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DEPARTMENT OF THE INTERIOR  
Hubert Work, Secretary

U. S. GEOLOGICAL SURVEY  
George Otis Smith, Director

WATER-SUPPLY PAPER 562

SURFACE WATER SUPPLY OF THE  
UNITED STATES  
1923

PART II. SOUTH ATLANTIC SLOPE AND EASTERN  
GULF OF MEXICO BASINS

NATHAN C. GROVER, Chief Hydraulic Engineer

A. H. HORTON, WARREN E. HALL, and W. E. KING  
District Engineers



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Box 3106, Capitol Station  
Oklahoma City, Okla.

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# SURFACE WATER SUPPLY OF SOUTH ATLANTIC SLOPE AND EASTERN GULF OF MEXICO DRAINAGE BASINS, 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, 1895-1923*

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. Information in regard to publications relating to water resources is presented in the appendix to this report.

### 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, miner’s inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in 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, and acre-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.

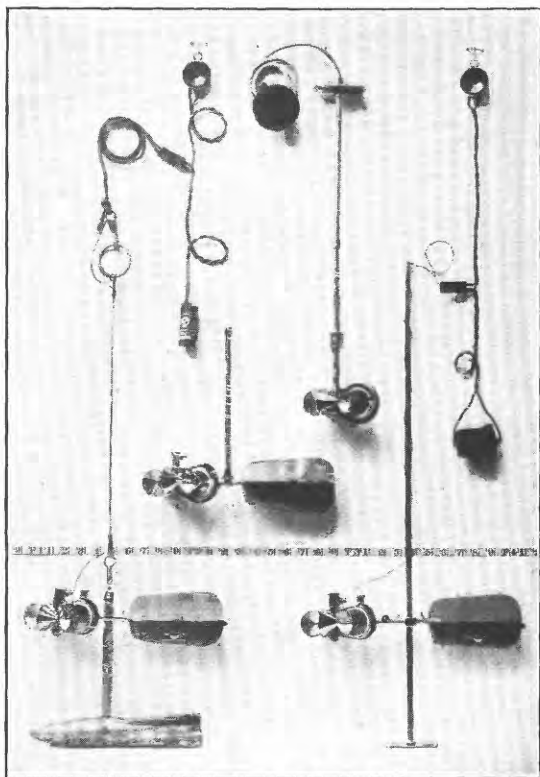
“Run-off in inches” is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

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.

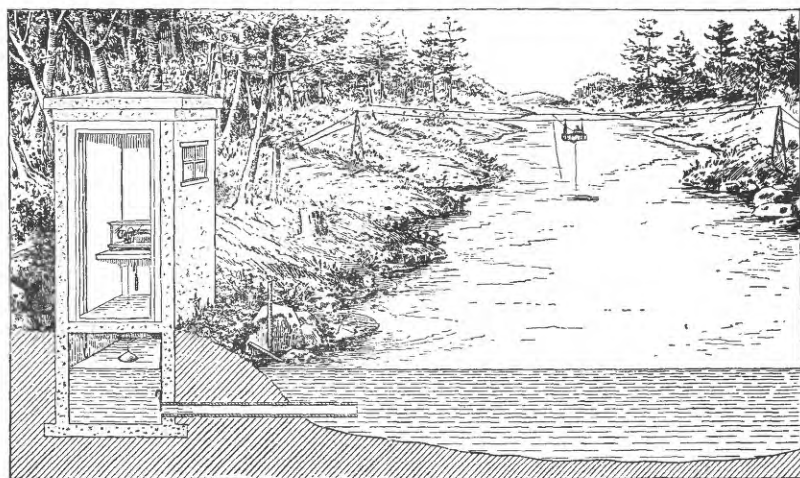
The following terms not in common use are here defined:

“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 determine the stage-discharge



A. PRICE CURRENT METERS

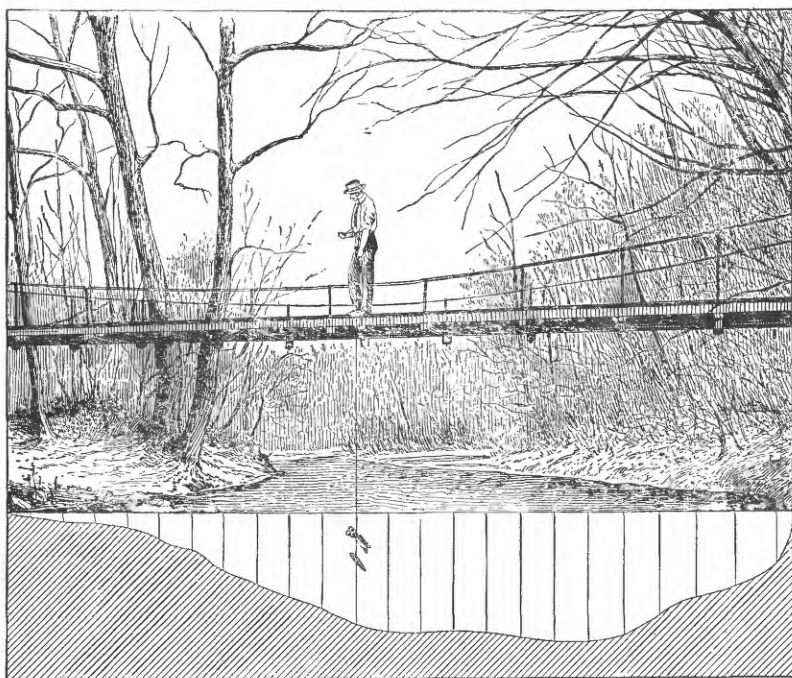


B. TYPICAL GAGING STATION





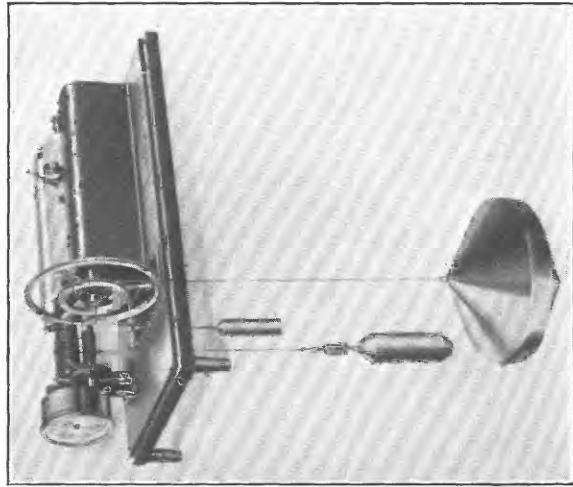
A



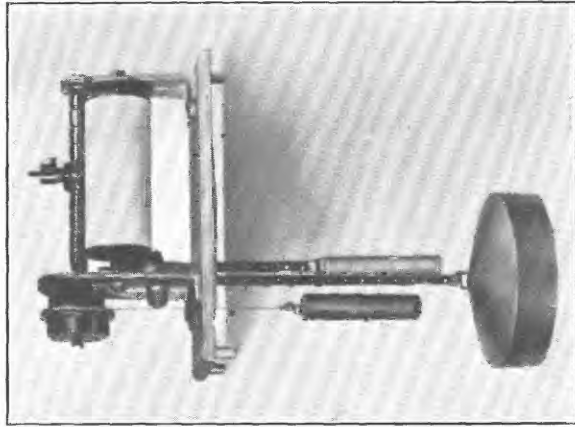
B

TYPICAL GAGING STATIONS

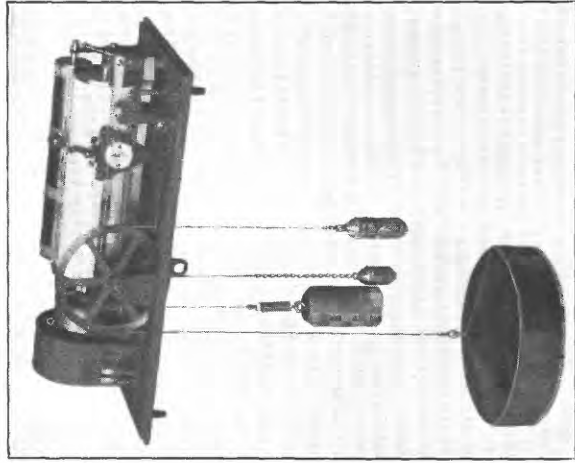
A, For wading measurement; B, for bridge measurement



A



B



C

WATER-STAGE RECORDERS

A, Au; B, Gurley; C, Stevens

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.

### EXPLANATION OF DATA

The data presented in this report cover the year 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 consists 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. (See Pls. I-III.) The general methods are outlined in standard textbooks on the measurement of river discharge.

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 daily discharge from which the monthly and yearly mean discharge is computed.

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 fluctuations 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 regular intervals during the day or by using 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 computations recorded in the remaining columns, which are defined on pages 2 and 3 are based.

#### ACCURACY OF FIELD DATA AND COMPUTED RESULTS

The accuracy of stream-flow data depends primarily (1) on the permanency 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 run-off 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 in the earlier reports by the Survey 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 first be 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 tables of monthly discharge give 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

Work in North Carolina was done in cooperation with the North Carolina Geological and Economic Survey, Col. Joseph Hyde Pratt, director.

Work in Georgia was done in cooperation with the Geological Survey of Georgia, Prof. S. W. McCallie, State geologist.

Acknowledgment is also due for financial assistance rendered by the following organizations and individuals; Roanoke Railway & Electric Co.; Halifax Power Co.; Roanoke Development Co.; Virginia Railway & Power Co.; Columbia Railway & Navigation Co.; Central Georgia Power Co.; Columbus Power Co.; Tallassee Power Co.; Viele, Blackwell & Buck; Alabama Power Co.; Houston Power Co.; city of Dothan, Ala.; B. H. Hardaway; and the Alabama Geological Survey.

### DIVISION OF WORK

Data for stations in Virginia, except for Roanoke River at Buggs Island, were collected and prepared for publication under the direction of A. H. Horton, district engineer, assisted by J. J. Dirzulaitis and W. C. Wiggins.

Data for stations in North Carolina, South Carolina, and Georgia and for Roanoke River at Buggs Island, Va., were collected and

prepared for publication under the direction of Warren E. Hall, district engineer, assisted by L. J. Hall, B. M. Hall, jr., J. H. Morgan, and Mrs. Effie T. Workman.

Data for stations in Florida and Alabama were collected and prepared for publication under the direction of W. R. King, district engineer, assisted by Warren Withee, P. E. Hanson, J. P. Clawson, A. E. Killebrew, and Duncan Charlton.

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

## GAGING STATION RECORDS

### JAMES RIVER BASIN

#### JAMES RIVER AT BUCHANAN, VA.

**LOCATION.**—At highway bridge near Chesapeake & Ohio Railway station at Buchanan, Botetourt County.

**DRAINAGE AREA.**—2,060 square miles.

**RECORDS AVAILABLE.**—August 18, 1895, to September 30, 1923.

**GAGE.**—Chain gage attached to highway bridge, installed November 21, 1903; read by D. D. Booze for United States Weather Bureau. A span of the bridge and the gage were destroyed by flood on the night of March 27, 1913. A temporary gage was used from April 22 to September 15, 1913, when a new gage was installed.

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

**CHANNEL AND CONTROL.**—Bed under bridge is composed of rock overlain with a thick deposit of mud. Banks, high; not overflowed except in extreme floods. Control of boulders and gravel several hundred feet below station.

**EXTREMES OF STAGE.**—Maximum stage recorded during year, 9.0 feet March 7; minimum stage, 1.85 feet October 1–6 and November 3–15.

1895–1923: Maximum stage recorded, 31 feet during the night of March 27, 1913, determined by levels from flood marks October 2, 1914 (discharge not determined); minimum stage, 1.2 feet (present gage datum) April 17 and May 2, 1896 (discharge, 260 second-feet).

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

**ACCURACY.**—Stage-discharge relation has changed. New rating curve not fully developed. Gage read to tenths once daily. The gage heights indicate river apparently has a very steady flow at low stages; this apparent condition may be due to careless or inaccurate gage readings.

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

The following discharge measurements were made by J. J. Dirzulaitis:

September 10, 1923: Gage height, 2.57 feet; discharge, 935 second-feet.<sup>1</sup>

September 11, 1923: Gage height, 2.44 feet; discharge, 707 second-feet.

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<sup>1</sup> Measurement affected by vibration of bridge due to continuous heavy traffic.

# JAMES RIVER BASIN

7

Daily gage height, in feet, of James River at Buchanan, Va., for the year ending September 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	1.85	1.95	1.95	3.7	4.8	4.1	3.7	4.1	2.9	2.3	4.2	2.1
2.....	1.85	1.95	1.95	6.0	4.5	3.9	3.7	3.9	2.9	2.2	4.9	2.1
3.....	1.85	1.85	1.95	4.6	6.3	3.8	3.6	3.7	2.9	2.2	4.0	2.1
4.....	1.85	1.85	1.95	4.4	6.0	3.7	3.6	3.7	2.9	2.2	4.6	2.1
5.....	1.85	1.85	1.95	4.0	5.7	3.6	3.5	3.6	2.9	2.2	5.0	2.2
6.....	1.85	1.85	1.95	4.0	5.1	4.4	3.9	3.6	2.9	2.2	4.5	3.2
7.....	2.15	1.85	1.95	3.5	4.7	9.0	4.1	3.5	2.9	2.2	4.2	2.7
8.....	2.6	1.85	1.95	3.4	4.5	8.4	4.0	3.5	2.9	2.1	4.0	2.3
9.....	2.3	1.85	1.95	3.3	4.4	5.9	3.9	3.4	2.9	2.1	3.9	2.1
10.....	2.6	1.85	1.95	3.3	4.3	4.7	3.8	3.4	2.9	2.1	3.9	2.1
11.....	3.3	1.85	1.95	3.2	4.2	4.6	3.8	3.3	3.1	2.1	8.3	2.2
12.....	3.0	1.85	1.95	3.3	4.1	4.6	3.8	3.2	3.8	2.1	5.9	2.1
13.....	2.5	1.85	1.95	3.1	4.0	4.8	4.1	3.1	4.4	2.1	5.1	2.1
14.....	2.4	1.85	1.95	3.2	3.9	4.7	6.9	3.0	5.1	2.1	4.2	2.1
15.....	2.1	1.85	3.0	3.1	3.8	4.6	7.7	3.0	4.9	2.1	3.5	2.1
16.....	2.05	2.05	4.1	3.1	3.7	4.9	6.3	3.3	4.4	2.1	3.3	2.1
17.....	2.05	1.95	5.8	3.0	3.6	8.1	5.4	3.9	4.1	2.1	3.0	2.1
18.....	2.05	1.95	6.7	3.1	3.5	7.7	4.9	3.8	3.8	2.1	2.8	2.1
19.....	2.05	1.95	5.0	2.0	3.4	7.4	4.4	3.7	3.6	2.1	2.7	2.1
20.....	2.05	1.95	4.2	3.1	3.3	7.9	4.1	3.6	3.4	2.1	2.6	2.1
21.....	2.05	1.95	3.8	3.0	3.2	6.3	3.9	3.5	3.2	2.1	2.5	2.1
22.....	2.05	1.95	3.3	3.0	3.1	4.8	3.7	3.4	3.0	2.1	2.5	4.0
23.....	1.95	1.95	3.1	2.9	3.1	4.7	3.7	3.3	2.8	2.1	2.4	3.4
24.....	1.95	1.95	2.9	3.0	3.0	4.5	3.6	3.2	2.7	2.1	2.4	3.8
25.....	1.95	1.95	3.0	3.2	3.0	4.4	3.6	3.1	2.6	2.1	2.3	2.9
26.....	1.95	1.95	2.9	2.6	3.0	4.2	3.5	3.1	2.5	2.1	2.3	2.6
27.....	1.95	1.95	2.9	4.0	3.2	4.1	3.4	3.0	2.4	2.1	2.2	2.5
28.....	1.95	1.95	2.8	6.5	3.7	4.0	3.3	3.0	2.4	2.1	2.2	2.4
29.....	1.95	1.95	3.2	8.1	-----	3.9	3.8	3.0	2.3	2.1	2.1	2.4
30.....	1.95	1.95	2.9	6.4	-----	3.8	4.4	2.9	2.3	2.2	2.1	2.4
31.....	1.95	-----	3.0	4.9	-----	3.8	-----	2.9	-----	2.4	2.1	-----

## JAMES RIVER AT CARTERSVILLE, VA.

LOCATION.—At highway bridge between Pemberton and Cartersville, Cumberland County, 1 mile below mouth of Willis River.

DRAINAGE AREA.—6,230 square miles.

RECORDS AVAILABLE.—January 1, 1899, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge; read by B. W. Palmore until January 9, 1923, and by A. F. Moon, jr., after January 13, 1923. Wire gage used previous to July 24, 1903.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Bed composed of rocks and sand; shifts somewhat during floods. Banks high; left bank is overflowed at a stage of about 20 feet.

EXTREMES OF STAGE.—Maximum stage recorded during year, 18.46 feet at 5 p. m. March 17; minimum stage, 0.69 foot at 5 p. m. July 23.

1899-1923: Maximum stage recorded, 26.7 feet at 6 p. m. December 30, 1901 (discharge, about 106,000 second-feet); minimum stage, 0.33 foot at 10 a. m. October 27, 1921.

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

ACCURACY.—Stage-discharge relation has changed. Rating curve not fully developed. Gage read to hundredths twice daily. Daily discharge withheld pending development of rating curve.

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

September 12, 1923: Gage height, 1.34 feet; discharge, 1,970 second-feet.

*Daily gage height, in feet, of James River at Cartersville, Va., for the year ending September 30, 1923*

Day	Oct.	Nov	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	0.92	1.1	1.08	4.70	6.53	3.40	3.87	4.90	2.25	1.15	5.19	1.67
2-----	.90	1.24	1.02	5.16	5.81	3.18	3.48	4.45	2.03	1.12	5.22	1.57
3-----	.88	1.14	1.12	5.80	5.93	2.97	3.38	3.89	2.13	1.01	4.39	1.22
4-----	.82	1.20	1.09	6.80	7.35	2.86	3.44	3.70	2.00	1.11	3.54	1.00
5-----	.85	1.30	1.20	5.40	7.80	2.78	3.56	3.25	1.76	1.20	3.82	1.30
6-----	.99	1.18	1.22	4.96	7.14	2.80	3.84	3.04	1.83	.91	3.72	2.27
7-----	1.12	1.16	1.32	4.66	6.05	10.14	3.86	2.80	1.90	1.06	3.65	2.37
8-----	1.25	1.07	1.49	3.73	5.40	10.46	3.83	2.63	1.80	2.68	2.94	2.00
9-----	1.85	1.20	1.58	3.61	5.05	10.56	3.92	2.75	1.70	2.56	2.71	2.14
10-----	3.50	1.24	1.64	-----	5.28	8.29	3.93	2.82	1.62	1.16	2.68	1.72
11-----	4.64	1.18	1.72	-----	5.29	6.44	3.67	2.76	1.52	1.16	2.06	1.36
12-----	3.72	1.22	1.82	-----	4.96	5.52	3.37	2.68	1.52	1.25	1.69	1.43
13-----	2.99	1.14	1.95	3.06	5.56	5.45	3.14	2.64	1.98	1.34	3.64	1.60
14-----	2.78	1.18	2.12	2.81	5.58	6.24	5.80	2.48	2.31	1.33	3.52	1.38
15-----	2.62	1.10	2.28	2.70	5.26	6.06	6.60	2.40	2.37	.99	4.04	1.28
16-----	2.42	1.14	2.10	2.58	4.72	6.72	7.78	2.53	3.68	1.06	3.42	1.18
17-----	2.10	1.09	2.40	2.53	4.57	18.06	7.60	3.03	3.38	1.12	3.12	1.11
18-----	1.54	1.18	3.70	2.44	4.22	13.66	7.00	3.00	2.60	.94	3.10	1.09
19-----	1.44	1.22	6.43	2.26	3.78	12.61	6.22	3.10	2.28	.83	2.50	1.02
20-----	1.30	1.16	5.78	2.34	3.56	10.98	5.36	3.26	2.01	.82	1.61	.92
21-----	1.34	1.12	4.24	2.36	3.36	9.14	4.62	3.53	1.72	.78	1.64	.96
22-----	1.34	1.08	3.37	2.36	3.17	7.22	4.26	3.12	1.72	.74	1.68	1.28
23-----	1.20	1.16	2.82	2.28	3.02	6.74	3.88	2.80	1.74	.78	1.60	3.58
24-----	1.24	1.06	2.56	2.77	2.86	6.04	3.66	2.78	1.68	.76	1.41	4.10
25-----	1.20	1.11	2.41	3.30	2.56	5.74	3.45	2.96	1.61	.72	1.34	2.90
26-----	1.24	1.12	2.28	3.56	2.54	5.56	3.20	2.80	1.55	1.02	1.17	2.28
27-----	1.22	1.06	2.16	3.98	3.20	5.44	3.02	3.02	1.48	.98	1.14	2.28
28-----	1.20	1.08	3.55	5.77	3.69	5.10	2.92	2.86	1.26	.82	1.06	2.12
29-----	1.18	1.02	5.23	8.26	-----	4.74	6.10	2.71	1.21	2.76	3.70	1.85
30-----	1.17	1.09	4.10	9.34	-----	4.30	4.85	2.40	1.14	1.62	3.54	1.58
31-----	1.14	-----	2.83	7.88	-----	4.01	-----	2.46	-----	2.54	2.14	-----

NOTE.—Gage not read Jan. 10-12.

### ROANOKE RIVER BASIN

#### ROANOKE RIVER AT ROANOKE, VA.

**LOCATION.**—At Walnut Street highway bridge in Roanoke, Roanoke County.

**DRAINAGE AREA.**—388 square miles.

**RECORDS AVAILABLE.**—July 10, 1896, to July 15, 1906; May 7, 1907, to September 30, 1923.

**GAGE.**—Chain gage on downstream side of bridge; read by an employee of Roanoke Railway & Electric Co. Wire gage used previous to November 28, 1903.

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

**CHANNEL AND CONTROL.**—Bed composed of coarse gravel and small boulders. Banks may be overflowed at extreme flood stages. Control, loose boulders.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during the year, 6.85 feet March 7 (discharge, 6,680 second-feet); minimum stage, 0.53 foot November 19-23 (discharge, 48 second-feet).

1896-1923: Maximum stage recorded, 14.34 feet August 6, 1901 discharge, 16,900 second-feet; minimum stage, zero on morning of December 23, 1909, when flow was retarded by freezing.

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

**ACCURACY.**—Stage-discharge relation permanent except as affected by ice. Rating curve fairly well defined between 80 and 7,000 second-feet; extended beyond these limits. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. The discharge for December and January appears to be too low when compared with the precipitation. The error, if any, is due to erroneous gage readings. Records for the remainder of the year are considered good.



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

September 10, 1923: Gage height, 1.06 feet; discharge, 168 second-feet.

