1916.
New River near Oldtown, Va., 1900–1903.
New River near Grayson, Va., 1908–1912.
New River at Radford, Va., 1898–1906; 1907–1915.
New River at Eggleston, Va., 1914–
New River at Fayette, W. Va., 1895–1901; 1902–1904; 1908–1916.
Kanawha River at Lock 2, Montgomery, W. Va., 1915–1922.
North Fork of New River, near Crumpler, N. C., 1908–1916.
North Fork of New River at Weaverford, N. C., 1900–1901.
Reed Creek at Graham Forge, Va., 1908–1916.
Big Reed Island Creek near Allisonia, Va., 1908–1916.
Little River near Copper Valley, Va., 1908–1916.
Walker Creek at Staffordsville, Va., 1908–1916.
Wolf Creek near Narrows, Va., 1908–1916.
Bluestone River at Lilly, W. Va., 1908–1916.
Bluestone River near True, W. Va., 1911–12.
Greenbrier River near Marlinton, W. Va., 1908–1916.
Greenbrier River at Alderson, W. Va., 1895–1906; 1907–
Gauley River at Allingdale, W. Va., 1908–1916.
Gauley River near Summersville, W. Va., 1908–1916.
Gauley River near Belva, W. Va., 1908–1916.
Cherry River at Richwood, W. Va., 1908–1916.
Meadow River near Russellville, W. Va., 1908–1916.
Elk River at Webster Springs, W. Va., 1908–1916.
Elk River at Gassaway, W. Va., 1908–1916.
Elk River at Clendenin, W. Va., 1908–1916.
Coal River at Brushton, W. Va., 1908–1916.
Coal River at Fuqua, W. Va., 1911–1916.
Coal River at Tornado, W. Va., 1908–1912.
Little Coal River at McCorkle, W. Va., 1915–1922.
Pocatalico River at Sissonville, W. Va., 1908–1916.

[1] Records 1910–1913 published under "Mohican River at Pomerene, Ohio."

Ohio River—Continued.
Raccoon Creek at Adamsville, Ohio, 1915–
Guyandot River at Wilber, W. Va., 1915–1922.
Guyandot River at Branchland, W. Va., 1915–1922.
Mud River at Yates, W. Va., 1915–1922.
Twelvepole Creek at Wayne, W. Va., 1915–1922.
Levisa Fork (head of Big Sandy River) at Thelma, Ky., 1915–1920.
Tug Fork at Kermit, W. Va., 1915–1920.
Blaine Creek at Yatesville, Ky., 1915–1921.
Scioto River near Dublin, Ohio, 1921–
Scioto River near Columbus, Ohio, 1898–1901; 1903–1906.
Scioto River at Columbus, Ohio, 1921–
Scioto River at Chillicothe, Ohio, 1913–14; 1921–
Scioto River at Waverly, Ohio, 1916–1920.
Olentangy River at Delaware, Ohio, 1921–
Olentangy River near Columbus, Ohio, 1898–1901; 1903–1906.
Big Walnut Creek at Rees Station, Ohio, 1921–
Darby Creek at Darbyville, Ohio, 1921–
Paint Creek at Bainbridge, Ohio, 1921–1923.
Little Miami River near Morrow, Ohio, 1903.
Little Miami River at Loveland, Ohio, 1906.
Little Miami River at Miamiville, Ohio, 1915–1920.
Little Miami River at Plainville, Ohio, 1914–15; 1918–1920.
East Fork of Little Miami River at Perintown, Ohio, 1915–1920.
Licking River at Farmers, Ky., 1915–1920.
Licking River at Falmouth, Ky., 1914–1916.
Licking River at Catawba, Ky., 1916–1920.
Licking River at Morning View, Ky., 1916.
South Fork of Licking River at Hayes, Ky., 1916–1920.
South Fork of Licking River at Falmouth, Ky., 1915–16.
Mill Creek at Arlington Heights, Ohio, 1912–1916.
Mill Creek at Cincinnati, Ohio, 1912–13.
Miami River at Sidney, Ohio, 1914–
Miami River at Piqua, Ohio, 1913–1917.
Miami River at Tadmor, Ohio, 1914–1917.
Miami River at Taylorsville, Ohio, 1922–
Miami River at Dayton, Ohio, 1905–1909; 1913–
Miami River at Franklin, Ohio, 1916–1921.
Miami River at Hamilton, Ohio, 1910–1918.
Miami River at Venice, Ohio, 1915–
Loramie Creek at Lockington, Ohio, 1915–
Stillwater River at Pleasant Hill, Ohio, 1916–
Stillwater River near West Milton, Ohio, 1914–1917.
Mad River near Springfield, Ohio, 1904–1906; 1914–
Mad River near Dayton, Ohio, 1914–1921.
Buck Creek at Springfield, Ohio, 1914–1921.
Twin Creek near Germantown, Ohio, 1914–
Fourmile Creek near Sevenmile, Ohio, 1914–1917.
Sevenmile Creek at Sevenmile, Ohio, 1914–1920.
Whitewater River at Brookville, Ind., 1915–1920.
Kentucky River at Frankfort, Ky., 1905–6.
Dix River near Danville, Ky., 1905.
Dix River near Burgin, Ky., 1910–1922.
Elkhorn Creek at Forks of Elkhorn, Ky., 1915–1920.
Eagle Creek at Glencoe, Ky., 1915–1920.