*Daily discharge, in second-feet, of Roanoke River at Roanoke, Va., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	77	59	97	267	267	522	210	255	147	133	247	87
2	77	59	87	288	267	491	203	247	133	133	247	87
3	77	59	87	267	288	491	193	247	131	128	433	87
4	77	59	87	255	332	491	193	247	125	123	522	147
5	77	57	133	247	462	491	184	247	123	120	522	228
6	77	57	120	247	554	260	177	240	118	118	406	210
7	162	56	120	247	589	6,680	177	228	111	120	332	380
8	147	54	108	240	624	4,930	177	210	108	120	267	462
9	133	53	108	228	745	3,580	193	203	97	120	193	332
10	125	53	108	210	789	2,250	203	193	97	133	177	228
11	120	51	108	210	789	1,650	228	177	147	133	162	193
12	113	51	104	210	624	1,890	247	162	2,640	128	210	147
13	108	51	99	210	554	2,900	210	162	3,040	125	147	133
14	108	51	97	210	522	3,180	193	162	1,890	177	147	120
15	102	49	97	210	491	2,640	210	162	1,360	147	133	108
16	97	49	97	228	380	1,800	332	332	663	133	128	104
17	97	49	97	247		1,650	433	288	491	128	120	104
18	93	49	97	288		1,100	466	247	380	120	147	79
19	93	48	104	310		624	380	228	332	115	147	87
20	87	48	108	310		462	380	228	267	108	147	162
21	87	48	113	310		406	380	221	210	104	139	108
22	83	48	108	310	380	288	356	210	193	99	133	193
23	77	48	97	310		267	332	247	184	99	177	147
24	73	51	97	310		228	332	332	177	97	147	133
25	64	51	97	288		228	310	288	162	97	133	131
26	68	51	97	288		228	288	228	147	97	120	162
27	68	51	93	288	491	221	280	210	147	97	113	147
28	68	51	93	288	554	221	267	197	147	97	104	133
29	64	51	89	288	-----	217	267	184	139	108	97	120
30	61	59	87	267	-----	210	259	165	133	115	89	120
31	61	-----	247	267	-----	210	-----	156	-----	177	87	-----

NOTE.—Discharge estimated Feb. 16-26 because of ice.

*Monthly discharge of Roanoke River at Roanoke, Va., for the year ending September 30, 1923*

[Drainage area, 388 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	162	61	91.0	0.235	0.27
November	59	48	52.4	.135	.15
December	247	87	106	.273	.31
January	310	210	263	.678	.78
February	789	267	469	1.21	1.26
March	6,680	210	1,450	3.74	4.31
April	433	177	267	.688	.77
May	332	156	223	.575	.66
June	3,040	97	468	1.21	1.35
July	177	97	121	.322	.36
August	522	87	199	.513	.59
September	462	87	162	.418	.47
The year	6,680	48	322	.830	11.28

## ROANOKE RIVER AT BROOKNEAL, VA.

LOCATION.—At highway bridge at Virginian Railway station at Brookneal, Campbell County,  $2\frac{3}{4}$  miles above Falling River.

DRAINAGE AREA.—2,350 square miles (measured on map compiled by United States Geological Survey, scale 1 to 500,000).

RECORDS AVAILABLE.—April 29 to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge; read by C. R. McDowell.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed composed of sand, silt, and bedrock. Banks low and subject to overflow.

EXTREMES OF STAGE.—Maximum stage recorded during period of record, 16.0 feet at 9 a. m. September 23; minimum stage, 3.38 feet at 9 a. m. and 5 p. m. September 3.

The flood of November, 1877, reached a stage of about 36 feet on the present gage and the flood about March 15, 1923, reached a stage of about 31 feet.

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

ACCURACY.—Gage read to hundredths twice daily. Rating curve not fully developed. Gage-height records good.

*Discharge measurements of Roanoke River at Brookneal, Va., during the year ending September 30, 1923*

[Made by J. J. Dirzulaitis]

Date	Gage height	Discharge
	<i>Feet</i>	<i>Sec.-ft.</i>
Apr. 29.....	5.88	2,560
May 1.....	5.50	2,220
Sept. 6.....	10.23	<sup>a</sup> 7,360
Sept. 6.....	10.02	<sup>b</sup> 6,020

<sup>a</sup> Discharge as corrected for effect of changing stage during measurement=7,120 second-feet.

<sup>b</sup> Discharge as corrected for effect of changing stage during measurement=6,790 second-feet.

*Daily gage height, in feet, of Roanoke River at Brookneal, Va., for the year ending September 30, 1923*

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1.....		5.44	4.35	3.64	9.18	3.46	16.....		5.86	6.06	6.82	3.83	3.72
2.....		5.16	4.30	3.60	8.58	3.41	17.....		5.86	5.76	7.36	3.76	3.70
3.....		4.96	4.25	3.58	5.66	3.38	18.....		5.24	4.92	4.92	5.40	3.69
4.....		4.91	4.16	3.56	4.85	3.39	19.....		5.05	4.62	4.24	5.08	3.70
5.....		4.88	4.04	3.56	6.00	5.41	20.....		4.83	4.66	3.83	4.14	3.66
6.....		4.87	4.00	3.62	7.64	9.83	21.....		4.83	4.46	3.67	3.98	3.71
7.....		4.84	4.15	3.77	5.42	5.44	22.....		4.82	4.46	3.55	4.08	5.85
8.....		4.82	4.24	5.06	4.56	15.44	23.....		4.72	4.46	3.50	4.92	16.03
9.....		4.93	4.09	5.55	6.37	9.75	24.....		4.68	4.42	3.50	4.15	8.23
10.....		5.03	3.98	4.54	5.12	4.77	25.....		4.86	4.12	3.58	3.82	6.35
11.....		4.81	3.84	3.91	5.14	5.18	26.....		4.86	3.94	3.58	3.72	5.36
12.....		4.76	4.36	3.72	5.49	4.61	27.....		4.78	3.86	3.54	3.66	4.87
13.....		4.76	8.02	3.90	5.26	4.08	28.....		4.62	3.78	3.50	3.56	4.61
14.....		4.75	9.27	5.56	4.64	3.74	29.....	5.88	4.44	3.70	3.88	3.60	4.33
15.....		4.83	7.84	6.07	4.28	3.72	30.....	6.61	4.45	3.65	3.96	3.84	4.13
							31.....		4.38		7.14	3.70	-----

## ROANOKE RIVER AT BUGGS ISLAND, VA.

LOCATION.—At proposed dam site 600 feet upstream from upper end of Buggs Island, Mecklenburg County,  $1\frac{1}{2}$  miles below mouth of Teets Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 6, 1921, to August 2, 1923, when the record was discontinued.

GAGE.—A Friez seven-day graph water-stage recorder in wooden stilling well on right bank.

EXTREMES OF STAGE.—Maximum stage during year occurred when recorder was not running; minimum stage, 1.32 feet at 2 p. m. October 1 and 4 a. m. October 3.

ICE.—Ice forms to considerable thickness during severe winters, probably affecting stage-discharge relation.

REGULATION.—During low water there are variations of flow, probably due to weekly (Sunday) shutdown of large power plants upstream.

COOPERATION.—Viele, Blackwell & Buck, engineers for the Roanoke Development Co., installed the recorder and furnished the gage heights from January 9 to December 30, 1922.

This station was established to determine the length of time it takes for changes in stage at proposed dam site above Buggs Island to reach the gaging station at Old Gaston, N. C., 35 miles below.

*Daily gage height, in feet, of Roanoke River at Buggs Island, Va., for the period October 1, 1922, to August 2, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
1.....	1.35	-----	1.90	3.75	4.81	6.04	3.20	4.62	2.70	2.85	6.43
2.....	1.42	-----	1.95	5.20	3.48	5.14	3.11	3.80	2.54	1.85	5.20
3.....	1.38	-----	1.80	5.21	4.15	4.34	3.07	3.18	2.38	1.80	-----
4.....	1.47	-----	1.85	4.43	5.14	3.69	3.45	2.96	2.32	1.86	-----
5.....	1.47	-----	2.35	3.79	5.54	3.27	4.17	2.86	2.14	2.01	-----
6.....	1.42	-----	2.30	3.40	5.41	3.18	4.48	2.79	2.14	2.13	-----
7.....	1.52	-----	2.45	3.05	4.85	4.94	4.43	2.70	2.10	1.93	-----
8.....	1.85	-----	2.60	3.46	4.30	8.15	3.73	2.80	2.06	1.95	-----
9.....	2.85	-----	2.45	4.15	4.38	8.40	3.45	2.76	2.18	3.25	-----
10.....	-----	-----	2.60	3.75	4.96	5.65	3.37	2.87	2.35	3.42	-----
11.....	-----	-----	2.50	3.22	5.26	4.40	3.16	2.91	2.18	2.80	-----
12.....	4.15	-----	2.50	2.87	5.00	4.05	3.04	2.78	2.16	2.38	-----
13.....	3.08	-----	2.40	2.70	5.36	4.78	3.86	2.67	3.11	2.29	-----
14.....	2.43	-----	2.25	2.58	6.45	6.60	8.49	2.63	3.60	2.24	-----
15.....	2.20	-----	2.40	2.55	5.75	6.50	7.50	2.68	4.09	2.82	-----
16.....	2.20	-----	2.55	2.56	4.80	5.85	5.85	2.71	4.55	3.17	-----
17.....	2.80	-----	2.70	2.52	3.92	10.21	4.80	2.64	3.04	2.68	-----
18.....	2.75	-----	3.40	2.47	3.55	13.25	4.00	3.06	2.74	3.09	-----
19.....	2.45	-----	3.80	2.47	3.24	-----	3.67	3.25	2.54	2.62	-----
20.....	2.23	-----	3.65	2.43	3.22	-----	3.47	2.78	2.45	2.25	-----
21.....	2.08	-----	3.05	2.46	3.08	-----	3.29	2.69	2.41	2.04	-----
22.....	1.95	-----	2.80	2.48	3.00	-----	3.10	2.65	2.30	1.87	-----
23.....	-----	-----	2.65	2.47	2.93	-----	3.14	2.70	2.24	1.72	-----
24.....	-----	-----	2.58	3.34	2.85	-----	2.98	2.62	2.18	1.72	-----
25.....	-----	-----	2.45	3.68	2.72	5.10	2.90	2.54	2.18	1.88	-----
26.....	-----	1.95	2.45	3.56	2.67	4.52	2.85	2.61	2.15	1.85	-----
27.....	-----	1.80	2.40	3.70	3.68	4.07	2.82	2.69	2.30	1.93	-----
28.....	-----	1.90	2.65	4.39	5.58	3.77	2.85	2.60	2.20	1.92	-----
29.....	-----	2.00	3.35	5.23	-----	3.57	4.10	2.44	2.03	2.09	-----
30.....	-----	2.00	3.83	5.37	-----	3.42	5.18	2.50	2.86	2.33	-----
31.....	-----	-----	3.39	4.50	-----	3.30	-----	2.47	-----	2.55	-----

## ROANOKE RIVER AT OLD GASTON N. C.

**LOCATION.**—At bridge of Roanoke Railway Co. at Old Gaston, Northampton County, three-fourths mile below mouth of Indian Creek,  $1\frac{1}{4}$  miles north of Thelma, N. C., and  $2\frac{1}{2}$  miles above mouth of Deep Creek.

**DRAINAGE AREA.**—8,350 square miles.

**RECORDS AVAILABLE.**—December 7, 1911, to September 30, 1923.

**GAGE.**—Friez water-stage recorder at downstream end of second masonry pier from right end of railroad bridge, installed November 21, 1921. Gage inspected by R. A. Howell.

**DISCHARGE MEASUREMENTS.**—Made from downstream side of bridge. Measuring section broken by 11 piers. This bridge has been floored over and is now a mbined toll highway and railroad bridge.

**CHANNEL AND CONTROL.**—Channel practically permanent. Control, about 1 mile below gage, is of rocks and probably permanent. Left bank subject to overflow in extreme floods but a fair determination can be made of the overflow discharge around bridge.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 13.06 feet at 7 a. m. March 20 (discharge, 119,000 second-feet); minimum stage, 1.3 feet at 8.35 a. m. October 2 and 8.25 a. m. October 5 (discharge, 1,580 second-feet). Minimum stage determined from one daily chain gage reading by observer.

1911-1923: Maximum stage recorded, 16.6 feet at 7 a. m. March 18, 1912 (discharge, 210,000 second-feet); minimum stage, 0.95 foot at 6 a. m. October 1, 1914 (discharge, 790 second-feet).

**ICE.**—Ice forms to considerable thickness at this station during severe winters.

**REGULATION.**—Small daily fluctuations in stage are caused by operation of power plants many miles upstream.

**ACCURACY.**—A change in stage-discharge relation was caused probably by high water in March. Rating curves used before and after change fairly well defined between 1,000 and 200,000 second-feet. Operation of water-stage recorder fairly satisfactory; checked with daily readings of chain gage. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage-height graph. Records good.

*Discharge measurements of Roanoke River at Old Gaston, N. C., during the year ending September 30, 1923*

Date	Made by—	Gage height	Dis-charge
Nov. 24	W. E. and L. J. Hall	Feet	Sec.-ft.
Feb. 28	L. J. Hall	1.84	3,060
		5.09	19,500

*Daily discharge, in second-feet, of Roanoke River at Old Gaston, N. C., for the year ending Sept. 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	2,090	2,930	2,500	9,000	11,500	22,000	7,720	15,600	4,690	2,510	30,000	4,360
2.....	1,700	3,080	2,500	15,900	10,000	19,200	6,900	11,600	5,380	2,390	22,100	3,440
3.....	1,830	2,780	2,640	11,500	9,500	14,100	6,500	8,590	4,360	2,510	16,800	3,160
4.....	1,700	2,930	2,640	14,700	16,600	11,000	6,900	7,720	4,040	2,390	12,100	2,890
5.....	1,580	2,780	2,640	11,000	18,500	8,500	10,000	7,300	3,890	2,510	8,590	2,890
6.....	1,960	2,780	3,080	9,500	19,900	7,540	12,700	5,740	3,440	3,020	6,500	3,020
7.....	2,640	2,500	3,540	7,540	16,600	10,500	13,200	5,740	3,440	3,300	8,150	9,040
8.....	2,780	2,780	3,700	7,080	13,600	31,300	11,000	5,380	3,440	3,020	8,590	13,800
9.....	3,540	2,780	3,700	12,000	13,000	40,200	9,040	5,740	3,300	3,300	9,040	16,200
10.....	8,500	2,930	4,180	11,000	15,300	24,200	8,150	5,740	8,740	7,720	6,120	15,000
11.....	22,000	2,780	4,180	9,000	17,800	14,700	7,720	6,120	3,740	6,500	6,120	8,150
12.....	15,300	2,780	4,520	7,080	17,200	12,000	7,800	5,740	3,740	4,690	8,150	8,150
13.....	9,000	2,780	4,180	5,920	16,600	15,300	7,720	5,380	5,380	4,360	6,900	7,300
14.....	5,920	2,500	3,700	6,280	25,000	28,100	34,300	5,030	7,300	4,360	7,300	5,740
15.....	4,520	2,930	3,700	5,200	22,800	25,800	36,200	5,030	10,000	4,040	6,500	4,040
16.....	5,200	3,080	4,180	4,860	17,200	22,800	24,400	5,380	9,040	6,500	5,740	3,740
17.....	9,000	3,230	5,560	4,860	12,500	54,200	16,800	5,030	6,900	5,500	4,360	3,400
18.....	7,080	3,380	6,660	4,860	10,000	69,400	12,100	5,740	5,380	5,030	3,590	2,640
19.....	5,560	3,380	8,500	4,520	8,500	95,700	10,000	7,300	4,690	5,740	3,590	2,640
20.....	4,520	3,380	9,500	4,520	8,000	113,000	9,040	6,500	4,360	4,040	6,120	2,640
21.....	3,700	2,780	8,000	4,180	7,540	54,200	8,150	5,030	4,040	3,440	5,740	2,890
22.....	3,380	2,930	6,280	4,180	6,660	25,000	7,720	5,030	3,890	3,020	4,360	13,200
23.....	3,230	2,930	5,560	4,520	6,660	17,800	6,900	5,030	3,590	2,640	4,360	11,600
24.....	3,380	2,930	4,860	5,200	6,280	15,300	6,900	5,030	3,440	2,890	9,040	30,000
25.....	3,380	2,930	4,520	10,000	6,280	17,200	6,500	4,690	3,300	2,890	10,500	27,500
26.....	3,860	2,640	3,860	10,000	5,560	14,700	6,120	4,690	3,160	2,760	7,720	14,400
27.....	3,860	2,360	3,860	9,500	7,080	12,000	6,120	5,030	3,300	2,760	5,030	9,520
28.....	3,540	2,780	4,520	12,000	17,200	10,500	6,500	4,690	3,590	3,740	4,040	8,590
29.....	3,230	2,780	6,280	15,900	9,520	11,000	4,690	4,690	3,160	6,120	3,440	6,120
30.....	2,930	2,780	9,500	19,200	8,590	17,400	4,360	2,890	6,500	3,890	4,690	4,690
31.....	2,640	-----	9,000	15,900	-----	8,150	4,360	-----	7,300	4,040	-----	-----

NOTE.—Daily discharge for following periods when water-stage recorder did not operate satisfactorily obtained from mean daily stages ascertained from graph constructed on basis of one daily reading and sometimes part of recorder graph: On Oct. 1-6, 12-21, Nov. 18-21, Dec. 15-30, Feb. 24-27, Mar. 31 to Apr. 7, 20, 21, May 5-12, Sept. 15-21, and 30.

*Monthly discharge of Roanoke River at Old Gaston, N. C., for the year ending September 30, 1923*

[Drainage area, 8,350 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	22,000	1,580	4,950	0.593	0.68.
November.....	3,380	2,360	2,880	.345	.38.
December.....	9,500	2,500	4,900	.687	.68.
January.....	19,200	4,180	8,930	1.07	1.23.
February.....	25,000	5,560	13,000	1.56	1.62.
March.....	113,000	7,540	26,900	3.22	3.71.
April.....	36,200	6,120	11,400	1.37	1.53.
May.....	15,600	4,360	6,100	.731	.84.
June.....	10,000	2,890	4,490	.538	.60.
July.....	7,720	2,390	4,120	.493	.57.
August.....	30,000	3,440	8,020	.960	1.13.
September.....	30,000	2,640	8,360	1.00	1.12.
The year.....	113,000	1,580	8,650	1.04	14.07

## DAN RIVER AT SOUTH BOSTON, VA.

**LOCATION.**—At Norfolk & Western Railway bridge at South Boston, Halifax County, 6 miles upstream from mouth of Banister River.

**DRAINAGE AREA.**—2,820 square miles (measured on map compiled by United States Geological Survey; scale, 1 to 500,000).

**RECORDS AVAILABLE.**—April 28 to September 30, 1923.

**GAGE.**—Chain gage on downstream side of guardrail of bridge; read by K. W. Thaxton.

**DISCHARGE MEASUREMENTS.**—Made from downstream side of bridge.

**CHANNEL AND CONTROL.**—Bed composed of fine sand. Banks subject to overflow at stages above 20 feet.

**EXTREMES OF STAGE.**—Maximum stage recorded during period of record, 13.16 feet at 2.30 p. m. September 23; minimum stage, 3.86 feet at 1.30 p. m. July 23.

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

**REGULATION.**—Dam one-fourth mile above station, and the dams at Danville regulate the flow.

**DIVERSIONS.**—The water supply of South Boston is taken out just above the measuring section.

**ACCURACY.**—Rating curve not fully developed. Gage read to hundredths twice daily. Gage-height record good.

The following discharge measurements were made by J. J. Dirzulaitis:

April 28, 1923: Gage height, 6.24 feet; discharge, 2,410 second-feet.

September 8, 1923: Gage height, 7.76 feet; discharge, 3,580 second-feet.

*Daily gage height, in feet, of Dan River at South Boston, Va., for the year ending September 30, 1923*

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1		8.64	6.39	4.38	10.88	5.00	16		5.80	6.08	5.80	4.71	4.34
2		6.92	5.61	4.78	10.94	4.48	17		5.76	5.24	5.32	4.66	4.10
3		6.68	5.01	4.80	8.00	4.38	18		7.58	5.88	4.64	4.61	4.35
4		6.52	5.14	4.92	5.84	4.34	19		6.44	5.26	4.76	6.61	4.62
5		6.24	5.08	5.26	5.68	4.06	20		5.30	5.24	4.32	5.98	4.38
6		5.44	5.04	4.14	6.13	8.07	21		5.61	5.12	4.49	5.31	4.61
7		6.00	4.93	4.55	5.82	6.52	22		5.84	5.01	4.18	4.64	7.98
8		6.24	4.49	5.47	4.87	7.88	23		6.12	4.68	3.92	4.76	12.14
9		6.58	5.80	6.18	5.13	7.50	24		5.70	4.74	4.36	9.22	12.34
10		6.80	5.00	5.46	5.88	6.30	25		6.18	4.92	4.30	8.24	7.55
11		6.57	5.12	5.06	5.63	7.78	26		6.12	5.51	5.04	5.32	6.60
12		6.08	5.71	4.64	4.86	6.48	27		5.34	5.59	4.90	5.06	6.84
13		5.28	6.42	4.84	6.08	5.94	28	5.97	5.32	5.14	4.88	4.53	5.39
14		5.81	7.33	5.36	6.04	4.90	29	8.02	5.63	4.88	6.16	4.85	4.77
15		6.15	6.45	6.08	5.46	5.08	30	10.52	5.62	4.95	5.81	5.19	4.84
							31		5.87		5.90	5.53	

## CAPE FEAR RIVER BASIN

## MORGAN CREEK NEAR CHAPEL HILL, N. C.

**LOCATION.**—At ford 500 feet below mouth of Neville Creek, 2 miles southwest of Carrboro, 3 miles southwest of Chapel Hill, Orange County, and 7 miles above mouth of creek.

**DRAINAGE AREA.**—29 square miles.

**RECORDS AVAILABLE.**—January 20 to September 30, 1923.

**GAGE.**—Stevens continuous water-stage recorder on left bank; attended by students or faculty of University of North Carolina at Chapel Hill.

**DISCHARGE MEASUREMENTS.**—Made from cable 75 feet upstream from gage.

**CHANNEL AND CONTROL.**—Creek is straight for 150 feet upstream and for about 700 feet downstream from gage; bed of stream shifting sand and current is sluggish at low water. Banks are high and wooded but subject to overflow at extreme high water. Control consists of large boulders and gravel about 40 feet downstream from gage; probably permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage during period of record, 8.50 feet at 7.15 a. m. March 13 (discharge, 1,380 second-feet); minimum stage, 1.01 feet from 8 p. m. July 27 to 3 a. m. July 28 (discharge, 2.5 second-feet).

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

**ACCURACY.**—Stage-discharge relation permanent. Rating curve well defined below 500 second-feet and fairly well defined between 500 and 1,000 second-feet. Operation of water-stage recorder satisfactory except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage-height graph. Records excellent.

*Discharge measurements of Morgan Creek near Chapel Hill, N. C., during the year ending September 30, 1923*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Jan. 11	L. J. Hall.....	1.52	22.2	Mar. 13	Smith and Morton.....	6.43	844
Feb. 3	Saville and Morton....	1.57	27.4	19	Martin and Morton.....	3.47	306
5	do.....	3.78	394	19	do.....	3.43	287
5	do.....	3.62	361	July 20	L. J. Hall.....	1.07	4.01
10	Smith and Morton.....	1.78	44.9	21	do.....	1.06	3.91
13	Saville and Morton....	2.38	115	Sept. 23	L. J. and W. E. Hall....	1.26	10.7
13	Morton, Martin, and Mays.	2.60	142				
13	do.....	2.52	122				

*Daily discharge, in second-feet, of Morgan Creek near Chapel Hill, N. C., for the year ending September 30, 1923*

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		38	99	25	37	12	5.5	8.3	4
2		31	52	24	31	12	5.8	6.8	4
3		28	42	23	27	11	5.5	6.5	3
4		42	35	23	24	10	5.2	6.8	3
5		212	31	23	23	9.9	4.6	9.1	23
6		113	28	23	23	9.5	4.3	6.5	20
7		67	141	23	21	9.1	6.2	5.5	24
8		56	52	21	30	8.7	30	5.5	17
9		46	38	29	24	7.9	10	12	11
10		42	34	27	20	7.6	6.5	6.2	8
11		37	37	25	18	10	5.2	16	27
12		31	50	24	16	31	4.6	12	10
13		73	874	71	17	16	6.2	7.2	8
14		62	168	144	30	12	15	5.8	7
15		42	76	61	20	11	20	4.6	7
16		35	212	44	20	10	9.5	4.0	9
17		30	300	38	17	9.5	11	4.0	7
18		26	108	36	15	8.3	6.2	4.9	6
19		26	177	32	14	7.9	4.3	4	6
20	14	23	91	29	16	7.2	4.0	4	6
21	15	21	64	27	31	6.8	3.8	5	5
22	14	20	56	26	17	6.5	3.5	27	26
23	14	18	54	24	16	6.2	3.0	28	12
24	71	17	48	23	14	5.8	3.2	10	7.9
25	55	17	40	22	14	5.5	4.0	9	6.5
26	34	21	37	21	14	5.2	3.5	7	6.2
27	30	123	34	21	14	5.2	2.8	6	5.5
28	33	71	31	22	13	4.9	10	7	5.2
29	27		29	76	13	5.8	66	6	4.9
30	24		28	51	12	5.2	14	5	4.9
31	42		28		12		11	5	

NOTE.—Recorder did not operate Aug. 19 to Sept. 22; discharge estimated by study of rainfall record at Chapel Hill, furnished by the North Carolina Geological and Economic Survey.

*Monthly discharge of Morgan Creek near Chapel Hill, N. C., for the year ending September 30, 1923*

[Drainage area, 29 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
January 20-31.....	71	14	31.1	1.07	0.48
February.....	212	17	45.9	1.69	1.76
March.....	874	28	99.8	3.44	3.97
April.....	144	21	35.3	1.22	1.36
May.....	37	12	19.8	.683	.79
June.....	31	4.9	9.26	.319	.36
July.....	66	2.8	9.50	.328	.38
August.....	28	4.0	8.22	.283	.33
September.....	27	3.0	9.80	.338	.38

#### DEEP RIVER AT RAMSEUR, N. C.

**LOCATION.**—At upper end of long pool 2,000 feet downstream from railroad station at Ramseur, Randolph County, and  $1\frac{1}{2}$  miles below mouth of Sandy Creek.

**DRAINAGE AREA.**—343 square miles (measured on United States Department of Agriculture soil survey maps).

**RECORDS AVAILABLE.**—November 24, 1922, to September 30, 1923.

**GAGE.**—Gurley seven-day water-stage recorder on right bank; attended to by J. M. Woodell.

**DISCHARGE MEASUREMENTS.**—Made from cable 200 feet below gage.

**CHANNEL AND CONTROL.**—Channel straight above and below gage for 700 feet. Bed composed of boulders and sand; fairly smooth. Banks are about 20 feet high but are overflowed occasionally. Control for low and medium stages is a solid rock shoal about 600 feet downstream from gage. There are three small islands between cable and control.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 19.22 feet at 1 p. m. March 13 (discharge, 16,600 second-feet); minimum stage, 0.44 foot from 8 p. m. July 27 to 6 a. m. July 28 (discharge, 35 second-feet).

**ICE.**—Negligible.

**DIVERSIONS.**—None.

**REGULATION.**—The record from recorder shows continual regulation by power plants above station, but as no plant has more than 10 hours' storage, the weekly and monthly mean discharge is representative of natural flow.

**ACCURACY.**—Stage-discharge relation, except for low water, is practically permanent. A slight shift occurred during high water January 1. Rating curve used to that date is well defined between 40 and 125 second-feet and fairly well defined above; curve used since January 1 is well defined between 80 and 6,000 second-feet and extended above. Operation of water-stage recorder satisfactory. Daily discharge ascertained by use of discharge integrator and for a few days by averaging discharge for two-hour periods. Records excellent.



*Discharge measurements of Deep River at Ramseur, N. C., during the year ending September 30, 1923*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 18	L. J. and W. E. Hall...	0.88	70.7	July 10	L. J. Hall.....	0.90	86.6
18	do.....	1.04	93.4	11	do.....	.99	101
19	L. J. Hall.....	.75	57.1	17	Saville and Smith...	2.59	696
24	L. J. and W. E. Hall...	1.13	107	Aug. 15	L. J. Hall.....	1.11	125
Feb. 22	L. J. Hall.....	1.77	326	15	do.....	1.23	161
23	do.....	1.47	217	16	do.....	1.37	184
Mar. 7	do.....	7.04	3,570	16	do.....	1.14	130
7	do.....	6.80	3,310	Sept. 22	L. J. and W. E. Hall...	1.53	226
8	do.....	3.26	1,070	22	do.....	1.07	120
8	do.....	2.92	839	22	do.....	1.40	192
9	do.....	2.36	578	26	do.....	1.30	163

*Daily discharge, in second-feet, of Deep River at Ramseur, N. C., for the year ending September 30, 1923*

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....		74	1,780	575	870	230	530	178	73	225	61
2.....		68	940	415	590	285	375	140	76	290	58
3.....		51	510	345	425	265	310	98	128	345	65
4.....		90	740	550	360	970	300	178	85	250	77
5.....		100	455	2,300	345	1,560	180	154	86	620	128
6.....		134	285	1,620	315	620	250	146	78	325	118
7.....		130	200	700	2,550	435	310	138	56	345	395
8.....		128	820	600	970	350	295	116	50	188	300
9.....		95	650	495	520	405	260	82	69	138	102
10.....		166	380	485	425	315	225	83	81	106	200
11.....		355	290	425	400	285	180	114	112	96	460
12.....		180	230	390	465	270	132	490	150	93	245
13.....		178	190	710	11,800	1,120	120	580	164	126	170
14.....		164	182	950	3,000	2,500	580	200	245	136	112
15.....		164	285	520	910	810	375	160	114	100	100
16.....		390	240	430	3,900	540	255	128	2,700	92	58
17.....		560	194	275	8,300	395	375	89	3,250	83	84
18.....		800	188	275	1,520	375	235	124	325	54	76
19.....		440	188	315	2,900	310	182	134	162	66	73
20.....		280	146	270	1,620	265	178	110	138	118	94
21.....		400	120	240	830	200	1,020	98	98	100	75
22.....		465	205	215	670	170	430	94	69	96	184
23.....		205	178	215	610	230	270	84	106	98	148
24.....		81	146	880	188	750	215	255	86	106	148
25.....		62	139	1,080	154	540	168	520	108	102	168
26.....		50	166	880	250	450	162	325	95	91	124
27.....		84	122	660	1,720	405	150	200	116	74	102
28.....		69	545	900	1,080	365	156	250	114	64	74
29.....		78	385	590	---	300	1,280	220	110	2,350	85
30.....		74	170	380	---	295	1,500	310	80	2,500	80
31.....		138	640	---	---	255	---	245	---	400	78

NOTE.—Discharge Nov. 24 and Sept. 28-30 determined from graph estimated on basis of maximum and minimum gage heights.

*Monthly discharge of Deep River at Ramseur, N. C., for the year ending September 30, 1923*

[Drainage area, 343 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
November 24-30.....	84	50	71.1	0.207	0.05
December.....	800	51	239	.697	.80
January.....	1,780	120	497	1.45	1.67
February.....	2,300	154	597	1.74	1.81
March.....	11,800	255	1,540	4.49	5.18
April.....	2,500	150	551	1.61	1.80
May.....	1,020	120	313	.913	1.05
June.....	580	80	148	.431	.48
July.....	3,250	50	455	1.33	1.53
August.....	620	54	154	.449	.52
September.....	460	45	137	.399	.45

**WEST FORK OF DEEP RIVER NEAR HIGH POINT, N. C.**

**LOCATION.**—At highway bridge  $1\frac{1}{2}$  miles northwest of Jamestown and  $3\frac{1}{2}$  miles northeast of High Point, Guilford County.

**DRAINAGE AREA.**—33 square miles (measured on United States Department of Agriculture soil survey maps).

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

**GAGE.**—Staff in two sections on right bank about 20 feet upstream from bridge; read by W. S. Davis.

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

**CHANNEL AND CONTROL.**—Bed composed mostly of sand. Control formed by loose rocks under lower side of bridge; sand between rocks washes away and is replaced frequently. Right bank is high but left bank is subject to overflow at about 8 feet gage height.

**EXTREMES OF DISCHARGE.**—No record of floods has been obtained.

**ICE.**—Not enough to affect stage-discharge relation.

**REGULATION.**—None.

**DIVERSIONS.**—None.

**ACCURACY.**—Stage-discharge relation for low water changes frequently. Rating curve for medium and higher stages fairly well defined. Gage read to hundredths once a day which was not sufficient during periods of rainfall. Daily discharge ascertained by applying daily gage height to rating table. Records poor.

*Discharge measurements of West Fork of Deep River near High Point, N. C., during the year ending September 30, 1923*

Date	Made by—	Gage height	Dis- charge	Date	Made by—	Gage height	Dis- charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
June 20	O. E. Martin.....	0.92	9.70	Sept. 15	O. E. Martin.....	1.10	8.54
July 9	do.....	.89	10.6	27	W. E. and L. J. Hall..	1.10	9.35
Aug. 16	W. E. and L. J. Hall..	1.01	9.73	27	do.....	1.10	8.96

*Daily discharge, in second-feet, of West Fork of Deep River near High Point, N. C., for the year ending September 30, 1923*

Day	June	July	Aug.	Sept.	Day	June	July	Aug.	Sept.
1.-----		5.2	10	86	16.-----	8.1	8.1	6.5	17
2.-----		8.1	15	27	17.-----	8.1	8.1	12	12
3.-----		8.1	13	20	18.-----	8.1	6.2	13	9.4
4.-----		6.2	13	16	19.-----	9.0	42	9.1	9.4
5.-----		5.2	13	114	20.-----	8.1	11	8.2	12
6.-----		4.6	14	20	21.-----	7.1	10	8.2	9.4
7.-----		6.2	11	14	22.-----	5.2	9.0	8.2	7.5
8.-----		53	9.1	11	23.-----	5.2	556	11	7.5
9.-----		9.0	9.1	8.4	24.-----	5.2	47	13	7.5
10.-----		10	23	9.4	25.-----	7.1	29	10	6.5
11.-----		14	8.2	9.4	26.-----	9.0	74	9.1	6.5
12.-----		11	11	8.4	27.-----	8.1	28	8.2	6.5
13.-----		11	11	8.4	28.-----	6.2	21	8.2	5.6
14.-----	11	9.0	9.1	8.4	29.-----	7.1	90	9.1	6.5
15.-----	9.0	8.1	7.3	9.4	30.-----	5.2	32	78	6.5
					31.-----		21	21	

*Monthly discharge of West Fork of Deep River near High Point, N. C., for the year ending September 30, 1923*

[Drainage area, 33 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
June 14-30.-----	11	5.2	7.46	0.226	0.14
July.-----	556	4.6	37.5	1.14	1.31
August.-----	78	6.5	13.2	.400	.46
September.-----	114	5.6	16.7	.506	.56

## PEEDEE RIVER BASIN

### YADKIN RIVER AT NORTH WILKESBORO, N. C.

**LOCATION.**—At bridge 3,870 feet below Southern Railway station at North Wilkesboro, Wilkes County.

**DRAINAGE AREA.**—500 square miles.

**RECORDS AVAILABLE.**—April 10, 1903, to June 30, 1909, and October 1, 1920, to September 30, 1923.

**GAGE.**—Chain gage on downstream handrail; read by S. U. Reynolds. Original chain gage on old bridge which was washed away July 16, 1916, was at different datum.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage.

**CHANNEL AND CONTROL.**—Channel is straight above station, slightly curved at bridge and straight for 600 feet below. Right bank is low and subject to overflow, but all water must pass under bridge and approaches. Left bank is high and rocky. Bed of stream is rocky, with sand in places.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 15.13 feet at 6 p. m. March 16 (discharge, 13,600 second-feet); minimum stage, 1.20 feet at 6 p. m. September 3 (discharge, 340 second-feet).

1903-1909 and 1920-1923: Maximum stage recorded, 18.8 feet (datum of old gage) at 10.20 a. m. November 19, 1906 (discharge, 22,300 second-feet); minimum stage, -0.6 foot January 26, 1905 (discharge, 184 second-feet).

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

**REGULATION.**—Very slight regulation from small milldams upstream.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 376 and 10,000 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.

The following discharge measurements were made by L. J. Hall:

October 12, 1922: Gage height, 2.13 feet; discharge, 721 second-feet. ]

July 13, 1923: Gage height, 1.75 feet; discharge, 535 second-feet.

*Daily discharge, in second-feet, of Yadkin River at North Wilkesboro, N. C., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	472	472	492	2,920	1,170	712	664	664	1,020	452	618	395
2.....	452	472	512	1,480	964	664	664	618	912	712	712	376
3.....	472	492	512	1,020	860	618	760	618	810	618	618	358
4.....	452	472	532	712	860	574	860	618	760	574	810	395
5.....	433	472	618	664	1,020	712	964	664	760	532	860	452
6.....	395	472	512	618	1,020	2,290	810	760	760	512	760	492
7.....	912	492	472	618	912	1,860	712	760	712	512	712	532
8.....	712	472	472	760	912	1,330	712	760	664	532	512	860
9.....	1,540	472	472	664	964	964	712	664	618	512	618	492
10.....	3,930	492	712	574	964	810	664	574	574	492	472	492
11.....	1,120	472	532	512	964	912	664	574	618	472	618	492
12.....	760	472	512	532	964	1,590	664	574	664	452	664	452
13.....	664	492	512	512	964	1,700	1,220	574	712	492	492	414
14.....	618	472	472	492	1,020	1,540	1,540	712	618	664	492	414
15.....	860	512	574	532	964	1,380	1,120	664	574	618	472	395
16.....	618	574	574	512	760	7,000	964	2,360	532	912	414	376
17.....	618	532	1,170	492	760	5,300	912	1,380	532	964	414	376
18.....	574	492	1,070	492	664	3,160	860	1,020	532	712	414	358
19.....	512	472	760	472	618	2,560	810	860	532	574	452	358
20.....	492	492	618	492	664	1,640	760	810	512	492	414	492
21.....	492	472	574	492	664	1,330	712	810	532	433	376	512
22.....	472	452	532	492	618	1,170	712	712	618	395	895	532
23.....	532	433	512	472	618	1,070	664	760	618	395	760	492
24.....	574	452	472	618	532	1,020	664	1,330	618	395	712	1,380
25.....	532	452	492	712	532	860	664	964	712	472	512	618
26.....	492	433	472	760	618	860	664	860	664	395	452	574
27.....	492	452	472	810	912	810	618	860	574	376	414	472
28.....	492	433	1,020	1,220	760	760	664	912	532	395	532	433
29.....	532	433	712	1,020	-----	760	760	1,800	472	512	664	414
30.....	512	452	574	860	-----	712	712	1,590	433	452	492	376
31.....	492	-----	618	1,120	-----	712	-----	1,220	-----	810	414	-----

*Monthly discharge of Yadkin River at North Wilkesboro, N. C., for the year ending September 30, 1923*

[Drainage area, 500 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	3,930	395	717	1.43	1.65
November.....	574	433	474	.948	1.06
December.....	1,170	472	598	1.20	1.38
January.....	2,920	472	763	1.53	1.76
February.....	1,170	532	830	1.66	1.73
March.....	7,000	574	1,530	3.06	3.53
April.....	1,540	618	796	1.59	1.77
May.....	2,360	574	905	1.81	2.09
June.....	1,020	433	640	1.28	1.43
July.....	964	376	543	1.09	1.26
August.....	860	376	557	1.11	1.28
September.....	1,380	358	492	.984	1.10
The year.....	7,000	358	738	1.48	20.04

## YADKIN RIVER AT DONNAHA, N. C.

**LOCATION.**—One-fourth mile upstream from railroad station at Donnaha, Forsyth County, just below site of old toll bridge which was washed away by a flood in 1916.

**DRAINAGE AREA.**—1,600 square miles.

**RECORDS AVAILABLE.**—April 11, 1913, to September 30, 1918, and October 1, 1920, to September 30, 1923, when station was discontinued.

**GAGE.**—Vertical gage in four sections on left bank, 150 feet downstream from left end of remains of old toll bridge; read by J. F. Goolsby.

**DISCHARGE MEASUREMENTS.**—Since 1920, made from a cable 400 feet upstream from gage.

**CHANNEL AND CONTROL.**—Bed composed of sand and bedrock. Current slightly obstructed by two old steel trusses, one of which is opposite and the other 300 feet below gage. Control is a rock ledge 450 feet below gage.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, about 22 feet: March 17 (discharge, about 42,500 second-feet); minimum stage, 5.4 feet for readings September 19–21, 28, and 29 (discharge, 1,160 second-feet).

1913–1923: Maximum stage recorded, 40.0 feet at 8 a. m. July 16, 1916 (determined by observer who measured from flood marks down to water surface at lower stage; discharge not determined); minimum stage, 4.65 feet at 4 p. m. September 30, 1914 (discharge, 678 second-feet).

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

**DIVERSIONS.**—None.

**REGULATION.**—None except for a few small milldams on tributary streams.

**ACCURACY.**—Stage-discharge relation practically permanent. Rating curve well defined below 2,500 second-feet and fairly well defined between 2,500 and 15,000 second-feet. Above 15,000 second-feet curve is an extension and data above that stage should be used with caution. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

The following discharge measurement was made by L. J. Hall:

October 14, 1922: Gage height, 5.76 feet; discharge, 1,710 second-feet).

*Daily discharge, in second-feet, of Yadkin River at Donna, N. C., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	1,300	1,450	1,610	3,290	2,910	2,720	2,340	2,530	2,720	1,300	4,050	1,610
2.....	1,300	1,450	1,610	3,290	2,530	2,530	2,530	2,530	2,340	1,300	2,440	1,530
3.....	1,300	1,450	1,610	2,910	2,340	2,530	2,440	2,240	2,060	1,450	1,780	1,450
4.....	1,300	1,300	1,610	2,530	2,240	2,240	2,530	2,910	2,060	1,300	1,870	1,380
5.....	1,300	1,380	1,610	2,240	2,150	2,440	3,480	2,240	1,960	1,380	2,440	1,870
6.....	1,300	1,380	1,610	1,960	2,340	5,000	2,910	2,240	1,780	1,450	2,530	2,910
7.....	1,530	1,380	1,610	1,780	2,440	5,190	2,910	2,060	1,780	1,610	1,870	3,480
8.....	1,700	1,380	1,610	1,700	2,440	3,670	3,290	2,530	1,780	1,450	1,610	1,870
9.....	5,190	1,380	1,610	1,610	2,720	3,290	3,670	2,530	1,780	1,450	1,700	1,450
10.....	4,050	1,300	1,610	1,870	2,530	3,290	4,240	2,720	1,700	1,610	8,990	1,380
11.....	3,480	1,380	1,700	2,440	2,530	2,910	4,430	2,530	1,610	1,610	3,670	1,700
12.....	2,910	1,300	1,700	2,910	2,530	2,530	3,480	2,530	1,610	2,150	2,530	1,700
13.....	2,240	1,300	1,870	2,910	2,530	2,530	3,290	3,100	1,610	2,240	2,910	1,610
14.....	1,870	1,300	2,060	2,720	2,530	2,530	2,910	3,670	1,610	1,870	2,060	1,450
15.....	1,780	1,300	2,340	2,440	2,440	2,910	2,910	4,430	1,700	1,530	2,440	1,380
16.....	1,700	1,300	2,340	2,240	2,530	17,600	2,910	5,950	1,700	1,380	2,440	1,380
17.....	1,610	1,300	2,440	2,150	2,910	24,700	3,290	5,190	1,610	1,300	1,870	1,380
18.....	1,610	1,300	2,150	2,240	2,530	9,180	2,910	3,860	1,450	1,300	1,530	1,300
19.....	1,610	1,300	2,150	2,440	2,530	7,850	3,290	2,910	1,530	1,380	1,380	1,160
20.....	1,610	1,300	1,960	2,440	2,910	7,470	3,290	2,240	1,530	1,380	1,530	1,230
21.....	1,610	1,300	1,780	2,200	2,530	8,230	3,290	2,340	1,530	1,300	1,530	1,230
22.....	1,610	1,300	1,870	1,960	2,910	7,470	2,910	2,240	1,450	1,450	1,450	1,300
23.....	1,610	1,450	1,780	1,870	3,100	7,060	2,720	2,150	1,450	1,380	3,670	1,380
24.....	1,610	1,450	1,960	2,060	3,290	7,060	2,530	2,240	1,610	1,530	3,670	2,340
25.....	1,530	1,450	1,780	2,240	2,910	6,710	2,530	2,240	1,960	1,450	2,440	1,870
26.....	1,450	1,450	2,060	2,530	3,670	6,330	2,340	1,870	1,610	1,380	1,780	1,700
27.....	1,450	1,450	2,060	2,910	3,670	5,760	2,440	1,960	1,450	1,700	1,700	1,380
28.....	1,450	1,300	2,240	2,910	2,530	4,240	2,240	1,780	1,450	1,610	5,380	1,230
29.....	1,450	1,450	2,440	2,720	-----	3,290	2,530	2,060	1,300	1,450	5,190	1,160
30.....	1,450	1,530	2,060	2,720	-----	2,910	2,910	2,060	1,300	1,450	2,530	1,300
31.....	1,450	-----	2,440	2,910	-----	2,530	-----	2,440	-----	1,870	2,150	-----

NOTE.—No gage reading Jan. 21; discharge interpolated. Discharge Mar. 16-18, Aug. 10 and 11 determined from mean daily gage height ascertained from a graph constructed on basis of two daily readings.

*Monthly discharge of Yadkin River at Donna, N. C., for the year ending September 30, 1923*

[Drainage area, 1,600 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	5,190	1,300	1,850	1.16	1.34
November.....	1,530	1,300	1,370	.856	.96
December.....	2,440	1,610	1,910	1.19	1.37
January.....	3,290	1,610	2,420	1.51	1.74
February.....	3,670	2,150	2,690	1.68	1.75
March.....	24,700	2,240	5,640	3.52	4.06
April.....	4,430	2,240	2,980	1.86	2.08
May.....	5,950	1,780	2,740	1.71	1.97
June.....	2,720	1,300	1,700	1.06	1.18
July.....	2,240	1,300	1,520	0.95	1.10
August.....	8,990	1,380	2,680	1.68	1.94
September.....	3,480	1,160	1,600	1.00	1.12
The year.....	24,700	1,160	2,430	1.52	20.61

## YADKIN RIVER NEAR SALISBURY N. C.

**LOCATION.**—At highway bridge known as Piedmont toll bridge, 1,000 feet upstream from Southern Railway bridge and 6 miles northeast of Salisbury, Rowan County.

**DRAINAGE AREA.**—3,400 square miles.

**RECORDS AVAILABLE.**—September 24, 1895, to December 31, 1909; September 1, 1911, to September 30, 1923.

**GAGE.**—Chain gage attached to highway bridge since January 1, 1906; read by J. T. Yarbrough. Datum unchanged except for possible change of about 0.1 foot due to settlement of bridge.