Ohio River—Continued.
Rolling Fork of Salt River (head of Salt River) at New Haven, Ky., 1905–6.
Green River at Munfordville, Ky., 1915–1922.
Wabash River at Logansport, Ind., 1903–1906.
Wabash River at La Fayette, Ind., 1901–1903.
Wabash River at Terre Haute, Ind., 1902–1904; 1905–6.
Wabash River at Mount Carmel, Ill., 1908–1913.
Eel River at Logansport, Ind., 1903.
Tippecanoe River at Springboro, near Delphi, Ind., 1903–1906; 1908.
Vermilion River near Danville, Ill., 1914–1921.
Embarrass River near Oakland, Ill., 1909–1912; 1914–15.
Embarrass River at Ste. Marie, Ill., 1909–1912; 1914–
White River, West Branch (head of White River), near Strawtown, Ind., 1922.
White River, West Branch, near Noblesville, Ind., 1915–1922.
White River, West Branch, at Indianapolis, Ind., 1904–1906.
Eel River at Cataract, Ind., 1903–1906.
East Branch of White River at Shoals, Ind., 1903–1906; 1909–1916.
Little Wabash River near Clay City, Ill., 1908–1912.
Little Wabash River at Wilcox, Ill., 1914–
Little Wabash River near Golden Gate, Ill., 1908–1912.
Little Wabash River at Carmi, Ill., 1908–1912.
Skillet Fork at Wayne City, Ill., 1908–1912; 1914–1921.
Skillet Fork near Mill Shoals, Ill., 1908–1912.
Saline River:
Middle Fork of Saline River, near Harrisburg, Ill., 1922–
Cumberland River at Barbourville, Ky., 1922–
Cumberland River at Cumberland Falls, Ky., 1907–1911; 1915–
Cumberland River at Burnside, Ky., 1914–
Cumberland River at Celina, Tenn., 1922–
Cumberland River at Carthage, Tenn., 1922–
Cumberland River at Nashville, Tenn., 1902–1904; 1918–
Cumberland River at Clarksville, Tenn., 1922–
Laurel River near Otis, Ky., 1922–
Rockcastle River at Rockcastle Springs, Ky., 1922–
New River (head of South Fork of Cumberland River) near New River, Tenn., 1922–
South Fork of Cumberland River at Nevelsville, Ky., 1915–
Obey River near Boom, Tenn., 1919–
Caney Fork near Rock Island, Tenn., 1911–
Caney Fork near Silver Point, Tenn., 1922–
Caney Fork near Lancaster, Tenn., 1922.
Collins River near Rowland, Tenn., 1916–
Harpeth River at Belleview, Tenn., 1920–
Red River near Adams, Tenn., 1920–
French Broad River (head of Tennessee River) at Rosman, N. C., 1907–1909.
French Broad River at Blantyre, N. C., 1920–
French Broad River at Horseshoe, N. C., 1904–1906.
French Broad River at Asheville, N. C., 1895–
French Broad River at Oldtown, near Newport, Tenn., 1900–1905; 1907; 1920–
French Broad River at Dandridge, Tenn., 1918–
Tennessee River at Knoxville, Tenn., 1899–1912; 1918–
Tennessee River at Loudon, Tenn., 1922–