**DISCHARGE MEASUREMENTS.**—Made from downstream side of highway bridge.

**CHANNEL AND CONTROL.**—Channel wide; bed rather rough. Control is a rock ledge about 500 feet below bridge extending entirely across river; permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 15.03 feet at 11 a. m. March 18 (discharge, 68,600 second-feet); minimum stage, 1.85 feet at 7 a. m. July 28 (discharge, 1,480 second-feet).

1895–1923: Maximum stage recorded, 23.8 feet at 1 a. m. July 18, 1916 (discharge, 121,000 second-feet); minimum stage, 1.2 feet September 20, October 6, November 22 and 26, 1897 (discharge, 900 second-feet).

**ICE.**—Never enough to affect stage-discharge relation.

**DIVERSIONS.**—None.

**REGULATION.**—Flow during low stages may be somewhat affected by developed powers on the river and tributaries.

**ACCURACY.**—Stage-discharge relation practically permanent. Rating curve well defined between 1,280 and 20,000 second-feet and fairly well defined up to 121,000 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 Yadkin River near Salisbury, N. C., during the year ending September 30, 1923*

Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 11	W. E. and L. J. Hall	4.76	11,000
July 12	L. J. Hall	1.99	1,850
Sept. 28	W. E. and L. J. Hall	2.05	1,850

*Daily discharge, in second-feet, of Yadkin River near Salisbury, N. C., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	1,640	2,100	2,000	4,740	5,420	6,440	3,720	4,740	4,400	2,000	3,100	1,900
2-----	1,720	2,100	2,000	11,800	5,080	5,080	3,400	3,560	3,560	2,440	4,060	1,720
3-----	1,720	1,900	2,000	6,780	4,230	3,890	3,560	3,250	3,250	2,820	2,440	1,810
4-----	1,720	2,000	2,210	5,080	4,400	3,400	4,230	3,100	3,100	3,400	2,440	1,900
5-----	1,720	1,900	2,320	4,060	5,760	3,250	9,000	3,100	2,960	2,440	2,690	1,900
6-----	1,720	2,100	2,320	3,400	7,860	3,100	8,620	3,250	2,690	2,210	4,060	1,900
7-----	4,400	1,900	2,320	3,100	6,100	10,200	5,760	3,250	2,820	2,210	3,720	3,250
8-----	7,140	2,100	2,100	4,060	5,080	14,000	4,400	3,400	2,820	2,210	5,420	7,140
9-----	4,400	2,100	2,100	4,400	4,740	7,500	4,230	3,720	2,560	2,100	3,250	7,140
10-----	4,060	1,900	2,320	3,560	4,740	5,080	3,890	3,890	2,440	1,900	3,100	2,690
11-----	11,800	1,900	2,820	2,960	4,400	4,400	3,560	2,960	2,320	1,900	10,600	2,320
12-----	4,740	1,900	2,560	2,690	4,400	4,400	3,400	2,820	2,440	1,900	5,760	3,400
13-----	2,960	2,100	2,320	2,440	4,400	6,100	5,080	2,960	3,560	2,320	5,420	4,400
14-----	2,560	2,000	2,100	2,560	5,420	11,400	17,800	4,400	2,960	2,100	4,230	2,320
15-----	2,320	2,100	2,210	2,560	5,080	9,400	12,700	4,740	2,960	2,560	2,560	1,900
16-----	2,440	2,100	3,250	2,440	4,060	13,200	7,140	4,740	2,440	2,210	2,100	1,720
17-----	2,560	2,100	3,100	2,320	3,400	48,000	5,420	10,200	2,560	4,740	2,000	1,900
18-----	2,440	2,100	6,100	2,320	3,250	66,000	5,080	6,100	2,210	3,560	2,320	1,720
19-----	2,320	2,100	5,080	2,320	3,100	28,400	4,400	4,060	2,210	2,440	4,060	1,720
20-----	2,100	2,100	3,400	2,320	2,820	19,800	4,060	3,720	2,100	1,900	2,320	1,560
21-----	2,100	2,000	2,960	2,320	2,960	11,000	3,720	4,740	2,210	1,720	1,900	1,900
22-----	2,000	1,900	2,820	2,320	2,960	7,860	3,560	4,740	2,000	1,640	1,900	2,320
23-----	2,210	2,000	2,560	2,320	2,690	6,440	3,560	4,230	1,900	1,720	2,000	5,760
24-----	2,320	1,900	2,440	2,440	2,560	7,500	3,400	3,720	2,320	1,720	5,080	4,400
25-----	2,560	1,900	2,320	2,820	2,560	7,140	3,250	6,100	3,720	1,720	3,720	2,560
26-----	2,320	1,900	2,320	4,230	2,690	5,420	3,250	4,740	3,890	1,720	2,320	3,250
27-----	2,100	2,000	2,320	4,400	6,780	5,080	3,100	3,720	2,690	1,640	2,100	2,320
28-----	2,100	2,000	2,440	5,760	8,620	4,740	3,100	3,400	2,100	1,560	3,100	2,100
29-----	2,100	2,000	3,250	7,140	-----	4,400	5,080	4,740	2,000	5,420	5,760	1,900
30-----	2,100	1,900	3,100	5,760	-----	4,060	6,440	7,500	2,000	5,080	2,820	1,720
31-----	2,000	-----	2,690	5,080	-----	3,890	-----	7,500	-----	2,960	2,320	-----

*Monthly discharge of Yadkin River near Salisbury, N. C., for the year ending September 30, 1923*

[Drainage area, 3,400 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October-----	11,800	1,640	2,920	0.859	0.99
November-----	2,100	1,900	2,000	.588	.66
December-----	6,100	2,000	2,700	.794	.92
January-----	11,800	2,320	3,890	1.14	1.31
February-----	8,620	2,560	4,480	1.32	1.38
March-----	66,000	3,100	11,000	3.24	3.74
April-----	17,800	3,100	5,260	1.55	1.73
May-----	10,200	2,820	4,420	1.30	1.50
June-----	4,400	1,900	2,710	.797	.89
July-----	5,420	1,560	2,460	.724	.83
August-----	10,600	1,900	3,510	1.03	1.19
September-----	7,140	1,560	2,750	.809	.90
The year-----	66,000	1,560	4,020	1.18	16.04



## YADKIN RIVER AT HIGH ROCK, N. C.

**LOCATION.**—50 feet upstream from Brinkles Ferry at High Rock, Davidson County, 2 miles above mouth of Lick Creek, 14 miles downstream from Salisbury gaging station, and 15 miles upstream from dam of Tallassee Power Co. at Badin.

**DRAINAGE AREA.**—3,930 square miles.

**RECORDS AVAILABLE.**—January 8, 1919, to September 30, 1923.

**GAGE.**—Friez seven-day graph water-stage recorder on right bank; attended by employees of Tallassee Power Co. Zero flow at gage about elevation 592.8 feet above sea level.

**CHANNEL AND CONTROL.**—Bed of stream composed of rock and gravel. Banks about 20 feet high; probably not subject to overflow. Control is rock shoal about half a mile downstream; permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage during year ending September 30, 1923, about elevation 603.8 feet about midnight March 18 (discharge, 76,900 second-feet); minimum stage, elevation 593.9 feet September 19–21 (discharge, 1,660 second-feet).

1919–1923: Maximum stage, elevation 605.9 feet morning of July 21, 1919 (discharge, 104,000 second-feet); minimum stage, elevation 593.72 feet from midnight to 8 a. m. October 16, 1921 (discharge, 1,250 second-feet).

The flood of July, 1916, reached a stage of 612.1 feet (discharge, 184,000 second-feet).

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

**REGULATION.**—Slight diurnal regulation noticeable in low-water periods from power developments on tributaries.

**ACCURACY.**—Stage-discharge relation permanent. Rating curve well defined between 1,000 and 28,000 second-feet and extended above. Operation of water-stage recorder not satisfactory. Daily discharge ascertained by applying to the rating table mean daily gage height obtained by inspecting gage-height graph, except as noted in footnote to daily-discharge table. Records fair except that the mean monthly discharge at High Rock from March to July, 1919, and for October, 1921, are somewhat too small relative to discharge at station near Salisbury.

**COOPERATION.**—Water-stage recorder graphs and list of discharge measurements furnished by Tallassee Power Co.

*Discharge measurements of Yadkin River at High Rock, N. C., during the years ending September 30, 1919–1923*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		<i>Feet</i>	<i>Sec.-ft.</i>	1920		<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 29	Tallassee Power Co. ....	596.01	8,740	Aug. 27	Tallassee Power Co. ....	597.03	12,400
30	do. ....	596.90	11,900	Sept. 7	do. ....	594.64	3,160
30	do. ....	599.27	27,800	8	do. ....	594.68	3,890
Nov. 1	do. ....	598.37	21,700	9	do. ....	594.52	3,390
2	do. ....	596.45	10,700	Oct. 1	do. ....	597.04	13,300
4	do. ....	595.23	5,440	18	do. ....	594.33	2,720
12	do. ....	594.53	3,120	22	do. ....	594.28	2,610
14	do. ....	594.37	2,930	Nov. 28	do. ....	598.62	20,800
				Dec. 1	do. ....	599.10	24,300
1920							
Aug. 17	do. ....	595.82	7,900	1921			
19	do. ....	595.69	7,290	Sept. 8	L. J. Hall. ....	593.97	1,810
19	W. E. Hall. ....	595.69	7,270	Oct. 14	do. ....	593.94	1,490

\* Much drift running

\* Meter clogged.

*Daily discharge, in second-feet, of Yadkin River at High Rock, N. C., for the years ending September 30, 1919-1923*

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919									
1		9,050	9,890	4,800	4,800	6,590	4,480	5,600	4,170
2		8,630	15,500	4,480	6,210	6,210	4,020	5,970	4,170
3		8,630	14,000	4,170	7,790	5,830	3,710	5,130	3,410
4		8,630	11,200	4,170	7,790	5,470	3,560	4,480	2,830
5		9,050	9,050	4,480	6,990	5,470	3,410	4,170	2,690
6		8,630	13,000	4,800	6,210	5,130	3,120	4,020	2,690
7		8,210	16,000	4,800	6,210	5,130	3,410	3,860	2,690
8	7,390	7,790	10,800	4,480	6,590	5,470	3,410	3,710	2,690
9	6,990	7,790	11,200	4,480	6,990	5,130	3,560	3,560	2,690
10	6,210	7,790	21,000	4,170	7,790	5,130	3,260	3,260	2,560
11	5,830	7,790	20,400	4,170	8,210	5,130	3,120	3,260	2,560
12	5,470	7,390	10,300	5,470	8,630	4,800	3,120	3,410	2,560
13	5,470	7,390	8,630	13,900	7,790	4,800	3,260	9,050	2,690
14	5,130	10,300	7,790	7,590	7,390	4,800	3,120	6,590	2,690
15	5,130	11,600	7,390	6,750	8,210	4,800	3,260	5,470	2,560
16	5,130	8,630	6,990	5,970	8,210	4,800	4,800	5,830	2,560
17	4,800	6,590	6,990	8,440	7,790	4,800	6,210	5,470	2,420
18	6,210	5,830	7,390	8,000	6,590	4,480	6,590	5,130	2,420
19	9,470	5,470	7,390	5,970	6,590	4,480	6,990	4,480	2,420
20	7,790	5,130	7,390	5,600	6,210	4,480	58,700	4,170	2,290
21	6,210	5,130	6,590	5,230	6,210	4,480	86,000	3,860	2,420
22	5,470	6,210	6,210	5,230	6,210	4,170	44,100	3,560	2,290
23	5,830	12,600	5,470	5,230	6,210	4,170	39,600	3,560	2,420
24	10,300	14,000	5,130	5,970	6,210	4,170	26,400	3,560	2,560
25	10,300	9,470	5,130	5,970	6,590	4,170	10,300	3,260	2,560
26	15,500	13,000	4,800	4,800	6,590	4,800	7,390	3,120	2,560
27	21,500	14,000	4,800	4,480	6,990	5,130	5,830	2,690	2,420
28	16,000	9,470	5,470	4,480	6,990	5,130	5,970	2,830	2,290
29	12,100		5,830	4,480	6,990	5,470	5,230	2,830	2,290
30	10,800		5,470	4,480	6,990	5,130	5,600	3,260	2,420
31	9,890		5,130		6,590		5,230	4,020	

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	2,290	3,120	2,970	2,950	5,130	4,170	8,500	4,480	3,120	2,690	2,160	7,390
2	2,290	2,970	3,120	2,950	4,480	4,020	14,000	4,170	3,120	2,560	2,290	6,210
3	2,420	2,970	3,120	2,950	6,210	3,860	42,000	4,170	3,260	2,560	2,420	5,130
4	2,420	3,120	3,120	2,660	23,200	3,710	25,000	4,020	4,480	2,690	2,290	4,170
5	2,560	2,970	2,970	2,150	31,600	8,000	31,000	4,020	9,050	2,290	2,290	4,020
6	2,690	2,830	2,970	2,560	10,300	13,000	32,000	3,860	14,000	1,900	2,830	3,860
7	2,830	2,830	2,970	2,030	6,990	9,000	16,000	3,710	9,470	1,900	3,120	3,710
8	2,560	2,690	2,970	2,970	5,830	6,000	9,000	4,800	6,210	2,830	4,170	3,710
9	2,560	2,690	3,410	4,020	5,130	4,830	8,000	6,210	4,800	3,260	5,130	3,560
10	2,560	2,690	5,470	3,710	4,800	4,650	8,000	4,800	4,480	2,420	7,390	3,710
11	2,690	2,830	22,000	3,260	4,480	4,460	7,000	3,860	4,170	2,690	7,790	4,800
12	2,830	2,830	10,000	3,120	4,170	4,460	6,000	3,560	4,020	3,560	9,470	4,480
13	3,560	2,830	6,000	2,970	5,470	13,000	15,000	3,560	4,170	5,130	8,630	4,020
14	4,480	6,210	5,560	2,830	6,210	17,000	15,000	3,560	4,020	4,020	7,390	3,860
15	4,800	9,470	6,360	2,830	5,130	9,400	8,000	3,560	3,560	2,830	8,210	3,860
16	4,480	5,470	5,020	2,830	4,480	6,800	6,500	3,260	3,560	3,410	9,050	4,170
17	3,560	3,860	4,280	3,410	3,860	7,500	6,000	3,120	3,560	4,170	7,790	5,130
18	3,410	3,560	4,120	3,410	3,710	8,400	5,470	3,120	3,410	3,560	6,990	4,170
19	4,020	3,410	3,770	3,260	4,020	8,400	5,130	3,120	3,410	3,860	8,210	3,410
20	3,860	3,410	3,990	2,970	3,860	13,000	4,800	3,260	4,480	8,210	10,860	3,120
21	3,410	3,260	3,590	2,970	3,560	10,000	7,000	4,170	8,630	8,210	7,790	2,970
22	3,260	3,260	3,590	3,120	3,710	6,700	7,000	4,020	12,100	7,790	7,790	2,970
23	4,020	3,260	3,420	3,410	3,860	6,210	6,000	3,860	9,050	4,800	6,990	3,260
24	5,470	3,120	3,100	4,800	4,170	5,470	4,800	3,560	6,990	3,260	5,130	5,470
25	5,470	3,120	3,420	9,470	4,800	4,800	4,170	3,410	5,130	3,020	4,480	11,200
26	5,130	3,120	3,260	9,470	4,800	5,830	4,480	3,860	4,020	3,490	4,020	6,210
27	4,170	3,120	3,100	6,990	4,800	6,990	7,390	4,170	3,120	2,870	9,470	5,130
28	3,710	3,120	3,260	10,300	4,800	6,210	7,790	3,560	2,830	2,460	19,800	5,470
29	3,560	3,120	3,260	13,000	4,480	8,630	6,210	3,260	2,690	2,460	13,000	6,990
30	3,260	2,970	2,950	9,470		13,000	4,800	3,410	2,690	2,340	10,800	6,990
31	3,120		3,100	6,590		9,500		2,970		2,290	8,630	

Daily discharge, in second-feet, of Yadkin River at High Rock, N. C., for the years ending September 30, 1919-1923—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1920-21												
1-----	12,600	2,690	21,500	5,830	12,400	6,590	6,210	6,990	4,170	4,740	4,020	2,080
2-----	8,630	2,690	16,600	5,470	11,500	6,210	9,470	5,830	4,020	3,410	2,690	1,780
3-----	4,800	2,830	8,630	5,470	9,730	5,830	6,990	6,210	4,020	2,970	2,290	1,900
4-----	4,020	2,970	6,210	5,130	8,880	5,830	5,820	8,630	3,860	2,970	2,160	2,080
5-----	3,710	2,830	8,000	5,130	8,460	5,470	5,130	9,470	4,480	2,970	2,560	1,780
6-----	3,410	2,690	6,990	4,800	9,050	5,470	4,800	6,990	5,470	2,690	2,830	1,780
7-----	3,260	2,690	5,830	4,800	8,630	5,470	4,800	6,210	4,800	2,830	2,560	2,160
8-----	2,970	2,690	14,500	4,480	10,300	5,130	4,800	5,830	4,020	2,830	2,560	2,080
9-----	2,970	2,560	24,500	5,470	10,800	5,130	4,800	5,470	4,800	2,830	2,560	1,780
10-----	2,970	2,690	19,300	17,600	21,000	5,130	4,800	5,130	5,470	3,260	2,830	1,780
11-----	2,970	2,690	11,200	21,000	5,500	5,130	4,800	5,130	4,800	4,480	2,420	3,260
12-----	2,970	2,830	8,630	13,000	35,400	5,130	4,480	6,990	4,020	3,260	2,160	3,560
13-----	2,830	2,970	7,390	7,790	15,000	5,130	4,480	12,100	4,170	3,860	2,420	2,560
14-----	2,690	2,830	14,500	8,000	9,890	5,130	4,170	8,630	3,710	4,170	2,690	2,080
15-----	2,690	2,830	30,000	31,000	8,630	5,470	4,170	6,990	3,710	4,480	3,260	1,780
16-----	2,690	3,710	17,600	24,000	7,790	5,470	4,800	9,470	3,560	5,130	3,560	1,610
17-----	2,690	16,600	9,470	13,000	7,390	5,130	11,700	9,470	3,410	5,130	3,260	1,570
18-----	2,830	14,500	7,390	9,470	6,990	5,130	27,600	6,590	4,170	5,830	2,970	1,410
19-----	2,830	6,990	6,210	7,790	6,210	5,130	11,700	5,470	3,560	7,790	3,120	1,390
20-----	2,690	4,800	6,210	6,990	9,470	4,800	7,790	5,130	3,560	4,480	2,830	1,480
21-----	2,690	4,170	5,470	6,210	17,100	4,800	6,590	5,130	3,710	6,210	2,420	1,590
22-----	2,690	4,020	5,130	6,210	12,600	4,800	7,790	5,470	3,560	4,170	2,160	2,290
23-----	2,560	3,860	6,590	5,830	9,050	5,470	5,830	5,470	3,120	3,560	2,560	5,130
24-----	2,690	3,710	7,390	6,590	8,210	6,210	6,210	4,800	3,410	3,120	1,800	2,970
5-----	2,690	3,410	6,210	6,590	7,390	6,990	6,210	4,800	3,710	2,830	2,030	1,900
26-----	2,690	3,260	5,470	6,210	6,990	6,210	5,130	5,470	3,560	2,970	2,160	1,900
27-----	2,690	3,260	9,890	6,440	6,590	5,470	6,210	3,710	3,410	2,030	2,830	1,900
28-----	2,690	7,790	13,500	7,220	6,590	5,470	14,000	5,830	4,800	3,560	1,900	3,560
29-----	2,690	20,400	9,890	7,640	-----	5,130	15,000	4,800	4,170	3,120	1,780	2,690
30-----	3,120	13,500	7,390	7,220	-----	5,130	8,210	4,800	5,300	2,560	1,780	2,080
31-----	2,830	-----	6,210	9,290	-----	5,130	-----	4,480	-----	3,120	1,900	-----
1921-22												
1-----	1,660	20,400	3,860	2,560	4,170	5,130	10,300	6,210	4,800	4,800	4,480	2,970
2-----	1,640	16,600	3,410	2,420	9,470	6,990	10,800	5,470	5,830	5,480	4,170	2,690
3-----	1,660	6,990	4,480	2,420	17,100	17,600	9,050	5,130	15,500	4,800	4,020	2,420
4-----	1,900	4,480	5,130	2,290	12,100	19,800	6,990	6,590	19,300	4,480	4,170	3,260
5-----	2,420	3,560	5,130	2,290	9,890	14,500	6,210	20,400	12,100	10,300	4,800	4,800
6-----	2,030	3,260	4,170	2,560	12,600	9,470	5,830	19,800	19,300	13,500	4,170	5,830
7-----	1,590	4,480	3,710	2,690	12,100	8,210	6,590	14,500	13,500	7,390	4,480	3,410
8-----	1,430	2,830	3,260	2,560	13,000	9,470	6,990	9,050	13,000	5,130	4,170	2,420
9-----	1,590	2,830	3,120	2,560	10,300	7,790	6,990	6,990	9,470	5,830	3,560	2,290
10-----	1,590	3,710	2,970	2,690	7,790	9,050	6,210	6,210	9,470	6,590	3,260	2,290
11-----	1,640	4,020	2,830	5,130	6,210	18,800	5,830	6,210	8,630	4,800	4,170	2,420
12-----	1,540	3,260	2,830	9,050	5,830	19,800	5,470	6,990	6,990	4,170	3,710	2,560
13-----	1,480	2,970	2,690	5,830	5,470	11,700	5,130	7,790	5,830	3,860	3,560	3,120
14-----	1,500	2,830	2,690	4,020	7,390	8,210	4,800	8,630	5,470	3,860	3,410	3,120
15-----	1,430	2,690	2,560	3,560	10,800	7,390	4,480	7,790	5,470	6,210	3,560	2,420
16-----	1,300	2,690	2,420	3,260	23,800	14,500	4,170	5,830	5,130	9,470	4,020	2,420
17-----	1,390	2,830	2,290	3,120	23,200	14,000	4,170	7,790	4,800	10,300	5,130	2,420
18-----	1,540	2,830	2,560	3,260	11,700	8,630	4,170	14,500	4,170	7,390	5,470	2,420
19-----	1,450	2,690	2,970	3,260	6,990	6,590	4,480	22,700	4,480	9,890	5,830	2,420
20-----	1,390	4,170	3,710	3,410	5,830	9,470	9,890	28,400	8,210	16,600	5,130	2,160
21-----	1,390	4,480	3,560	5,830	5,130	11,700	8,630	21,000	7,790	8,210	5,130	2,160
22-----	1,500	3,860	3,120	9,050	4,480	8,210	5,830	12,100	6,590	6,590	3,860	2,160
23-----	1,480	3,260	2,830	8,630	4,170	6,210	6,990	8,630	6,210	6,590	3,410	2,290
24-----	1,410	4,480	2,690	6,210	4,170	5,470	5,130	7,390	4,480	5,470	3,120	2,290
25-----	1,540	2,970	3,120	4,800	4,170	5,130	8,210	6,590	3,860	4,800	3,260	2,290
26-----	1,520	2,690	4,170	4,170	4,170	5,130	7,790	5,830	3,860	4,480	3,120	2,420
27-----	1,520	2,690	3,710	3,710	4,800	5,130	4,170	5,830	3,560	5,830	3,260	2,290
28-----	1,520	3,120	3,120	3,120	5,130	5,830	4,800	5,830	3,560	5,470	4,480	2,290
29-----	1,500	3,710	2,970	4,170	-----	9,470	6,990	5,470	3,860	4,800	4,020	2,290
30-----	1,500	4,480	2,830	4,800	-----	10,800	7,390	5,130	4,480	5,130	3,260	2,160
31-----	5,130	-----	2,690	4,170	-----	9,470	-----	4,800	-----	4,480	2,830	-----