Ohio River—Continued.
Tennessee River at Chattanooga, Tenn., 1873–1913; 1915–
Tennessee River at Florence, Ala., 1871–
Tennessee River at Johnsonville, Tenn., 1875–
Davidson River near Davidson River, N. C., 1904–1909.
Davidson River near Brevard, N. C., 1920–
Little River at Calhoun, N. C., 1907–8.
Mills River, South Fork (head of Mills River), near Sitton, N. C., 1904–1909.
Mills River:
North Fork of Mills River at Pinkbed, N. C., 1904–1909.
Mud Creek at Naples, N. C., 1907.
Swannanoa River at Swannanoa, N. C., 1907–1909.
Swannanoa River at Biltmore, N. C., 1904; 1905; 1920–
Ivy River at Democrat, N. C., 1907.
Pigeon River at Canton, N. C., 1907–1909.
Pigeon River near Crabtree, N. C., 1920–
Pigeon River at Newport, Tenn., 1900–1901; 1903–1905; 1906–1909; 1918–
North Toe River (head of Nolichucky River) at Spruce Pine, N. C., 1907–8; 1920–
Nolichucky River at Embreeville, Tenn., 1920–
Nolichucky River at Chucky Valley, Tenn., 1900–1901.
Nolichucky River at Greeneville, Tenn., 1903–1908; 1919–
Nolichucky River at Morristown, Tenn., 1920–
Little Pigeon River at Sevierville, Tenn., 1920–
Holston River, South Fork (head of Holston River), near Chilhowie, Va., 1907–1909; 1920–
Holston River, South Fork, at Bluff City, Tenn., 1900–
Holston River near Rogersville, Tenn., 1902–
Middle Fork of Holston River at Chilhowie, Va., 1907–1909; 1920–
Watauga River at Butler, Tenn., 1900–1901; 1920–
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., 1911–1915.
Doe River at Valley Forge, Tenn., 1911–1916; 1920–
Doe River at Elizabethton, Tenn., 1907–8; 1912.
North Fork of Holston River near Saltville, Va., 1907–8; 1920–
North Fork of Holston River at Mendota, Va., 1920–
Little Tennessee River at Franklin, N. C., 1907–1910; 1921–
Little Tennessee River at Almond, N. C., 1912–1917.
Little Tennessee River at Judson, N. C., 1896–
Little Tennessee River at Calderwood, Tenn., 1912–1918; 1921–
Little Tennessee River at McGhee, Tenn., 1905–1913; 1918–
Cullasaja Creek at Cullasaja, N. C., 1907–1909; 1921–
Nantahala River near Nantahala, N. C., 1907–1909.
Nantahala River at Wesser, N. C., 1920–21.
Nantahala River at Almond, N. C., 1912–1917; 1921–
Tuckasegee River near East Laport, N. C., 1907–1909; 1920–
Tuckasegee River at Bryson, N. C., 1897–
Scott Creek at Sylva, N. C., 1921–22.
Scott Creek near Dillsboro, N. C., 1907–8.
Oconalufty River at Cherokee, N. C., 1907–8; 1921–
Cheoah River at Millsaps, N. C., 1907–8.
Cheoah River at Johnson, N. C., 1912–1918; 1920–

Ohio River—Continued.
Tennessee River—Continued.
Clinch River at Cleveland, Va., 1920–
Clinch River at Clinchport, Va., 1907–1909.
Clinch River at Speer Ferry, Va., 1920–
Clinch River near Lone Mountain, Tenn., 1919–
Clinch River at Clinton, Tenn., 1918–
Powell River near Pennington, Va., 1920–
Powell River near Arthur, Tenn., 1919–
Emery River at Deermont, Tenn., 1920–
Hiwassee River near Hayesville, N. C., 1907–1909; 1922–23.
Hiwassee River at Murphy, N. C., 1896–1917; 1918–
Hiwassee River at Reliance, Tenn., 1900–1913; 1919–
Hiwassee River at Charleston, Tenn., 1899–1902; 1920–
Shooting Creek near Hayesville, N. C., 1922–
Tusquitee Creek near Hayesville, N. C., 1907–1909.
Valley River at Tomotla, N. C., 1904–1909; 1914–1917; 1918–
Nottely River near Ranger, N. C., 1901–1905; 1914–1917; 1918–
Toccoa River (head of Ocoee River) near Dial, Ga., 1907–8; 1913–
Toccoa River near Morganton, Ga., 1898–1903; 1913–
Ocoee River at McCays (Copperhill) Tenn., 1903–1913; 1918–
Ocoee River at McHarge, Tenn., 1917–
Ocoee River at Emf, Tenn., 1913–
Ocoee River at Parksville, Tenn., 1911–1916; 1921–
Sequatchie River at Whitwell, Tenn., 1920–
Bear Creek near Red Bay, Ala., 1913–1920.
Elk River near Estill Springs, Tenn., 1920–
Elk River near Elkmont, Ala., 1904–1908; 1919–
Duck River at Normandy, Tenn., 1920–
Duck River at Columbia, Tenn., 1904–1908; 1920–
Duck River at Centerville, Tenn., 1919–
Buffalo River near Flatwoods, Tenn., 1920–
Cache River at Forman, Ill., 1922–