*Daily discharge, in second-feet, of Yadkin River at High Rock, N. C., for the years ending September 30, 1919-1923—Continued*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922-23												
1-----	1,900	2,160	2,420	4,170	7,790	7,790	4,800	6,990	6,210	2,160	3,560	2,290
2-----	1,900	2,160	2,290	6,990	7,390	5,830	4,170	4,800	5,130	2,160	4,020	2,030
3-----	1,900	2,160	2,290	8,630	6,210	5,130	4,170	4,480	3,860	2,160	2,830	1,900
4-----	1,900	2,160	2,420	7,790	5,470	4,800	6,210	4,020	3,410	2,560	2,690	1,900
5-----	1,900	2,160	2,420	6,210	6,210	4,170	10,800	3,860	2,970	2,690	3,410	2,160
6-----	1,780	2,160	2,690	6,210	8,630	4,020	10,300	4,020	2,830	2,690	4,170	2,160
7-----	1,900	2,160	2,690	4,020	8,630	5,830	6,990	4,170	2,690	2,690	4,170	3,860
8-----	4,800	2,160	2,690	4,170	7,790	20,400	5,470	4,020	2,690	2,560	5,130	6,210
9-----	6,590	2,160	2,560	5,470	6,210	19,300	5,470	4,480	3,120	2,560	4,800	9,470
10-----	5,830	2,160	2,690	5,130	6,210	7,390	5,130	4,800	2,970	2,420	4,480	6,210
11-----	8,630	2,290	2,970	4,170	6,210	6,470	4,800	4,020	2,690	2,290	9,470	3,860
12-----	8,630	2,030	3,120	3,560	5,470	5,470	4,480	3,560	2,560	2,160	6,590	4,800
13-----	5,130	2,030	2,970	3,560	5,470	6,590	6,590	3,560	3,120	2,690	5,130	5,470
14-----	3,710	2,160	2,830	2,970	6,210	10,300	18,200	5,470	3,560	2,160	4,480	4,800
15-----	1,900	2,160	2,690	2,830	6,210	10,800	16,000	5,830	3,560	2,420	2,830	2,560
16-----	3,120	2,160	2,970	2,830	5,830	9,470	9,470	6,990	3,260	2,420	2,290	2,030
17-----	3,560	2,160	3,560	2,690	5,130	40,700	6,990	11,700	2,830	3,120	2,030	1,900
18-----	3,560	2,290	4,480	2,690	4,480	65,200	6,210	9,050	2,560	4,170	2,420	1,780
19-----	3,260	2,290	5,830	2,560	4,020	39,600	5,830	5,830	2,420	3,170	5,130	1,660
20-----	2,830	2,290	5,470	2,560	3,710	19,300	5,470	4,170	2,160	2,690	3,710	1,660
21-----	2,420	2,420	4,800	2,690	3,560	12,600	4,800	6,990	2,160	2,290	2,560	1,660
22-----	2,160	2,290	4,170	2,690	3,410	8,630	4,480	6,590	2,030	1,900	2,420	1,900
23-----	2,160	2,290	4,020	2,690	3,410	12,600	4,480	5,470	2,160	1,660	2,290	4,170
24-----	2,420	2,160	3,560	2,970	3,120	7,790	4,170	4,480	2,160	1,660	3,710	5,830
25-----	2,690	2,290	3,260	3,560	2,970	8,630	4,020	5,130	2,830	1,660	5,130	5,130
26-----	2,690	2,420	2,970	4,170	3,260	6,990	4,020	5,470	3,260	1,660	3,260	4,480
27-----	2,560	2,290	2,970	5,470	6,210	6,210	3,860	5,130	3,410	1,480	2,420	4,020
28-----	2,420	2,420	3,120	6,210	9,890	6,210	4,020	4,170	3,120	1,660	2,290	3,560
29-----	2,290	2,420	3,560	7,390	-----	5,470	6,210	4,170	2,690	3,560	5,470	2,420
30-----	2,290	2,420	3,860	7,790	-----	5,130	9,470	5,470	2,290	6,990	4,020	2,030
31-----	2,160	-----	3,860	7,790	-----	4,800	-----	7,790	-----	4,480	2,690	-----

NOTE.—Discharge for following periods when recorder did not operate properly, estimated by comparison with records for station at Salisbury: Feb. 15, Apr. 13-25, July 20-24, July 28 to Aug. 2, Nov. 14-16, and Dec. 10-31, 1919; Jan. 1-5, Feb. 4, 5, Mar. 5-22, 30, Apr. 1-17, 21-23, May 9, June 21-23, and July 25-30, 1920; Jan. 14-17, 27-31, Feb. 1-5, Mar. 17, 18, 27-29, June 30, July 1, Nov. 1, and 2, 1921; Jan. 12, Feb. 2-4, Apr. 20, May 5-7, and 19-21, 1922; Feb. 27, 28, Mar. 1, 2, 7-10, 13-24, and May 17-19, 1923.

*Monthly discharge of Yadkin River at High Rock, N. C., for the years ending September 30, 1919-1923*

[Drainage area, 3,930 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1919					
January 8-31-----	21,500	4,800	8,540	2.17	1.94
February-----	14,000	5,130	8,720	2.22	2.31
March-----	21,000	4,800	9,110	2.32	2.68
April-----	13,900	4,170	5,670	1.42	1.58
May-----	8,630	4,800	6,950	1.77	2.04
June-----	6,590	4,170	4,990	1.27	1.42
July-----	86,000	3,120	12,000	3.05	3.52
August-----	9,050	2,690	4,300	1.09	1.26
September-----	4,170	2,290	2,670	.679	.76

Monthly discharge of the Yadkin River at High Rock, N. C., for the years ending September 30, 1919-1923—Continued

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per mile square	
1919-20					
October.....	5,470	2,290	3,470	0.883	1.02
November.....	9,470	2,690	3,470	.883	.99
December.....	22,000	2,950	4,510	1.15	1.33
January.....	13,000	2,030	4,500	1.15	1.33
February.....	31,600	3,560	6,480	1.65	1.78
March.....	17,000	3,710	7,650	1.95	2.25
April.....	42,000	4,170	11,100	2.82	3.15
May.....	6,210	2,970	3,820	.972	1.12
June.....	14,000	2,690	5,250	1.34	1.50
July.....	8,210	1,900	3,530	.898	1.04
August.....	19,800	2,160	6,980	1.78	2.05
September.....	11,200	2,970	4,770	1.21	1.35
The year.....	42,000	1,900	5,450	1.39	18.91
1920-21					
October.....	12,600	2,560	3,460	.880	1.01
November.....	20,400	2,560	5,180	1.32	1.47
December.....	30,000	5,130	10,700	2.72	3.14
January.....	31,000	4,480	9,090	2.31	2.66
February.....	52,500	6,210	12,300	3.13	3.26
March.....	6,990	4,800	5,440	1.38	1.59
April.....	27,600	4,170	7,480	1.90	2.12
May.....	12,100	4,480	6,450	1.64	1.89
June.....	5,470	3,120	4,060	1.03	1.15
July.....	7,790	2,550	3,830	.975	1.12
August.....	4,020	1,780	2,520	.641	.74
September.....	5,130	1,390	2,220	.565	.63
The year.....	52,500	1,390	6,020	1.53	20.78
1921-22					
October.....	5,130	1,300	1,680	.427	.49
November.....	20,400	2,690	4,530	1.15	1.28
December.....	5,130	2,290	3,280	.835	.96
January.....	9,050	2,290	4,120	1.05	1.21
February.....	23,800	4,170	9,000	2.29	2.38
March.....	19,800	5,130	9,990	2.54	2.93
April.....	10,800	4,170	6,480	1.65	1.84
May.....	28,400	4,800	9,860	2.51	2.89
June.....	19,300	3,560	7,660	1.95	2.18
July.....	16,600	3,860	6,670	1.70	1.96
August.....	5,830	2,830	4,040	1.03	1.19
September.....	5,830	2,160	2,680	.682	.76
The year.....	28,400	1,300	5,810	1.48	20.07
1922-23					
October.....	8,630	1,780	3,260	.830	.96
November.....	2,420	2,030	2,230	.567	.63
December.....	5,830	2,290	3,300	.840	.97
January.....	8,630	2,560	4,590	1.17	1.35
February.....	9,890	2,970	5,680	1.45	1.51
March.....	65,200	4,020	12,300	3.13	3.61
April.....	18,200	3,860	6,570	1.67	1.86
May.....	11,700	3,560	5,350	1.37	1.58
June.....	6,210	2,030	3,020	.768	.86
July.....	6,990	1,430	2,610	.664	.77
August.....	9,470	2,030	3,880	.987	1.14
September.....	9,470	1,660	3,460	.880	.98
The year.....	65,200	1,660	4,700	1.20	16.22

## FISHER RIVER NEAR DOBSON, N. C.

LOCATION.—At Turkey Ford steel highway bridge on Dobson-Ararat highway, 2 miles east of Dobson, Surry County.

DRAINAGE AREA.—109 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 1, 1920, to September 30, 1923.

**GAGE.**—Chain gage on upstream side of bridge; read by Miss Ada Kidd. Prior to August 30, 1921, gage was an enameled staff fastened to tree on left bank about 20 feet above bridge.

**DISCHARGE MEASUREMENTS.**—Made from lower side of bridge.

**CHANNEL AND CONTROL.**—Channel straight above and below gage; bed rather rough. Banks subject to overflow above gage height 10 feet. Control is shoals about 50 feet below gage; practically permanent.

**EXTREMES OF DISCHARGE.**—1920-1923: Maximum stage recorded, 10.1 feet at 5 p. m. March 16, 1923 (discharge, 6,700 second-feet); minimum stage, 0.34 foot at 7 a. m. and 5 p. m. July 27, 1923 (discharge, 42 second-feet).

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

**REGULATION.**—Probably none.

**ACCURACY.**—Stage-discharge relation probably permanent. Rating curve well defined between 54 and 300 second-feet and extended above by comparison with records for Ararat River near Pilot Mountain. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records probably good.

*Discharge measurements of Fisher River near Dobson, N. C., during the year ending September 30, 1923*

[Made by L. J. Hall]

Date	Gage height	Discharge
Oct. 13.....	Feet 0.64	Sec.-ft. 121
July 14.....	.43	81.1

*Daily discharge, in second-feet, of Fisher River near Dobson, N. C., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	91	107	104	940	147	135	154	138	128	182	164	76
2.....	91	104	107	239	154	125	158	138	122	223	132	71
3.....	88	104	119	182	200	119	164	132	122	135	76	71
4.....	88	107	125	164	650	122	178	132	110	110	168	76
5.....	82	107	135	141	208	116	208	135	110	101	161	110
6.....	88	107	107	135	182	122	193	132	132	91	110	158
7.....	435	101	107	128	175	540	161	182	135	88	412	364
8.....	132	107	107	144	175	204	189	204	104	98	171	264
9.....	138	107	107	128	175	161	158	161	91	85	113	122
10.....	568	101	144	116	175	154	151	128	88	79	289	144
11.....	178	104	113	116	182	175	151	122	98	74	281	144
12.....	144	101	113	116	193	119	151	125	135	74	208	110
13.....	132	104	101	107	251	485	255	110	128	74	171	94
14.....	125	107	94	110	211	268	215	122	122	60	125	82
15.....	125	107	113	110	204	196	189	122	110	65	110	88
16.....	138	119	125	104	193	4,100	182	268	98	60	94	101
17.....	125	107	320	104	168	1,440	168	154	88	71	164	94
18.....	119	107	171	98	204	435	161	135	91	55	119	88
19.....	107	107	113	104	154	622	151	128	94	55	94	88
20.....	110	107	119	104	135	320	144	125	98	47	88	82
21.....	113	101	119	110	128	281	144	122	91	47	82	940
22.....	107	101	110	110	128	255	144	113	79	49	88	595
23.....	122	101	104	151	122	247	138	144	91	51	412	208
24.....	125	101	98	168	116	231	138	388	135	53	158	193
25.....	122	101	91	161	119	193	138	171	161	65	113	154
26.....	113	98	98	175	141	200	135	135	74	47	94	144
27.....	101	101	98	227	193	193	138	110	76	42	88	154
28.....	104	98	235	341	151	185	138	110	76	49	144	132
29.....	101	94	175	204	-----	171	208	264	68	51	113	119
30.....	101	101	135	164	-----	164	158	210	62	128	88	116
31.....	101	-----	122	171	-----	185	-----	144	-----	116	79	-----

Monthly discharge of Fisher River near Dobson, N. C., for the year ending September 30, 1923

[Drainage area, 109 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	568	82	139	1.28	1.48
November.....	119	94	104	.954	1.06
December.....	320	91	127	1.17	1.35
January.....	940	98	173	1.59	1.83
February.....	650	116	187	1.72	1.79
March.....	4,100	116	396	3.63	4.18
April.....	255	135	165	1.51	1.68
May.....	388	110	156	1.43	1.65
June.....	161	62	104	.954	1.06
July.....	223	42	81.5	.748	.86
August.....	412	76	152	1.39	1.60
September.....	940	71	173	1.59	1.77
The year.....	4,100	42	163	1.50	20.31

### SANTÉE RIVER BASIN

#### SANTÉE RIVER AT FERGUSON, S. C.

**LOCATION.**—At Ferguson boat landing, three-fourths mile from railroad station, in Orangeburg County, 4 miles downstream from mouth of Eutaw Creek.

**DRAINAGE AREA.**—14,800 square miles (from United States Weather Bureau records and checked on map compiled by United States Geological Survey, scale 1 to 500,000).

**RECORDS AVAILABLE.**—December 1, 1907, to September 30, 1923.

**GAGE.**—Gurley seven-day water-stage recorder on right bank installed November 23, 1921, just below the staff gage at boat landing which was used prior to that date. Gage tended by H. C. Savage.

**DISCHARGE MEASUREMENTS.**—Made from downstream side of steel railroad bridge 1 mile above gage. This bridge was originally used by a lumber company and had long trestle approaches. The trestles were destroyed by flood of July, 1916, and have never been rebuilt. The steel bridge, which consists of four deck-girder spans on concrete piers, spans only the main channel. Above 12 or 13 foot stages the stream spreads over left bank, which is a flat swamp, for about  $3\frac{1}{2}$  miles, and over right bank, which is also flat and swampy, for about half a mile.

**CHANNEL AND CONTROL.**—The channel up to 12 feet is deep, narrow, and probably permanent. Left bank above 12-foot stage is a flat swamp  $3\frac{1}{2}$  miles wide. Right bank is a flat swamp about half a mile wide and somewhat lower than left bank. Control is not definitely known, as there are no shoals or riffles below Ferguson. However, much of the river banks and bottom are limestone and marl and it is believed that control is fairly permanent. Current is good at all stages and slope of surface is very even for 50 miles downstream.

**EXTREMES OF DISCHARGE.**—Maximum stage during year, 15.2 feet at noon March 23 (discharge, 89,000 second-feet); minimum stage, 2.31 feet at 4 a. m. October 4 (discharge, 4,240 second-feet).

1907–1923: Maximum stage recorded, 24.5 feet on July 22, 1916 (estimated discharge, 368,000 second-feet); minimum stage, 0.9 foot October 23, 1918 (discharge not estimated). Minimum stage probably caused by regulation of storage reservoirs above.

**ICE.**—None.

**DIVERSIONS.**—None.

**REGULATION.**—Two large hydroelectric plants have fairly large reservoirs on Broad River; there are a number of reservoirs on Wateree River, two of which are very large; and there is at least one reservoir on Saluda River. Apparently the Parr Shoals reservoir on Broad River and Camden reservoir on Wateree River have the most effect. As the two are about equidistant from Ferguson the storage effect probably reaches the gage about the same time. There are no daily fluctuations, probably because the nearest reservoir is more than a hundred miles upstream. However, there is a very distinct weekly fluctuation during average and low water periods caused apparently by shutdown of plants on Saturday afternoons and Sundays. On Mondays the stage at Ferguson begins to drop and continues with accelerated rapidity until some time during Tuesday. After reaching the lowest point the stage rises rapidly and is back to an even stage by Wednesday night. During the rest of the week there is comparatively little fluctuation. This cycle occurs so often as to be quite noticeable on the water-stage recorder graphs.

**ACCURACY.**—Stage-discharge relation practically permanent during year. Rating curve well defined between 5,000 and 16,000 second-feet. Above 16,000 second-feet rating is based on an extended curve which is fairly accurate up to 20,000 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage-height graph. Records good.

*Discharge measurements of Santee River at Ferguson, S. C., during the year ending September 30, 1923*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Dec. 9	W. E. and L. J. Hall...	8.87	13,000	Sept. 18	L. J. Hall.....	4.87	6,710
12	do.....	5.97	8,390	18	do.....	4.54	6,310
Sept. 17	L. J. Hall.....	7.14	9,580	19	W. E. and L. J. Hall...	5.55	8,150

*Daily discharge, in second-feet, of Santee River at Ferguson, S. C., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	9,490	7,790	9,640	19,500	21,300	19,500	27,200	18,600	25,000	14,200	14,400	19,800
2.....	7,920	9,640	9,950	17,600	20,900	21,300	26,000	18,900	26,000	12,300	15,700	20,900
3.....	5,280	10,900	9,950	18,900	20,500	23,400	25,000	19,200	27,200	9,190	15,700	22,200
4.....	4,980	11,100	9,190	20,500	20,500	30,500	22,800	19,500	30,500	9,040	15,500	22,800
5.....	7,140	11,300	6,290	22,200	19,800	41,000	22,200	19,500	35,000	14,000	15,900	22,800
6.....	8,190	10,100	6,650	23,400	18,400	41,000	22,200	19,500	32,500	15,900	14,400	21,700
7.....	8,470	7,140	9,490	25,000	19,200	35,000	23,400	19,500	30,500	14,600	10,900	20,500
8.....	9,190	7,400	11,600	26,000	20,500	28,800	25,000	19,800	27,200	12,900	12,200	19,200
9.....	10,300	9,950	13,100	24,100	22,200	26,000	27,200	20,100	25,000	10,300	13,100	17,600
10.....	12,700	11,100	13,300	22,200	26,000	26,000	30,500	20,900	24,100	9,040	13,300	14,400
11.....	15,700	11,600	12,500	21,300	35,000	26,000	28,800	21,300	22,800	10,300	14,000	10,300
12.....	17,400	12,000	9,490	20,900	41,000	27,200	27,200	21,700	20,400	11,400	14,600	10,900
13.....	18,100	9,950	9,440	20,500	38,000	26,000	25,000	21,700	19,200	11,300	14,000	13,100
14.....	18,100	6,650	11,300	20,500	35,000	25,000	25,000	20,500	18,900	12,000	10,600	13,600
15.....	17,400	7,270	12,700	20,100	30,500	24,100	24,100	17,400	18,900	11,800	10,900	13,500
16.....	15,900	9,950	13,600	18,600	30,500	25,000	24,100	16,500	18,900	10,800	13,300	12,700
17.....	14,000	10,900	14,000	16,700	30,500	28,800	25,000	17,200	18,600	8,750	14,400	10,600
18.....	17,600	11,600	13,600	17,000	27,200	41,000	26,000	18,100	17,400	9,490	15,000	7,140
19.....	19,800	11,600	12,200	17,200	25,000	47,000	26,000	19,200	13,600	11,400	15,300	7,660
20.....	21,300	10,100	14,200	17,200	23,400	53,000	27,200	20,100	12,200	13,500	13,500	10,600
21.....	23,400	6,890	17,800	16,700	21,700	62,000	26,000	20,900	12,500	14,400	12,300	11,600
22.....	25,000	7,920	19,800	14,600	20,900	80,000	26,000	20,500	12,700	14,200	15,900	11,600
23.....	23,400	10,900	21,300	10,800	20,900	89,000	25,000	19,800	12,500	12,000	17,200	12,500
24.....	19,200	11,800	23,400	11,300	20,900	83,000	23,400	19,500	12,300	8,470	17,400	13,800
25.....	16,700	12,000	27,200	15,700	20,500	65,000	21,700	19,800	11,100	7,920	17,200	12,300
26.....	15,900	11,800	28,800	18,900	19,200	53,000	21,300	20,500	8,330	10,300	17,600	12,000
27.....	14,800	10,300	25,000	19,800	16,500	44,000	20,900	21,700	10,300	12,300	17,400	12,700
28.....	13,800	6,890	21,700	20,900	16,700	38,000	20,500	22,800	14,400	12,300	14,400	13,100
29.....	13,300	6,290	20,500	22,200	-----	35,000	20,500	25,000	15,500	12,200	13,600	12,900
30.....	11,600	8,470	19,800	22,800	-----	32,500	19,500	25,000	15,000	10,800	16,100	12,300
31.....	8,190	-----	20,100	22,200	-----	30,500	-----	25,000	-----	12,300	18,600	-----



*Monthly discharge of Santee River at Ferguson, S. C., for the year ending September 30, 1923*

[Drainage area, 14,800 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	25,000	4,980	14,300	0.966	1.11
November.....	12,000	6,290	9,710	.656	.73
December.....	28,800	6,230	15,100	1.02	1.18
January.....	26,000	10,800	19,500	1.32	1.52
February.....	41,000	16,500	24,400	1.65	1.72
March.....	89,000	19,500	39,600	2.68	3.09
April.....	30,500	19,500	24,500	1.66	1.85
May.....	25,000	16,500	20,300	1.37	1.53
June.....	35,000	8,330	19,600	1.32	1.47
July.....	15,900	7,920	11,600	.784	.90
August.....	18,600	10,600	14,700	.993	1.14
September.....	22,800	7,140	14,600	.986	1.10
The year.....	89,000	4,980	19,000	1.28	17.39

**LINVILLE RIVER AT BRANCH, N. C.**

**LOCATION.**—At wooden highway bridge 800 feet from Branch post office, Burke County, a quarter of a mile upstream from Lake James,  $1\frac{1}{4}$  miles upstream from Fonta Flora, 2 miles below mouth of Linville Gorge and 12 miles from Nebo, N. C.

**DRAINAGE AREA.**—65 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—June 7, 1922, to September 30, 1923.

**GAGE.**—Vertical staff on downstream end of first bridge pier from right bank; read by J. M. Wall.

**DISCHARGE MEASUREMENTS.**—Made from downstream side of bridge.

**CHANNEL AND CONTROL.**—Channel wide and shallow, slightly curved above bridge and straight for 200 feet below; bed composed of gravel and boulders. Right bank wooded, not subject to overflow; left bank partly wooded and subject to overflow in extreme floods for 500 feet back from stream. Control is a boulder and gravel shoal 200 feet downstream from gage; probably permanent.

**EXTREMES OF DISCHARGE.**—1922–23: Maximum stage recorded, 5.4 feet at noon May 29, 1923 (discharge, about 2,830 second-feet); minimum stage, 1.54 feet at 5 p. m. October 6, 1922 (discharge, 29 second-feet).