REPORTS ON WATER RESOURCES OF THE OHIO RIVER BASIN[2]

PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY

WATER-SUPPLY PAPERS

Water-supply papers may be purchased (at price quoted below) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. An asterisk (*) indicates that the report is out of print. 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.

[2] For stream-measurement reports see tables on pp. 237 and 239.

*25. Water resources of the State of New York, Part II, by G. W. Rafter. 1899. 100 pp., 12 pls.

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 sand areas of Long Island.

*26. Wells of southern Indiana (continuation of No. 21), by Frank Leverett. 1899. 64 pp.

Discusses by counties the glacial deposits and the sources of well water; contains many well sections.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp. 11 pls.

Gives elevations and distances along rivers of the United States, and brief descriptions of many of the streams, including Ohio River and a number of its tributaries.

*57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp.

*61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp.

A second, revised, edition of Nos. 57 and 61 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 slope and eastern Gulf of Mexico drainage basins.

*79. Normal and polluted waters in northeastern United States, by M. O. Leighton. 1903. 192 pp.

Defines essential qualities of water for various uses, the impurities in rain, surface, and ground 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 Merrimack, 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.

Contain 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.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. See Water-Supply Paper 152.

Cites statutory restrictions of water pollution in Alabama, Indiana, Illinois, Kentucky, Maryland, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.

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. Contains:

Water resources of the Middlesboro-Harlan region of southeastern Kentucky, by George H. Ashley. Describes 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 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.

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, arranged 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 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 "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 and others. 1905. 206 pp., 18 pls.

Describes Wabash River flood, Indiana, 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.

*152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp.

Cites statutory restrictions of water pollution in Alabama, Illinois, Indiana, Kentucky, Maryland, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.

159. Summary of the underground water resources of Mississippi, by A. F. Crider and L. C. Johnson. 1906. 86 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 ground waters; artesian requisities, and special conditions in the Coastal Plain formations; gives notes on wells by counties, deep-well records, and selected records in detail; 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.

Gives accounts of floods on Allegheny and Ohio rivers, and estimates of flood discharge and frequency on Monongahela, Youghiogheny, and Tennessee rivers.

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 and properties of ground 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. 223 pp., 3 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 ground waters, collection and storage of rain water, 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.

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. The underground 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, and geologic formations; source, movements, occurrence and volume of ground water; methods of well construction and lifting devices; discusses 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, on 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., 22 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.

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 spring and well waters from Pennsylvania, West Virginia, Kentucky, Tennessee, and Illinois, and of mine waters from Ducktown, Tenn.

489. The occurrence of ground water in the United States, with a discussion of principles, by O. E. Meinzer. 1923. xi, 321 pp., 31 pls. 60c.

Discusses the principles of occurrence of ground water, kinds of rocks and their water-bearing properties, structure of rocks and its influence on ground water, and the water-bearing formations of the United States.

536. Surface water supply of the New-Kanawha River basin, West Virginia, Virginia, and North Carolina; N. C. Grover, chief hydraulic engineer; A. H. Horton and G. C. Stevens, district engineers. 1925. iv, 281 pp., 2 pls. 35c.

Discusses general features of basin and gives the gaging-station records for all stations in the basin from the time the stations were established to 1920, inclusive.

ANNUAL REPORTS

Each of the papers contained in the annual reports was also issued in separate form.