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

**ACCURACY.**—Stage-discharge relation permanent. Rating curve is well defined up to 500 second-feet and extended above. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

*Discharge measurements of Linville River at Branch, N. C., during the year ending September 30, 1923*

[Made by L. J. and W. E. Hall]

Date	Gage height	Dis- charge
	<i>Feet</i>	<i>Sec.-ft.</i>
July 3.....	2.09	180
4.....	2.23	220
Sept. 7.....	1.75	73.0

*Daily discharge, in second-feet, of Linville River at Branch, N. C., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	39	47	48	600	311	119	113	97	380	67	86	63
2.....	39	45	45	333	272	107	104	81	311	311	110	63
3.....	37	47	58	231	231	102	107	81	264	200	113	70
4.....	36	47	58	185	223	104	119	81	227	247	97	70
5.....	33	47	72	157	255	99	150	177	223	163	134	125
6.....	31	45	67	134	219	102	140	380	200	154	110	89
7.....	54	47	56	125	196	333	122	231	170	144	131	97
8.....	97	43	48	144	188	215	113	200	163	134	94	154
9.....	333	47	47	131	188	174	110	181	144	150	84	104
10.....	430	43	67	113	177	154	107	157	134	119	104	102
11.....	163	41	67	102	207	147	102	140	131	102	97	86
12.....	113	43	65	119	200	157	97	134	137	94	157	113
13.....	94	39	58	97	255	207	170	128	125	104	110	86
14.....	91	37	50	86	289	239	281	125	119	131	99	70
15.....	76	39	76	91	223	185	207	137	104	140	86	63
16.....	76	47	177	97	188	540	177	935	102	177	79	63
17.....	74	47	200	65	177	825	150	430	97	380	86	60
18.....	72	45	264	72	170	430	157	311	97	251	72	58
19.....	60	43	163	94	163	430	140	247	89	177	76	54
20.....	58	43	125	81	170	380	122	227	86	147	72	56
21.....	58	41	107	81	144	281	122	264	81	125	67	97
22.....	58	39	97	81	134	235	113	203	81	113	63	97
23.....	58	39	84	81	107	223	107	251	89	107	76	150
24.....	76	37	81	81	81	215	119	405	119	97	163	264
25.....	72	37	79	113	122	188	102	311	192	91	86	119
26.....	60	36	76	110	107	157	97	260	119	84	72	91
27.....	54	36	72	125	150	157	94	223	86	81	65	81
28.....	50	41	157	260	137	140	91	207	84	86	125	67
29.....	48	36	137	285	-----	134	113	1,620	79	84	110	70
30.....	47	47	104	207	-----	125	110	860	72	97	91	67
31.....	47	-----	97	333	-----	125	-----	540	-----	91	74	-----

NOTE.—Discharge May 29 determined from mean daily gage height ascertained from graph constructed on basis of three daily readings.

*Monthly discharge of Linville River at Branch, N. C., for the year ending September 30, 1923*

[Drainage area, 65 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	430	31	85.0	1.31	1.51
November.....	47	36	42.4	0.852	.73
December.....	264	45	93.6	1.44	1.66
January.....	600	65	155.6	2.38	2.74
February.....	311	81	189	2.91	3.03
March.....	825	99	227	3.49	4.02
April.....	281	91	129	1.98	2.21
May.....	1,620	81	310	4.77	5.50
June.....	380	72	144	2.22	2.48
July.....	380	67	143	2.20	2.54
August.....	163	63	96.4	1.48	1.71
September.....	264	54	91.6	1.41	1.57
The year.....	1,620	31	142	2.18	29.70

### SAVANNAH RIVER BASIN

CHATTOOGA RIVER NEAR TALLULAH FALLS, GA.

LOCATION.—300 feet above mouth of Camp Creek, 5½ miles above junction with Tallulah River, and 8 miles east of Tallulah Falls, Rabun County.

DRAINAGE AREA.—256 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1917, to September 30, 1923, when station was discontinued.

GAGE.—Gurley seven-day water-stage recorder installed on right bank August 17, 1917. On the same date a new vertical staff gage was installed about 30 feet upstream, to which all recording gage records are referred. Prior to August 17, 1917, readings were taken from an old vertical staff gage on same site as new staff gage and set at same datum. Gage read by employees of Georgia Railway & Power Co.

DISCHARGE MEASUREMENTS.—Made from cable at gage location.

CHANNEL AND CONTROL.—Section under cable may shift somewhat. Control is a solid rock shoal about 100 feet below gage; permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, 7.43 feet at 1.45 p. m. December 17 (discharge, 6,610 second-feet); minimum stage, 0.75 foot November 4 to December 2, December 6, and 7 (discharge, 302 second-feet).

1917–1923: Maximum stage recorded, 12.2 feet March 24, 1917 (discharge, 13,900 second-feet); minimum stage, 0.6 foot October 16–18, 1918 (discharge, 255 second-feet).

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

ACCURACY.—Stage-discharge relation probably permanent, but no measurements have been made since 1919. Rating curve previously developed well defined between 280 and 2,500 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage-height graph. Records good.

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

*Daily discharge, in second-feet, of Chattooga River near Tallulah Falls, Ga., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	372	338	302	1,710	705	810	810	865	2,150	755	865	582
2.....	372	320	302	1,170	705	755	755	865	1,710	755	705	538
3.....	372	320	372	920	655	705	810	865	1,550	865	605	560
4.....	372	302	450	810	705	705	980	980	1,390	810	582	655
5.....	372	302	355	755	1,240	705	980	1,100	1,550	810	538	582
6.....	430	302	302	655	1,240	705	865	1,100	1,630	810	560	515
7.....	630	302	302	655	920	920	865	980	1,710	755	605	515
8.....	560	302	355	655	865	810	865	980	1,390	755	655	810
9.....	515	302	560	655	810	755	810	980	1,240	810	630	582
10.....	515	302	515	582	755	705	755	920	1,170	755	605	538
11.....	410	302	390	560	705	705	755	920	1,170	705	560	538
12.....	390	302	355	560	705	515	755	755	1,310	705	538	515
13.....	390	302	355	538	1,240	1,310	1,390	810	1,170	655	560	492
14.....	372	302	320	515	1,170	1,170	2,550	755	1,100	810	515	470
15.....	372	302	560	630	980	920	1,390	865	1,040	705	492	390
16.....	372	302	655	582	865	1,790	1,170	1,710	980	705	492	390
17.....	372	302	3,400	538	810	2,450	1,100	1,170	920	1,040	492	390
18.....	372	302	1,390	538	810	1,550	980	1,040	920	810	492	390
19.....	372	302	865	515	755	1,550	980	920	920	655	582	390
20.....	372	302	705	515	755	1,310	920	1,100	865	630	560	582
21.....	372	302	605	538	755	1,170	920	1,310	920	605	492	1,630
22.....	372	302	560	515	705	1,100	920	1,100	920	605	470	705
23.....	372	302	538	582	705	1,040	865	1,880	865	582	492	605
24.....	390	302	515	1,170	655	1,040	865	1,970	980	582	515	582
25.....	372	302	492	1,170	655	980	865	1,390	1,040	560	470	655
26.....	372	302	470	980	705	920	865	1,390	865	560	450	655
27.....	372	302	515	865	1,040	865	865	1,390	865	538	450	582
28.....	372	302	1,170	810	865	865	980	1,880	980	655	1,040	515
29.....	372	302	810	755	-----	865	1,040	2,650	920	920	1,040	450
30.....	365	302	655	705	-----	810	980	3,180	810	655	655	490
31.....	338	-----	630	705	-----	810	-----	2,550	-----	630	582	-----

*Monthly discharge of Chattooga River near Tallulah Falls, Ga., for the year ending September 30, 1923*

[Drainage area, 256 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	630	338	399	1.56	1.80
November.....	338	302	304	1.19	1.33
December.....	3,400	302	638	2.49	2.87
January.....	1,710	515	737	2.88	3.32
February.....	1,240	655	839	3.23	3.42
March.....	2,450	515	1,010	3.95	4.55
April.....	2,550	755	988	3.86	4.31
May.....	3,180	755	1,300	5.08	5.86
June.....	2,150	810	1,170	4.57	5.10
July.....	2,040	538	716	2.80	3.23
August.....	1,040	450	590	2.30	2.65
September.....	1,630	390	574	2.24	2.50
The year.....	3,400	302	772	3.02	40.94

### ALTAMAHA RIVER BASIN

#### OCONEE RIVER NEAR GREENSBORO, GA.

**LOCATION.**—At highway bridge connecting Morgan and Greene Counties, Ga.,  $1\frac{1}{2}$  miles downstream from Town Creek, 4 miles upstream from mouth of Apalachee River, and 5 miles west of Greensboro, Greene County.

**DRAINAGE AREA.**—1,100 square miles.

**RECORDS AVAILABLE.**—July 25, 1903, to September 30, 1923, when station was discontinued.

**GAGE.**—Chain gage attached to bridge; read by N. T. Oakes.

**DISCHARGE MEASUREMENTS.**—Made from downstream side of bridge.

**CHANNEL AND CONTROL.**—Bed composed chiefly of sand; slightly shifting. Control practically permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 20.9 feet at 4 p. m. May 30 (discharge, 26,300 second-feet); minimum stage, 1.0 foot at 8 a. m. October 2 (discharge, 326 second-feet).

1903-1923: Maximum stage recorded, 35.4 feet August 26, 1908 (discharge, about 70,000 second-feet); minimum stage, 0.2 foot in forenoon of July 15, 1918 (discharge, 141 second-feet).

**ICE.**—None.

**DIVERSIONS.**—None.

**REGULATION.**—Considerable diurnal fluctuation caused by operation of power plants.

**ACCURACY.**—Stage-discharge relation practically permanent. No measurements of discharge have been made since 1919, but rating curve developed previously is considered applicable and is well defined between 250 and 6,000 second-feet; extended above 6,000 second-feet on basis of area and mean velocity curves and a discharge of 53,600 second-feet for crest of flood on December 11, 1919, as computed, using concrete dam at Athens as weir and correcting for difference in drainage area. Gage read to tenths twice daily. No corrections for elongation of chain have been made since 1919 but each year a new chain has been installed. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

*Daily discharge, in second-feet, of Oconee River near Greensboro, Ga., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	352	614	614	3,050	1,190	8,320	1,500	4,090	16,000	1,190	1,320	1,090
2-----	378	614	614	3,710	1,150	2,550	1,360	2,020	8,820	1,150	1,320	890
3-----	432	680	550	2,330	1,110	1,920	1,320	1,540	3,230	1,460	1,640	2,020
4-----	404	680	614	1,540	1,190	1,680	2,770	4,800	2,440	1,110	925	1,780
5-----	378	550	680	1,280	2,120	1,640	6,400	13,600	2,330	1,070	820	2,660
6-----	404	614	647	1,110	3,590	1,460	4,740	24,800	2,020	960	820	1,920
7-----	995	680	614	1,110	2,720	3,050	1,720	19,700	2,120	960	2,120	1,280
8-----	1,980	820	750	1,070	2,020	2,660	1,680	11,600	1,880	1,030	2,880	960
9-----	1,640	750	1,360	995	1,540	1,820	1,820	7,260	1,720	1,070	1,720	890
10-----	1,190	680	1,070	890	1,460	1,500	1,540	5,410	1,590	960	2,550	890
11-----	820	550	890	820	4,480	1,460	1,360	2,380	2,220	925	1,540	820
12-----	614	550	750	820	4,160	1,460	1,360	2,020	2,120	855	960	750
13-----	550	614	890	820	4,160	6,400	1,640	1,820	2,600	855	925	750
14-----	520	680	890	785	7,260	11,800	4,220	1,820	2,500	960	785	750
15-----	520	647	890	890	11,800	14,500	3,410	1,680	1,640	1,640	750	680
16-----	750	680	2,220	820	10,100	9,360	1,920	5,690	1,460	1,360	715	614
17-----	1,280	614	1,640	750	2,330	11,300	1,540	7,260	1,460	960	750	614
18-----	1,640	614	3,960	785	1,820	9,000	1,410	6,860	1,460	1,880	1,070	680
19-----	995	614	5,550	750	1,640	8,320	1,360	2,720	1,230	1,110	1,110	647
20-----	750	680	7,700	785	1,500	10,500	1,280	4,800	1,680	995	1,640	680
21-----	680	614	1,920	750	1,360	4,870	1,280	5,480	1,360	890	1,110	750
22-----	647	582	1,150	820	1,360	2,660	1,190	5,130	1,460	785	890	855
23-----	750	550	1,190	1,150	1,280	2,220	1,190	2,990	1,040	820	820	890
24-----	680	582	1,070	6,200	1,190	2,080	1,110	2,120	1,410	750	1,070	750
25-----	680	582	1,030	5,480	1,150	1,820	1,110	1,920	1,540	715	1,820	1,110
26-----	614	490	960	3,470	1,190	1,720	1,110	3,350	1,590	680	1,190	960
27-----	550	582	960	2,550	7,700	1,720	1,030	4,740	1,280	680	960	750
28-----	614	680	1,280	1,920	11,800	1,640	2,550	6,020	1,190	960	2,220	680
29-----	550	614	1,540	1,640	-----	1,540	5,410	6,860	1,230	890	4,420	680
30-----	550	582	1,110	1,360	-----	1,540	6,020	24,200	1,540	820	3,470	550
31-----	680	-----	925	1,280	-----	1,590	-----	23,000	-----	1,190	1,500	-----

*Monthly discharge of Oconee River near Greensboro, Ga., for the year ending September 30, 1923*

[Drainage area, 1,100 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October-----	1,980	352	761	0.692	0.80
November-----	820	490	626	1.569	.63
December-----	7,700	550	1,480	1.35	1.66
January-----	6,200	750	1,670	1.52	1.75
February-----	11,800	1,110	3,370	3.06	3.19
March-----	14,500	1,460	4,330	3.94	4.54
April-----	6,400	1,030	2,210	2.01	2.24
May-----	24,800	1,540	7,020	6.38	7.36
June-----	16,000	1,190	2,490	2.26	2.52
July-----	1,880	680	1,040	.945	1.09
August-----	4,420	715	1,480	1.35	1.56
September-----	2,660	550	976	.887	.99
The year-----	24,800	352	2,290	2.08	28.23

**OCONEE RIVER AT FRALEY'S FERRY, NEAR MILLEDGEVILLE, GA.**

**LOCATION.**—At Fraley's Ferry in Baldwin County, 4 miles downstream from mouth of Little River and 6 miles upstream from Milledgeville.

**DRAINAGE AREA.**—2,840 square miles.

**RECORDS AVAILABLE.**—May 23, 1906, to December 31, 1908; October 6, 1909, to September 30, 1923, when the station was discontinued.

**GAGE.**—A combination sloping and vertical rod gage on left bank. Low-water section, inclined, is 75 feet upstream from ferry cable and extends to 8.5 feet; vertical section, 8.5 to 10.0 feet, is at same site. High-water section, 10.0 to 20.0 feet, is attached to tree 75 feet upstream from inclined section. Read by H. H. Taylor.

**DISCHARGE MEASUREMENTS.**—Made from ferryboat.

**CHANNEL AND CONTROL.**—Sandy and shifting at measuring section. Control formed a rock ledge extending across river 200 feet downstream; permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 17.8 feet sometime before 6 a. m. May 6 (discharge, 44,000 second-feet); minimum stage, 4.7 feet at 5 p. m. October 2 and 3 (discharge, 670 second-feet).

1906-1923: Maximum stage recorded, approximately 24.6 feet March 17, 1913 (discharge, 93,600 second-feet); minimum stage, 3.88 feet at 5 p. m. October 8, 1918 (discharge, 182 second-feet).

**ICE.**—None.

**DIVERSIONS.**—None.

**REGULATION.**—Operation of power plants a great distance upstream can cause only slight fluctuations.

**ACCURACY.**—Stage-discharge relation considered permanent. Rating curve well defined between 400 and 4,200 second-feet; above 4,200 second-feet based on flood run-off obtained from stations at Greensboro and Dublin. Current-meter measurements have not been made since May, 1919. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records below 4,200 second-feet probably good; those above that stage fair.

*Daily discharge, in second-feet, of Oconee River near Milledgeville, Ga., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	830	1,300	1,300	5,020	3,000	17,700	4,140	8,850	27,400	2,210	3,000	3,000
2-----	710	1,300	1,200	7,020	3,000	9,510	3,520	4,800	17,700	2,360	4,140	3,340
3-----	710	1,200	1,300	5,720	3,000	5,020	3,340	3,340	9,510	2,680	3,520	5,250
4-----	750	1,200	1,200	3,720	3,000	4,140	3,720	6,750	6,220	2,680	2,680	4,800
5-----	750	1,200	1,360	3,000	4,140	3,720	12,200	29,100	4,800	2,360	2,060	3,720
6-----	830	1,300	1,410	2,680	8,210	3,720	12,900	39,500	4,580	2,060	1,790	3,000
7-----	920	1,360	1,300	2,360	7,300	8,210	6,480	29,900	4,140	1,920	3,340	2,840
8-----	2,360	1,410	1,410	2,360	5,020	7,590	4,360	22,300	5,480	2,060	5,020	2,210
9-----	3,000	1,660	1,920	2,060	3,720	5,020	5,250	14,000	3,920	2,360	8,850	2,210
10-----	3,000	1,530	3,720	2,060	4,580	3,720	4,360	12,900	3,340	2,210	13,600	1,920
11-----	1,920	1,410	2,360	1,920	9,840	3,520	3,720	7,890	5,240	2,060	5,970	1,790
12-----	1,360	1,300	1,790	1,790	12,900	3,520	3,340	4,580	6,480	1,790	3,340	1,660
13-----	1,300	1,200	1,660	1,790	15,800	11,900	3,340	4,140	8,210	1,660	2,210	1,530
14-----	1,200	1,300	1,790	1,790	27,800	24,200	8,850	3,720	5,250	1,660	2,060	1,600
15-----	1,100	1,300	1,790	1,790	18,500	20,400	8,210	3,720	4,140	2,060	1,790	1,530
16-----	1,200	1,300	3,160	1,790	14,300	22,600	5,480	11,900	3,340	2,680	1,790	1,410
17-----	3,720	1,300	4,140	1,790	8,850	27,000	3,720	14,000	2,840	2,680	1,920	1,410
18-----	5,250	1,200	4,140	1,660	5,020	18,100	3,720	12,600	2,840	5,480	2,360	1,410
19-----	3,160	1,300	7,300	1,660	4,140	30,300	3,340	8,210	2,680	5,480	3,000	1,410
20-----	1,660	1,410	8,530	1,660	3,720	32,500	3,000	6,480	2,520	3,300	5,480	1,790
21-----	1,530	1,410	5,970	1,660	3,340	19,200	2,840	8,850	3,720	2,360	5,020	1,790
22-----	1,470	1,300	3,340	1,790	3,000	8,530	2,680	8,210	3,000	2,060	3,000	3,340
23-----	1,300	1,200	2,680	5,970	3,000	5,970	2,680	5,970	3,520	1,790	2,360	2,680
24-----	1,410	1,200	2,360	28,200	2,840	5,480	2,680	5,020	3,720	1,530	5,020	2,210
25-----	1,360	1,250	2,210	23,400	2,680	5,020	2,520	3,720	4,140	2,060	5,020	1,790
26-----	1,360	1,200	1,920	11,500	2,680	4,580	2,520	5,480	3,920	2,210	3,920	2,260
27-----	1,300	1,150	1,920	6,480	23,000	4,140	2,520	23,400	3,720	1,790	2,680	2,360
28-----	1,200	1,300	2,360	4,800	27,000	3,920	2,680	29,500	3,160	1,790	4,580	1,660
29-----	1,300	1,410	2,680	3,920	-----	8,530	8,530	18,500	2,680	2,210	16,600	1,410
30-----	1,150	1,300	2,360	3,340	-----	3,720	10,800	24,200	2,520	2,360	12,200	1,360
31-----	1,200	-----	2,210	3,000	-----	5,020	-----	32,900	-----	2,680	5,480	-----

*Monthly discharge of Oconee River near Milledgeville, Ga., for the year ending September 30, 1923*

[Drainage area, 2,840 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	5,250	710	1,620	0.570	0.66
November.....	1,660	1,150	1,310	.461	.51
December.....	8,530	1,200	2,670	.940	1.08
January.....	28,200	1,660	4,760	1.68	1.94
February.....	27,800	2,680	8,340	2.94	3.06
March.....	32,500	3,520	10,700	3.77	4.35
April.....	12,900	2,520	4,910	1.73	1.93
May.....	39,500	3,340	13,400	4.72	5.44
June.....	27,400	2,520	5,490	1.93	2.15
July.....	5,480	1,530	2,400	.845	.97
August.....	16,600	1,790	4,640	1.63	1.88
September.....	5,250	1,360	2,290	.806	.90
The year.....	39,500	710	5,200	1.83	24.87

## ST. MARYS RIVER BASIN

### ST. MARYS RIVER AT MONIAC, GA.

**LOCATION.**—At wooden highway bridge 200 feet upstream from railroad trestle and 200 yards west of Moniac station, Charlton County, on Georgia Southern & Florida Railway.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—January 26, 1921, to September 30, 1923, when station was discontinued.

**GAGE.**—Staff gage fastened to an ash tree on left bank 20 feet downstream from highway bridge; read to tenths twice daily by Mrs. L. Knabb.

**DISCHARGE MEASUREMENTS.**—Low-water measurements made from downstream side of highway bridge; high-water measurements made from railroad trestle.

**CHANNEL AND CONTROL.**—Bed of stream composed of sand. One channel at low water and two or three at high stages; straight for short distances above and below gage. Right bank low, flat, and wooded and subject to overflow; left bank high.

**EXTREMES OF STAGE.**—Maximum stage recorded during year, 7.0 feet morning and evening October 19, evening January 7, morning and evening January 8, and morning and evening July 20; minimum stage, 1.9 feet morning and evening December 9.

1921-1923: Maximum stage recorded, 9.9 feet at 8 a. m. August 2, 1921; minimum stage recorded, 0.81 foot at 6 a. m. and 6 p. m. June 20, 1921.

**DIVERSIONS.**—None.

**REGULATION.**—None.

*Daily gage height, in feet, of St. Marys River at Moniac, Ga., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	2.5	5.5	2.1	4.0	3.0	2.75	4.95	2.3	5.4	5.25	5.55	2.4
2-----	2.5	5.25	2.0	4.15	2.9	2.75	4.85	2.3	5.15	4.95	5.75	2.4
3-----	2.4	5.05	2.0	4.9	2.9	2.8	4.65	2.2	4.9	5.4	5.95	2.4
4-----	2.5	4.75	2.0	5.65	2.9	2.7	4.5	2.2	5.8	5.1	6.45	2.4
5-----	2.5	4.5	2.0	6.1	2.95	2.65	4.35	2.3	6.25	5.15	6.5	2.3
6-----	2.5	4.25	2.0	6.8	3.45	2.5	4.1	2.4	6.35	5.2	6.35	2.3
7-----	2.4	4.05	2.0	6.95	3.6	2.45	3.9	2.5	6.25	5.3	6.05	2.3
8-----	2.4	3.85	2.0	7.0	3.55	2.4	3.9	2.4	6.05	5.4	5.85	2.3
9-----	2.3	3.65	1.9	6.7	3.4	2.3	3.75	2.35	6.0	5.3	5.35	2.4
10-----	2.3	3.45	2.0	6.4	3.25	2.25	3.65	2.3	6.15	5.2	5.1	2.9
11-----	2.25	3.35	2.0	6.05	2.9	2.2	3.55	2.15	6.15	5.1	4.75	3.1
12-----	2.2	3.2	2.0	5.85	2.95	2.2	3.45	2.1	6.0	5.1	4.5	3.1
13-----	2.2	3.1	2.0	5.65	3.0	2.2	3.4	2.1	6.2	5.0	4.2	3.05
14-----	2.2	2.95	2.0	5.35	3.1	2.25	3.3	2.1	6.5	5.0	3.9	3.0
15-----	3.9	2.9	2.0	5.15	3.15	2.35	3.25	2.7	6.15	5.1	3.65	3.0
16-----	5.95	2.8	2.0	4.95	3.3	2.4	3.2	3.55	5.9	5.2	3.4	3.0
17-----	6.2	2.75	2.0	4.75	3.4	2.55	3.1	4.45	5.8	5.2	3.15	3.1
18-----	6.6	2.65	2.0	4.35	3.5	4.45	3.0	4.55	5.9	5.1	2.95	3.45
19-----	7.0	2.6	2.0	4.15	3.6	4.9	3.0	4.45	5.8	5.75	2.8	3.45
20-----	6.9	2.55	2.4	3.95	3.7	5.0	2.9	4.2	5.65	7.0	2.65	3.35
21-----	6.65	2.5	3.35	3.8	3.7	4.8	2.8	4.3	5.45	6.9	2.5	3.25
22-----	6.35	2.45	3.4	3.65	3.6	4.4	2.7	5.85	5.1	6.75	2.4	3.2
23-----	6.15	2.4	3.4	3.55	3.4	4.0	2.6	5.9	4.7	6.65	2.35	3.2
24-----	5.95	2.35	3.35	3.5	3.2	3.75	2.6	5.75	4.3	6.5	2.3	3.5
25-----	5.65	2.25	3.3	3.45	2.95	3.65	2.5	5.55	4.15	6.35	2.3	3.9
26-----	5.3	2.25	3.3	3.35	2.9	3.55	2.5	5.4	4.15	6.1	2.3	4.25
27-----	4.95	2.2	3.3	3.3	2.9	3.4	2.4	5.35	5.65	5.8	2.3	4.45
28-----	4.65	2.2	3.2	3.2	2.8	3.4	2.35	5.3	6.0	5.85	2.3	4.35
29-----	4.45	2.15	3.1	3.2	-----	3.5	2.3	5.2	5.85	5.65	2.35	4.15
30-----	4.75	2.1	3.0	3.15	-----	3.65	2.3	5.25	5.6	5.3	2.4	3.9
31-----	4.7	-----	2.9	3.1	-----	5.05	-----	5.3	-----	5.35	2.4	-----

### SUWANNEE RIVER BASIN

#### SUWANNEE RIVER AT FARGO, GA.

**LOCATION.**—At railroad trestle a few hundred feet east of Fargo depot, Clinch County, on Georgia Southern & Florida Railway.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—January 27, 1921, to September 30, 1923, when the station was discontinued.

**GAGE.**—Staff gage attached to seventeenth bent from right bank abutment of railroad trestle; read to hundredths twice daily by L. L. Sloan.

**DISCHARGE MEASUREMENTS.**—Made from downstream side of highway bridge 200 feet downstream from railroad trestle.

**CHANNEL AND CONTROL.**—Full of vegetation. One channel about 110 feet wide at low water; at stages above 10 feet water spreads out over swamp which is 2,175 feet wide. Channel is very boily with many snags; straight for 100 feet below bridge and slightly curved above.

**EXTREMES OF STAGE.**—Maximum stage recorded during year, 7.83 feet at 5 p. m. January 14, 8 a. m. January 15, and 5 p. m. June 13; minimum stage, 1.39 feet at 5 p. m. December 8.

1921-1923: Maximum stage recorded, 9.69 feet at 5 p. m. August 12, 1921; minimum stage, -2.17 feet at 5 p. m. June 23, 1921.

Highest known flood is said to have reached a stage corresponding to gage height 16.0 feet, date unknown.

**DIVERSIONS.**—None.

**REGULATION.**—None.



*Daily gage height, in feet, of Suwannee River at Fargo, Ga., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	2.60	5.44	2.07	4.70	5.88	3.57	3.07	2.80	7.30	7.48	6.68	3.41
2.....	2.48	5.46	1.95	4.75	5.72	3.45	3.18	2.93	7.56	7.44	6.74	3.45
3.....	2.38	5.45	1.83	4.79	5.56	3.33	3.26	3.04	7.46	7.38	6.81	3.49
4.....	2.30	5.39	1.72	5.10	5.40	3.21	3.34	3.14	7.36	7.32	6.89	3.55
5.....	2.22	5.31	1.62	5.68	5.26	3.09	3.40	3.20	7.32	7.24	6.95	3.63
6.....	2.14	5.20	1.54	6.34	5.24	2.97	3.46	3.26	7.40	7.16	6.98	3.71
7.....	2.06	5.11	1.46	6.88	5.30	2.85	3.52	3.31	7.50	7.08	7.00	3.78
8.....	1.98	4.99	1.40	7.17	5.35	2.73	3.57	3.35	7.58	7.00	6.96	3.84
9.....	1.92	4.86	1.42	7.35	5.39	2.61	3.60	3.36	7.64	6.92	6.88	3.88
10.....	2.04	4.72	1.52	7.50	5.42	2.49	3.62	3.34	7.70	6.82	6.80	3.94
11.....	2.16	4.57	1.67	7.62	5.43	2.38	3.61	3.30	7.75	6.72	6.70	4.04
12.....	2.30	4.43	1.84	7.71	5.41	2.34	3.56	3.24	7.79	6.61	6.58	4.14
13.....	2.44	4.26	2.04	7.78	5.36	2.40	3.50	3.18	7.82	6.49	6.44	4.22
14.....	2.59	4.12	2.24	7.82	5.30	2.50	3.43	3.24	7.80	6.37	6.30	4.26
15.....	2.76	3.99	2.46	7.82	5.22	2.60	3.34	3.40	7.76	6.25	6.15	4.22
16.....	2.96	3.87	2.68	7.80	5.12	2.68	3.24	3.62	7.72	6.13	5.98	4.16
17.....	3.18	3.75	2.90	7.78	5.01	2.76	3.14	3.85	7.66	6.01	5.82	4.09
18.....	3.39	3.63	3.12	7.74	4.89	2.84	3.04	4.07	7.60	5.90	5.64	4.01
19.....	3.58	3.51	3.32	7.70	4.77	2.89	2.94	4.27	7.54	5.92	5.42	3.92
20.....	3.76	3.39	3.50	7.66	4.65	2.92	2.83	4.41	7.48	6.02	5.18	3.82
21.....	3.88	3.27	3.68	7.62	4.53	2.94	2.71	4.49	7.40	6.12	4.96	3.72
22.....	4.05	3.15	3.82	7.76	4.41	2.90	2.59	4.57	7.32	6.24	4.74	3.62
23.....	4.22	3.03	3.96	7.74	4.29	2.86	2.47	4.65	7.24	6.34	4.51	3.52
24.....	4.38	2.91	4.09	6.90	4.17	2.82	2.35	4.72	7.18	6.40	4.20	3.48
25.....	4.54	2.79	4.20	6.80	4.05	2.77	2.30	4.80	7.20	6.46	4.04	3.52
26.....	4.70	2.67	4.30	6.69	3.93	2.73	2.37	4.90	7.26	6.51	3.84	3.52
27.....	4.86	2.65	4.39	6.57	3.81	2.69	2.45	5.02	7.32	6.55	3.70	3.48
28.....	5.02	2.43	4.46	6.45	3.69	2.66	2.52	5.30	7.36	6.56	3.57	3.41
29.....	5.16	2.31	4.52	6.33	-----	2.72	2.58	5.77	7.40	6.53	3.46	3.35
30.....	5.28	2.19	4.58	6.20	-----	2.84	2.68	6.34	7.44	6.55	3.39	3.24
31.....	5.38	-----	4.64	6.04	-----	2.96	-----	6.81	-----	6.62	3.38	-----

## APALACHICOLA RIVER BASIN

## CHATTAHOOCHEE RIVER NEAR NORCROSS, GA.

**LOCATION.**—At Medlock's Bridge,  $1\frac{1}{2}$  miles upstream from mouth of John Creek,  $4\frac{1}{2}$  miles north of Norcross, Gwinnett County, and 5 miles below Suwannee Creek.

**DRAINAGE AREA.**—1,170 square miles.

**RECORDS AVAILABLE.**—January 9, 1903, to September 30, 1923, when station was discontinued.

**GAGE.**—Chain gage on toll bridge; read by W. O. Medlock. January 1 to September 30, 1916, a Dexter water-stage recorder on right bank just above bridge and referred to chain gage without change in datum, was also used for recording stages below 7 feet. See "Regulation."

**DISCHARGE MEASUREMENTS.**—Made from downstream side of bridge.

**CHANNEL AND CONTROL.**—Bed sandy; shifts. Control is a rock shoal about  $2\frac{1}{2}$  miles downstream and is more pronounced for higher than for lower stages. Medium stages are somewhat affected by shifting bottom conditions between gage and rock shoal. However at extreme low stages control is practically permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 14.6 feet at 6 p. m. December 18 (discharge, 18,600 second-feet); minimum stage, 1.58 feet at 7 a. m. October 5 (discharge, 810 second-feet).

1903-1923: Maximum stage recorded, 27.1 feet at 3 p. m. December 10, 1919 (discharge, 54,700 second-feet); minimum stage, 1.02 feet October 21, 1911 (discharge, 294 second-feet). It is believed that this low stage was caused by shutting off flow at the two power dams near Gainesville, Ga.

**ICE.**—Never enough to affect stage-discharge relation.

**REGULATION.**—Diurnal fluctuation is caused by operation of hydroelectric plants on Chattahoochee and Chestatee Rivers near Gainesville, Ga. Monthly discharge, January to September, 1916, determined from records, of water-stage recorder, agreed very closely with that obtained by using mean daily gage heights from two readings of chain per day, indicating that monthly discharge obtained by using records from chain gage is not seriously in error. See Water-Supply Paper 472, page 34.

**ACCURACY.**—Stage-discharge relation probably permanent during the year, although no discharge measurements have been made since September, 1922. Rating curve previously developed is well defined between 800 and 55,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

*Daily discharge, in second-feet, of Chattahoochee River near Norcross, Ga., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	970	1,040	1,000	5,240	2,160	3,150	1,940	3,480	6,920	2,160	1,460	1,370
2	910	1,040	940	5,600	1,940	2,600	1,940	2,710	5,020	2,050	2,490	1,370
3	940	1,000	940	3,260	1,940	2,160	1,940	2,600	4,140	2,160	2,160	1,840
4	940	1,040	970	2,600	1,940	2,160	2,160	3,590	3,700	2,380	1,550	2,830
5	880	1,000	1,370	2,050	4,470	1,940	2,490	5,960	3,480	1,840	1,370	2,600
6	1,040	1,000	1,290	1,940	6,680	1,940	2,380	3,260	3,260	1,840	1,460	1,940
7	1,740	1,040	1,000	1,840	3,920	2,820	2,050	3,480	3,150	1,740	1,740	1,460
8	1,940	1,070	1,140	1,740	2,930	2,600	2,050	3,260	3,480	2,050	1,640	1,370
9	1,550	1,040	1,140	1,550	2,600	2,160	1,940	3,260	3,260	2,600	1,940	1,290
10	1,140	1,000	1,370	1,550	2,160	1,940	1,940	2,600	2,820	2,600	3,040	1,210
11	1,210	970	1,290	1,550	3,040	1,940	1,840	2,380	2,820	1,840	2,380	1,140
12	1,140	970	1,140	1,460	2,380	1,940	1,740	2,270	4,800	1,740	1,740	1,210
13	1,040	940	1,460	1,370	6,680	3,260	2,380	2,160	3,700	1,550	1,370	1,210
14	1,040	1,040	1,370	1,370	7,760	4,140	4,580	2,270	2,820	2,160	1,460	1,140
15	1,070	1,000	1,550	1,460	4,140	3,040	4,030	2,160	2,600	1,940	1,640	1,140
16	1,140	1,000	2,270	1,370	2,930	3,040	2,820	4,470	2,490	2,380	1,460	1,040
17	1,140	1,000	8,240	1,370	2,600	5,480	2,380	4,470	2,380	3,700	1,290	1,070
18	1,140	1,000	17,300	1,370	2,270	4,360	2,160	3,260	2,270	3,260	1,550	1,070
19	1,070	1,040	9,080	1,290	2,160	4,800	2,160	2,600	2,160	2,600	1,370	1,070
20	1,070	1,000	3,480	1,290	1,940	4,580	1,940	4,030	2,050	1,740	2,820	1,070
21	1,000	1,040	2,710	1,290	1,940	3,260	1,940	5,020	2,160	1,740	1,460	1,210
22	1,000	1,000	2,160	1,210	1,840	2,820	1,940	3,920	2,160	1,640	1,940	2,160
23	1,040	940	1,940	1,460	1,840	2,710	2,050	3,040	2,380	1,640	1,940	1,370
24	1,070	1,040	1,640	2,270	1,740	3,150	1,840	3,480	2,270	1,550	2,820	1,210
25	1,140	910	1,740	3,480	1,740	2,820	1,840	2,820	2,380	1,460	1,840	1,370
26	1,070	970	1,550	3,370	1,740	2,490	1,840	2,820	2,270	1,460	1,370	1,290
27	1,000	970	1,550	3,040	4,800	2,160	1,740	5,480	1,940	1,370	1,290	1,290
28	1,000	970	2,490	2,600	5,020	2,160	4,140	5,240	2,820	1,460	1,740	1,070
29	1,000	1,070	3,040	2,380	-----	2,160	5,240	8,120	4,470	1,640	4,360	1,070
30	970	940	2,270	2,160	-----	2,050	5,840	11,900	2,710	1,740	2,820	1,000
31	970	-----	1,840	1,940	-----	2,050	-----	11,200	-----	1,550	1,640	-----

*Monthly discharge of Chattahoochee River near Norcross, Ga., for the year ending September 30, 1923*

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,940	880	1,110	0.949	1.09
November	1,070	910	1,000	.855	.95
December	17,300	940	2,620	2.24	2.58
January	5,600	1,210	2,140	1.83	2.11
February	7,760	1,740	3,120	2.67	2.78
March	5,480	1,940	2,830	2.42	2.79
April	5,840	1,740	2,510	2.15	2.40
May	11,900	2,160	4,190	3.58	4.13
June	6,920	1,940	3,100	2.65	2.96
July	3,700	1,370	1,990	1.70	1.96
August	4,360	1,290	1,910	1.63	1.88
September	2,930	1,000	1,390	1.19	1.33
The year	17,300	880	2,320	1.98	26.96

## CHATTAHOOCHEE RIVER AT WEST POINT, GA.

**LOCATION.**—At West Point waterworks pumping plant, just below Oseligee Creek, one-fourth mile east of Alabama-Georgia State line in Troup County, and 1 mile upstream from West Point railroad station. Prior to October 20, 1912, station was at Montgomery Street Bridge in West Point.

**DRAINAGE AREA.**—3,300 square miles.

**RECORDS AVAILABLE.**—July 30, 1896, to September 30, 1923.

**GAGE.**—Original gage was a chain on downstream handrail of Montgomery Street Bridge. On October 20, 1912, the gage was moved 1 mile upstream to a point opposite city pumping plant. A staff gage (0-18 feet) was placed on left bank. This gage was read from October 20, 1912, to December 10, 1919, by using a telescope, from pumping station which is on right bank. The flood of December 10, 1919, put the gage out of commission. On January 14, 1920, the rod on left bank was replaced but could not be read below 6 feet because of a sand bar formed by flood. A short section of rod (0-6.7 feet) was located on right bank. Both rods were set to same datum, but the right-bank section reads slightly higher than the left-bank section. Since January 14, 1920, the observer has read right-bank gage during stages below 6 feet and left-bank gage for stages above 6 feet. The observer is J. H. Miller.

**DISCHARGE MEASUREMENTS.**—Made from the Montgomery Street Bridge 1 mile downstream. No tributaries enter between gage and bridge.

**CHANNEL AND CONTROL.**—Bed rough and rocky; fairly permanent. Banks subject to overflow at high stages. Control is a rock ledge extending across river just below gage and is not affected by Langdale dam 5 miles downstream.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 16.7 feet at 5 p. m. February 14 (discharge, 39,400 second-feet); minimum stage, 2.3 feet at 7 a. m. October 4 (discharge, 1,100 second-feet).

1896-1923: Maximum stage recorded, 30.0 feet at 2 p. m. December 10, 1919 (discharge, 134,000 second-feet); minimum stage recorded (old gage), 0.8 foot September 18-21, 1896 (discharge, 780 second-feet).

**ICE.**—None.

**DIVERSIONS.**—None.

**REGULATION.**—Operation of power plants a great distance upstream causes some diurnal fluctuation.

**ACCURACY.**—Stage-discharge relation permanent since December 10, 1919.

Rating curve well defined between 1,000 and 60,000 second-feet; extended above 60,000 second-feet on basis of a computed discharge of 134,000 second-feet for the crest of the flood on December 10, 1919, using the Goat Rock dam, 12 miles above Columbus, as a weir and correcting for difference in drainage area. Gage read to tenths twice daily; during high water oftener. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

*Discharge measurements of Chattahoochee River at West Point, Ga., during the year ending September 30, 1923*

[Made by B. M. Hall, jr.]

Date	Gage height	Discharge
Oct. 5.....	<i>Feet</i> 2.54	<i>Sec.-ft.</i> 1,370
5.....	2.60	1,430

*Daily discharge, in second-feet, of Chattahoochee River at West Point, for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	1,480	1,950	1,810	12,800	4,500	15,200	5,250	12,800	20,800	6,750	2,780	4,750
2.....	1,600	1,950	1,810	14,800	4,030	10,000	4,750	8,250	15,800	5,250	5,250	3,360
3.....	1,480	1,950	1,810	12,200	4,260	7,250	4,750	6,500	10,500	4,030	4,260	2,580
4.....	1,150	1,540	1,950	9,250	4,260	6,000	6,500	5,250	8,250	7,750	4,030	2,580
5.....	1,420	1,810	1,810	5,250	8,500	5,500	11,000	7,250	7,750	4,260	3,360	3,580
6.....	10,000	1,740	1,950	4,750	15,200	5,250	7,750	10,200	6,750	3,800	3,150	4,260
7.....	10,000	1,670	2,410	5,000	12,200	6,250	6,250	12,200	6,750	3,580	3,360	3,800
8.....	6,250	2,250	2,410	4,500	10,800	7,750	5,750	9,000	6,000	4,260	3,150	2,950
9.....	3,580	2,580	2,950	3,800	7,500	6,750	6,250	9,750	5,750	3,800	4,030	2,760
10.....	3,150	1,950	3,800	3,360	6,750	5,750	6,250	6,250	5,250	3,580	5,750	2,250
11.....	2,580	1,950	2,950	3,150	11,800	5,250	4,750	5,750	5,250	3,800	5,000	1,950
12.....	1,810	1,950	2,580	2,950	17,200	5,250	4,500	5,250	5,750	3,800	4,750	1,950
13.....	1,810	1,950	2,580	2,950	15,000	16,800	4,750	5,250	6,250	3,150	3,800	1,810
14.....	1,950	1,740	2,760	2,950	37,100	19,000	8,750	5,250	8,500	2,950	2,950	2,410
15.....	1,950	1,810	3,360	3,580	33,200	10,800	9,250	4,750	5,500	2,950	2,250	1,670
16.....	1,950	1,950	5,250	3,360	19,200	9,750	8,250	15,800	4,750	3,360	2,250	1,810
17.....	1,950	1,950	6,500	2,950	9,750	16,200	6,750	16,500	5,250	3,360	2,410	1,540
18.....	3,150	1,950	11,800	2,950	7,250	15,800	5,750	11,200	4,030	3,800	2,760	1,540
19.....	2,580	2,760	23,500	2,950	6,250	16,800	5,250	8,500	3,800	8,250	3,360	1,670
20.....	2,100	3,580	25,200	2,580	5,750	15,800	4,750	8,750	3,800	5,250	8,750	1,480
21.....	1,810	2,250	17,800	2,760	5,250	12,800	4,500	9,500	3,150	3,800	5,250	1,600
22.....	1,950	1,950	5,750	2,760	5,250	9,750	4,260	9,250	3,580	2,580	4,030	1,600
23.....	2,150	1,950	4,750	3,580	4,500	7,750	4,260	8,500	4,260	2,580	3,150	1,810
24.....	2,350	1,950	4,260	20,200	4,500	9,500	3,800	6,750	7,250	2,760	9,750	2,410
25.....	2,550	1,950	3,800	14,800	3,800	8,250	4,260	6,250	8,750	2,760	10,200	2,250
26.....	1,810	1,950	3,360	9,750	4,500	7,250	3,800	9,750	6,250	2,580	7,250	1,950
27.....	1,880	1,810	3,360	7,500	8,750	6,750	3,800	15,800	5,750	2,580	3,800	1,950
28.....	1,950	1,810	4,260	6,750	18,800	5,250	4,260	18,200	4,750	2,760	2,950	1,950
29.....	1,670	1,670	3,800	6,000	-----	5,250	12,200	20,500	10,200	2,580	8,250	1,740
30.....	1,670	1,740	4,750	3,800	-----	5,250	18,800	18,500	6,750	2,580	14,800	1,810
31.....	1,740	-----	12,800	4,750	-----	5,750	-----	17,200	-----	2,580	7,750	-----

NOTE.—No gage-height record Oct. 23, 24, 27, Aug. 7, and 8; discharge estimated by comparison with record for station at Norcross.

*Monthly discharge of Chattahoochee River at West Point, Ga., for the year ending September 30, 1923*

[Drainage area, 3,300 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	10,000	1,150	2,690	0.815	0.94
November.....	3,580	1,540	2,000	.606	.68
December.....	25,200	1,810	5,740	1.74	2.01
January.....	20,200	2,580	6,090	1.85	2.13
February.....	37,100	3,800	10,600	3.21	3.34
March.....	19,000	5,250	9,380	2.84	3.27
April.....	18,800	3,800	6,340	1.92	2.14
May.....	20,500	4,750	10,200	3.09	3.56
June.....	20,800	3,150	6,910	2.09	2.33
July.....	8,250	2,580	3,800	1.15	1.33
August.....	14,800	2,250	4,990	1.51	1.74
September.....	4,750	1,480	2,330	.706	.79
The year.....	37,100	1,150	5,890	1.78	24.26

#### FLINT RIVER NEAR WOODBURY, GA.

LOCATION.—At Macon & Birmingham Railroad bridge, one-fourth mile downstream from mouth of Elkins Creek, one-third mile upstream from mouth of Cane Creek, and 3 miles east of Woodbury, Pike County.

DRAINAGE AREA.—1,090 square miles.

RECORDS AVAILABLE.—March 29, 1900, to September 30, 1923, when station was discontinued.

**GAGE.**—Chain gage attached to guardrail on downstream side of Macon & Birmingham Railroad bridge; installed May 24, 1918. Prior to that date gage was a vertical staff in four sections on left bank about 300 feet above present gage. Gages set to same datum. Zero of gage, 660 feet above sea level. Gage read twice daily by E. T. Riggins.

**DISCHARGE MEASUREMENTS.**—Made from downstream side of railroad bridge.

**CHANNEL AND CONTROL.**—Bottom consists chiefly of rock; rough, current irregular. Control formed by a shoal 1 mile downstream; shifts occasionally.