Annual reports may be purchased (at price quoted below) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. An asterisk (*) indicates that the report is out of print.

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:

*The 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. Contains:

*The water resources of Illinois, by Frank Leverett, pp. 695–849, pls. 108 to 113. Describes the physical features of the State, and the drainage basins, including tributaries of the Mississippi in western Illinois, 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. 33 to 37. Describes the Wabash, Whitewater, Great Miami, Little Miami, Scioto, Hocking, Muskingum, and Beaver rivers and lessser 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 water; 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. 71 to 73. Describes the principal geologic formations of Ohio and the waters from the different strata; discusses the flowing wells at various points and the artesian wells of preglacial channels in Allen, Auglaize, and Mercer counties; discusses city and village supplies; gives analyses of waters from various formations.

MONOGRAPHS

Monographs may be purchased (at prices quoted below) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. An asterisk (*) indicates that the report is out of print. Monographs are of quarto size.

41. 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 Genessee 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 may be purchased (at price quoted below) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. An asterisk (*) indicates that the report is out of print. Professional papers are of quarto size.

*37. The southern Appalachian forests, by H. B. Ayres and W. W. Ashe. 1905. 291 pp., 37 pls.

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.

135. The composition of the river and lake waters of the United States, by F. W. Clarke. 1924. iv, 199 pp. 50c.

Contains analyses of the water of the principal rivers in the Ohio River basin.

BULLETINS

Bulletins may be obtained (at price quoted below) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. An asterisk (*) indicates that the report is out of print. 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.

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 Delaware 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.

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*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp.

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in Alabama, Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia, and detailed records of wells in Madison County, Ala.; Crawford County, Ill.; Delaware, Martin, Randolph, and Vanderburg counties, Ind.; Hopkins and Metcalfe counties, Ky.; Hocking, Noble, Tuscarawas, and Wayne counties, Ohio; Armstrong, Greene, Somerset, 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.[3] 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 the 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 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 many of the folios were usable. They are 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 sell 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.

[3] 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.

An asterisk (*) indicates that the folio is out of print.

*16. Knoxville folio, Tennessee-North Carolina.

*67. Danville folio, Illinois-Indiana.

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.

*90. Cranberry folio, North Carolina-Tennessee.

*102. Indiana folio, Pennsylvania.

Indicates promising localities for artesian water.

*105. Patoka folio, Indiana-Illinois.

Discusses the water supply of the streams, springs, wells, cisterns, and artificial ponds.

*121. Waynesburg folio, Pennsylvania.

*123. Elders Ridge, Pennsylvania.

*124. Mount Mitchell, North Carolina-Tennessee.

Describes water powers and the sources of water used for industrial and domestic supplies.

*144. Amity, Pennsylvania.

Gives a brief discussion of the water supply of the town of Washington.

*146. Rogersville, Pennsylvania.

*147. Pisgah, North Carolina-South Carolina.

*151. Roan Mountain, Tennessee-North Carolina.

*160. Accident-Grantsville, Maryland-Pennsylvania-West Virginia.

Notes possibility of obtaining artesian water.

*172. Warren, Pennsylvania-New York.

*174. Johnstown, Pennsylvania.

Describes the city water supply at Johnstown and the water resources of the quadrangle.

*176. Sewickley, Pennsylvania.

*177. Burgettstown-Carnegie, Pennsylvania.

Contains partial well records.

180. Claysville, Pennsylvania.[4] 5c.

*184. Kenova, Kentucky-West Virginia-Ohio.

187. Ellijay, Georgia-North Carolina-Tennessee. 25c.

Contains brief paragraph on water power.

189. Barnesboro-Patton, Pennsylvania. 25c.

197. Columbus, Ohio. Library edition, 25c.; octavo edition, 50c.

Gives brief description of the water supply of Columbus and analyses of the mineral content of the water of Scioto River.

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 report of the Tenth Census (vol. 17). The following reports deserve special mention.

[4] Field edition only.

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. 1861.

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 by 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 value 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.

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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.

INDEX BY AREAS AND SUBJECTS.

[A=Annual Reports; M=Monograph; B=Bulletin; P=Professional Paper; W=Water-Supply Paper; G F=Geologic folio.]

[5] Many analyses of river, spring, and well waters are scattered through publications, as noted in abstracts.

INDEX OF STREAMS

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