**EXTREMES OF STAGE.**—Maximum stage recorded during year, 10.0 feet at 5 p. m. March 13; minimum stage, 0.14 foot at 7 a. m. October 7.

1900-1923: Maximum stage recorded, 17.1 feet at 7 a. m. December 11, 1919 (discharge, 38,400 second-feet); minimum stage recorded, -0.4 foot October 8-10, 1911 (discharge, 86 second-feet).

**ICE.**—None.

**DIVERSIONS.**—None.

**REGULATION.**—Some slight diurnal fluctuations caused by operation of small mills on tributary streams.

No determination of discharge has been made, as the rating curve has not been verified by discharge measurements since September 20, 1919.

*Daily gage height, in feet, of Flint River near Woodbury, Ga., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	0.80	0.40	0.66	2.15	1.34	5.00	1.95	3.95	4.20	1.19	2.30	1.20
2.....	.40	.41	.66	3.00	1.20	3.70	1.68	2.33	3.23	1.01	1.17	.92
3.....	.20	.46	.68	3.01	1.25	3.00	1.62	1.75	2.30	1.01	1.01	.99
4.....	.40	.50	.68	2.68	1.55	2.03	2.20	2.15	1.77	.95	.88	.89
5.....	.40	.50	.69	2.07	2.66	1.80	3.65	3.20	1.68	.89	.74	.88
6.....	.40	.50	.75	1.78	3.29	1.85	3.70	3.65	1.64	.73	.61	1.06
7.....	.17	.48	.70	1.47	3.17	3.70	3.10	2.95	1.75	.75	.55	.96
8.....	.44	.52	.79	1.38	2.60	3.15	2.45	2.45	1.65	.75	.50	.70
9.....	1.06	.60	1.00	1.28	2.20	2.30	2.75	2.26	1.42	.70	2.60	.68
10.....	.94	.58	1.36	1.18	2.20	1.88	2.45	2.18	1.36	.84	4.20	.57
11.....	.57	.57	1.46	1.11	2.55	1.67	1.85	1.95	1.89	.69	3.19	.50
12.....	.44	.54	1.28	1.07	3.16	1.80	1.70	1.60	2.19	.64	2.17	.44
13.....	.38	.52	1.11	1.03	4.35	8.55	1.78	1.58	2.39	.59	1.45	.36
14.....	.34	.48	1.05	1.01	6.00	8.00	2.79	1.48	2.25	.55	.88	.33
15.....	.34	.50	1.12	1.13	8.00	6.05	2.51	1.49	1.40	.55	.77	.30
16.....	.36	.55	1.55	1.26	6.25	5.40	2.15	3.30	1.19	.54	.65	.30
17.....	.62	.58	1.85	1.24	3.65	5.45	1.77	3.90	1.09	.59	.60	.28
18.....	.66	.60	2.08	1.13	2.40	5.35	1.67	3.21	.98	1.45	.60	.24
19.....	.63	.81	2.33	1.03	1.90	6.10	1.55	2.70	.90	1.35	.60	.24
20.....	.51	1.32	2.53	1.00	1.65	6.50	1.40	2.25	.86	1.09	.91	.24
21.....	.48	1.07	2.46	.98	1.48	4.55	1.40	2.13	.82	.95	1.55	.32
22.....	.42	.88	1.94	1.03	1.41	3.45	1.40	2.00	.78	.90	1.79	.38
23.....	.40	.75	1.49	1.82	1.40	2.81	1.25	1.80	.77	.74	1.39	.32
24.....	.39	.70	1.25	4.82	1.36	2.55	1.15	1.67	1.23	.50	1.25	.34
25.....	.40	.67	1.09	5.58	1.24	2.38	1.39	1.50	2.75	.50	1.26	.65
26.....	.42	.62	1.00	4.80	2.15	2.32	1.16	1.90	2.30	.50	1.78	.51
27.....	.48	.61	1.00	3.40	6.00	2.17	1.10	3.95	1.35	.50	1.68	.44
28.....	.48	.64	1.11	2.60	6.12	1.98	1.00	4.20	1.00	.55	1.76	.39
29.....	.43	.68	1.13	2.01	-----	1.90	2.45	4.30	1.75	.69	2.26	.35
30.....	.36	.69	1.05	1.65	-----	1.93	5.20	3.90	1.41	.59	2.24	.31
31.....	.36	-----	1.05	1.46	-----	2.00	-----	4.30	-----	.51	1.70	-----

#### FLINT RIVER NEAR CULLODEN, GA.

**LOCATION.**—At Grays Ferry, Upson County,  $1\frac{1}{2}$  miles upstream from mouth of Auchumpkee Creek and 14 miles southwest of Culloden.

**DRAINAGE AREA.**—2,000 square miles.

**RECORDS AVAILABLE.**—July 1, 1911, to May 31, 1923.

**GAGE.**—Original gage was a staff in four sections on left bank at old ferry landing. In August, 1918, a Stevens continuous water-stage recorder was installed on left bank about 100 feet upstream from old rod gage; the Stevens gage was replaced by a Gurley seven-day graph recorder on May 29, 1919. Gage inspected by Arthur Preston.

**DISCHARGE MEASUREMENTS.**—Made from boat.

**CHANNEL AND CONTROL.**—Channel sandy and shifting at gage. Control is a rock ledge half a mile downstream; fairly permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during period October 1, 1922, to May 31, 1923, 20.2 feet at noon March 19 (discharge, 31,400 second-feet).

1911-1923: Maximum stage recorded, 33.3 feet during night of July 9, 1916 (discharge, 83,700 second-feet); minimum stage, 1.00 foot October 8, 1911 (discharge, 165 second-feet).

**ICE.**—None.

**DIVERSIONS.**—None.

**ACCURACY.**—Stage-discharge relation considered permanent, but no discharge measurements have been made since February 17, 1920. Rating curve previously developed well defined between 250 and 5,000 second-feet; extension above 5,000 second-feet based on discharge at crest of floods at Woodbury corrected for difference in drainage area. Operation of water-stage recorder not satisfactory owing to frequent stopping of clock, but observer read rod gage when clock was not running. Diurnal fluctuation at this station is negligible. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

*Daily discharge, in second-feet, of Flint River near Culloden, Ga., for the period October 1, 1922, to May 31, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
1.....	585	655	860	3,680	2,010	10,500	3,100	7,570
2.....	550	655	840	4,740	2,010	7,400	2,700	4,280
3.....	515	655	800	4,740	1,900	5,220	2,460	2,580
4.....	480	655	800	4,130	1,900	3,830	2,580	5,700
5.....	450	655	800	3,100	3,530	3,100	4,900	12,300
6.....	450	655	760	2,580	5,870	2,830	5,700	8,250
7.....	480	655	800	2,120	5,380	4,740	4,740	5,700
8.....	585	620	1,100	1,900	4,580	5,380	3,680	4,430
9.....	725	620	1,300	1,800	3,530	4,130	3,830	3,530
10.....	840	620	1,700	1,700	3,980	3,100	3,830	3,380
11.....	880	620	1,800	1,600	4,130	2,700	3,100	3,100
12.....	840	585	1,600	1,500	4,740	2,460	2,460	2,230
13.....	800	585	1,500	1,500	5,870	10,400	2,700	2,010
14.....	760	585	1,400	1,400	8,250	22,100	5,870	1,800
15.....	760	585	1,800	1,400	12,700	14,900	4,580	1,900
16.....	725	585	2,120	1,500	13,600	10,200	3,530	5,060
17.....	1,010	585	2,120	1,600	7,910	11,600	2,830	6,040
18.....	2,830	550	2,580	1,600	4,740	9,820	2,700	5,060
19.....	1,400	550	3,100	1,600	3,380	22,100	2,460	4,130
20.....	965	840	3,380	1,600	2,580	24,400	2,230	4,280
21.....	800	1,200	3,240	1,600	2,340	10,900	2,010	3,530
22.....	760	1,150	3,100	1,700	2,230	7,230	2,010	2,830
23.....	690	1,100	2,700	2,830	2,120	5,220	2,010	2,580
24.....	690	1,010	2,460	15,400	2,010	4,430	1,900	2,120
25.....	655	965	2,230	12,200	1,900	3,830	1,900	1,800
26.....	690	900	2,010	9,280	1,900	3,530	1,800	8,080
27.....	690	850	1,800	6,380	16,500	3,380	1,700	7,740
28.....	690	850	1,800	4,280	19,000	2,960	1,800	6,210
29.....	690	870	1,800	3,100	-----	2,700	3,530	8,760
30.....	690	900	1,800	2,460	-----	2,830	7,570	8,080
31.....	655	-----	1,700	2,230	-----	3,530	-----	5,700

NOTE.—No gage-height record Nov. 26 to Dec. 1, and Dec. 9-15. Discharge estimated by comparison with gage-height graph of Flint River at Woodbury, Ga.

*Monthly discharge of Flint River near Culloden, Ga., for the period October 1, 1922, to May 31, 1923*

[Drainage area, 2,000 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	2,830	450	785	0.0392	0.45
November.....	1,200	550	744	.372	.42
December.....	3,380	760	1,800	.900	1.04
January.....	15,400	1,400	3,460	1.73	1.99
February.....	19,000	1,900	5,380	2.69	2.80
March.....	24,400	2,460	7,470	3.74	4.31
April.....	7,570	1,700	3,210	1.60	1.78
May.....	12,300	1,800	4,860	2.43	2.80

#### CHIPOLA RIVER NEAR ALTHA, FLA.

**LOCATION.**—At Willis highway bridge, 1 mile above Look and Tremble Shoals, 3 miles above mouth of Tenmile Creek, and 4 miles southwest of Altha, Calhoun County.

**DRAINAGE AREA.**—740 square miles.

**RECORDS AVAILABLE.**—November 21, 1912, to December 31, 1913; September 21, 1921, to September 30, 1923.

**GAGE.**—Chain gage attached to upstream handrail of bridge; read by A. A. Allen. Original gage was a vertical staff spiked to cedar stump on left bank, 75 feet above bridge. On April 22, 1913, a chain gage was attached to the upstream handrail of the bridge. This bridge was replaced later, and on September 21, 1921, the present gage was installed on the new bridge. Datum unchanged.

**DISCHARGE MEASUREMENTS.**—Made from upstream side of bridge.

**CHANNEL AND CONTROL.**—Bed is rough, with bottom of soft limestone; both banks steep and are seldom overflowed. Rock shoal, 1 mile below gage, forms excellent control for low and medium stages. Highwater control not well defined.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year 20.7 feet at 10 a. m. June 29 (discharge not determined); minimum stage, 8.54 feet at 12.30 p. m. December 2 (discharge, 466 second-feet).

1913; 1921–1923: Maximum stage recorded, 21.1 feet March 22, 1913 (discharge not determined); minimum stage, 8.49 feet January 7, 1922 (discharge, 440 second-feet).

**REGULATION.**—Slight regulation during low water caused by small power plant located on Dry Creek, several miles above gage.

**ACCURACY.**—Stage-discharge relation practically permanent below 1,500 second-feet; above that stage the low-water control is drowned out but stage-discharge relation is fairly permanent. Rating curve well defined below 1,500 second-feet and fairly well defined between 1,500 and 2,600 second-feet; extended above 2,600 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good between 500 and 1,500 second-feet, fair between 1,500 and 3,000 second-feet and fair to poor for higher stages. No estimates of discharge have been made for stages above 16 feet (discharge, 3,870 second-feet).

*Discharge measurements of Chipola River near Altha, Fla., during the year ending September 30, 1923*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 7	A. E. Killebrew <sup>a</sup> .....	8.82	624	Mar. 28	P. E. Hanson.....	11.50	1,900 <sup>b</sup>
12	Warren Withee.....	8.74	572	June 9	do.....	13.23	2,600 <sup>b</sup>
28	B. M. Hall, jr. <sup>b</sup> .....	8.74	560	Sept. 12	J. P. Clawson.....	11.22	1,750 <sup>b</sup>
Jan. 23	P. E. Hanson.....	10.62	1,560				

<sup>a</sup> Engineer for city of Dothan, Ala.

<sup>b</sup> Engineer for Hardaway Construction Co.

*Daily discharge, in second-feet, of Chipola River near Altha, Fla., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	697	684	578	1,920	1,720	1,450	2,000	1,540	2,940	-----	3,580	-----
2.....	684	551	472	1,640	1,590	1,540	1,540	1,880	3,120	-----	3,530	-----
3.....	710	657	512	2,040	1,500	1,540	1,880	1,880	2,770	-----	3,670	-----
4.....	710	657	551	1,880	1,640	1,520	1,920	1,800	2,420	-----	3,620	2,720
5.....	710	644	551	2,040	1,780	1,500	1,920	1,640	2,220	-----	3,550	2,380
6.....	763	630	578	2,180	1,880	1,400	1,920	1,640	2,140	-----	3,480	2,220
7.....	763	630	578	2,380	1,720	1,640	1,840	1,640	2,300	3,440	3,260	2,040
8.....	763	604	578	2,300	1,760	1,300	1,920	1,500	2,460	3,150	2,760	2,000
9.....	763	578	472	2,260	1,720	1,300	2,000	1,450	2,540	2,860	2,420	1,980
10.....	816	578	697	2,180	2,000	1,400	1,880	1,350	2,440	2,460	2,380	1,960
11.....	763	587	922	2,040	2,090	1,350	2,080	1,300	2,340	2,420	1,960	1,920
12.....	710	596	975	1,880	2,180	1,300	1,920	1,240	2,110	2,180	-----	1,800
13.....	684	604	922	1,760	2,000	1,450	1,960	1,180	2,260	2,040	-----	1,760
14.....	710	578	869	1,680	2,040	1,800	2,040	1,130	2,630	2,000	-----	1,780
15.....	736	551	922	1,590	1,880	1,450	1,840	1,080	2,420	1,980	-----	1,590
16.....	763	578	869	1,400	1,840	1,540	1,640	1,190	2,180	1,960	-----	1,440
17.....	763	578	869	1,500	1,880	1,840	1,640	1,130	2,140	1,840	-----	1,300
18.....	763	604	869	1,300	1,710	1,940	1,590	1,130	2,110	1,920	-----	1,190
19.....	763	591	869	1,190	1,540	2,040	1,500	1,190	1,880	1,880	-----	1,350
20.....	763	578	922	1,350	1,640	1,960	1,400	1,240	1,880	1,880	-----	1,190
21.....	710	551	975	1,270	1,500	2,000	1,350	1,300	2,990	1,840	-----	1,540
22.....	697	472	975	1,190	1,400	2,110	1,540	1,240	2,110	1,800	-----	1,880
23.....	684	578	1,030	1,540	1,300	2,220	1,720	1,190	1,300	1,760	-----	1,710
24.....	684	578	1,080	1,960	1,300	2,300	1,760	1,190	1,220	1,540	-----	1,540
25.....	684	578	1,130	1,840	1,270	2,200	1,760	2,040	1,130	1,540	-----	1,640
26.....	657	578	1,130	1,960	1,240	2,110	1,720	2,580	2,260	1,640	-----	1,590
27.....	684	578	1,080	1,960	1,540	2,040	1,960	2,900	-----	2,110	-----	1,350
28.....	684	578	1,130	2,040	1,760	1,880	2,300	2,760	-----	2,080	-----	1,400
29.....	657	578	1,130	2,000	-----	1,760	1,920	2,630	-----	2,290	-----	1,400
30.....	630	578	1,240	1,960	-----	1,960	1,540	2,990	-----	2,500	-----	1,320
31.....	657	-----	1,580	1,920	-----	2,110	-----	2,860	-----	2,760	-----	-----

NOTE.—Gage not read on Sundays and holidays; discharge for those days interpolated. Discharge not computed June 27 to July 6 when stage was above 16.0 feet. The gage readings, in feet, during that period are as follows: June 27, 20.21; June 28, 19.8; June 29, 20.7; June 30, 20.4; July 2, 18.4; July 3, 18.1; July 5, 1.74; and July 6, 16.3 feet. No record Aug. 12 to Sept. 3.



*Monthly discharge of Chipola River near Altha, Fla., for the year ending September 30, 1923*

[Drainage area, 740 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	816	630	717	0.969	1.12
November.....	684	472	590	.797	.89
December.....	1,580	472	873	1.18	1.36
January.....	2,380	1,190	1,810	2.45	2.82
February.....	2,180	1,240	1,690	2.28	2.37
March.....	2,300	1,300	1,740	2.35	2.71
April.....	2,300	1,350	1,810	2.45	2.73
May.....	2,990	1,080	1,660	2.24	2.58
June 1-25.....	3,120	1,130	2,240	3.03	2.93
July 7-31.....	3,440	1,540	2,150	2.90	2.70
August 1-11.....	3,670	1,960	3,110	4.20	1.72
September 4-30.....	2,720	1,190	1,700	2.30	2.31

**CHOCTAWHATCHEE RIVER BASIN****CHOCTAWHATCHEE RIVER NEAR NEWTON, ALA.**

**LOCATION.**—Near highway bridge on Newton-Ozark road, 1 mile north of Newton, Dale County.

**DRAINAGE AREA.**—720 square miles (measured on map compiled by United States Geological Survey, scale 1 to 500,000).

**RECORDS AVAILABLE.**—June 11, 1906, to August 22, 1908; October 20, 1911, to August 3, 1912; November 29, 1921, to September 30, 1923.

**GAGE.**—Gurley seven-day water-stage recorder on left bank 700 feet above highway bridge; installed November 29, 1921; inspected by L. L. Davenport. Original gage was vertical staff at Elba Junction, 1 mile above highway bridge, and was used during 1906. On April 22, 1907, a chain gage was attached to downstream side of highway bridge and was used until August 3, 1912. Gage heights for 1906 were reduced to the same datum as the chain gage. Present gage is set to an independent datum.

**DISCHARGE MEASUREMENTS.**—Made from cable 100 feet above gage.

**CHANNEL AND CONTROL.**—Bed composed of marl formation; permanent. Low-water control is low marl shoal 100 feet below gage; probably permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year from water-stage recorder, 18.53 feet at 8 p. m. March 20 (discharge, 13,200 second-feet); minimum mean daily stage,  $-0.01$  foot October 1 (discharge, 124 second-feet).

1906-1908; 1911-1912; 1921-1923: Maximum stage recorded, 24.2 feet, old gage datum, March 25, 1908 (discharge, not determined); minimum mean daily stage,  $-0.02$  foot on September 5, 1922 (discharge, 122 second-feet).

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

**REGULATION.**—Possibly slight regulation from gristmill dams above.

**ACCURACY.**—Stage-discharge relation practically permanent during the year. Rating curve well defined between 250 and 2,000 second-feet; extended beyond these limits. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph, except for days of considerable fluctuation in stage, for which it was ascertained by averaging bihourly discharge. Records good below 2,000 second-feet; fair above that point.

*Discharge measurements of Choctawhatchee River near Newton, Ala., during the year ending September 30, 1923*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 8	Warren Withee.....	0.74	236	Mar. 28	P. E. Hanson.....	3.05	1,640
13	Withee and Killebrew.....	.64	257	June 8	do.....	2.61	1,380
Jan. 27	P. E. Hanson.....	2.63	1,320	Sept. 14	J. P. Clawson.....	1.04	393
Mar. 27	do.....	3.46	1,880				

*Daily discharge, in second-feet, of Choctawhatchee River near Newton, Ala., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	124	312	305	2,520	758	1,380	2,300	585	1,380	1,150	1,220	1,280
2.....	131	305	312	2,380	730	1,180	1,920	857	1,080	1,250	1,020	1,020
3.....	195	299	305	2,680	714	1,020	1,630	1,120	900	870	758	870
4.....	179	290	305	2,680	785	900	1,520	1,020	812	702	631	758
5.....	191	284	312	2,080	1,260	812	1,420	1,080	1,020	595	686	692
6.....	208	269	312	1,660	2,000	785	1,380	1,220	990	515	870	620
7.....	275	266	296	1,490	2,220	960	1,280	1,050	1,280	443	812	550
8.....	322	281	333	1,280	1,420	990	1,480	840	1,250	416	620	724
9.....	398	284	620	1,120	1,390	840	1,740	675	1,080	389	540	615
10.....	356	308	1,220	1,020	2,760	785	1,420	595	870	402	505	490
11.....	281	287	1,380	960	3,280	758	1,250	550	1,180	389	452	461
12.....	238	281	1,150	900	3,200	714	1,150	510	900	352	434	425
13.....	212	260	900	870	2,600	1,130	1,360	470	930	312	535	389
14.....	187	254	870	840	2,000	1,350	2,000	448	785	305	1,020	380
15.....	191	257	1,020	960	1,560	1,380	1,560	461	714	305	1,320	348
16.....	191	251	1,420	840	1,320	1,280	1,350	680	675	326	1,050	344
17.....	266	245	1,350	785	1,150	1,740	1,320	1,050	697	575	730	305
18.....	665	248	2,700	730	1,050	2,290	1,280	1,300	580	585	560	322
19.....	1,370	290	5,300	724	960	8,440	1,080	812	560	675	538	333
20.....	1,370	456	6,190	708	930	12,200	990	697	535	812	1,840	340
21.....	960	505	4,820	708	900	9,950	1,260	605	485	785	1,520	606
22.....	785	812	2,780	686	870	4,720	1,420	575	434	702	1,430	1,310
23.....	495	724	1,920	1,040	840	2,960	1,180	590	402	550	1,540	900
24.....	372	620	1,560	2,080	812	2,820	1,020	701	412	438	1,490	870
25.....	336	570	1,280	1,810	812	2,450	900	2,760	384	394	2,020	1,350
26.....	333	438	1,150	1,520	812	2,150	785	1,330	881	389	3,030	1,030
27.....	312	376	2,520	930	1,320	1,850	758	1,820	990	744	3,600	675
28.....	287	352	1,490	1,150	1,420	1,680	714	3,250	1,070	1,440	2,030	525
29.....	284	319	1,350	960	-----	1,740	686	3,620	1,740	2,260	2,240	448
30.....	284	308	1,080	870	-----	2,470	626	2,650	1,280	2,160	1,960	407
31.....	305	-----	1,430	785	-----	2,680	-----	1,850	-----	1,580	1,840	-----

*Monthly discharge of Choctawhatchee River near Newton, Ala., for the year ending September 30, 1923*

[Drainage area, 720 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,370	124	390	0.542	0.62
November.....	812	245	358	.497	.55
December.....	6,190	296	1,550	2.15	2.48
January.....	2,680	686	1,280	1.78	2.05
February.....	3,280	714	1,420	1.97	2.05
March.....	12,200	714	2,460	3.42	3.94
April.....	2,300	626	1,290	1.79	2.00
May.....	3,620	448	1,150	1.60	1.84
June.....	1,740	384	877	1.22	1.36
July.....	2,260	305	736	1.02	1.18
August.....	3,600	434	1,250	1.74	2.01
September.....	1,350	305	646	.897	1.00
The year.....	12,200	124	1,120	1.56	21.08

## CHOCTAWHATCHEE RIVER NEAR BELLWOOD, ALA.

**LOCATION.**—Half a mile below Chalkers Bluff dam site of city of Dothan,  $1\frac{1}{2}$  miles above Central of Georgia Railway bridge, and  $2\frac{1}{2}$  miles east of Bellwood, Geneva County.

**DRAINAGE AREA.**—1,260 square miles (measured on United States Soil Survey maps by the Ludlow Engineers, Winston-Salem, N. C.)

**RECORDS AVAILABLE.**—December 11, 1921, to September 30, 1923.

**GAGE.**—Gurley seven-day water-stage recorder on left bank of river; inspected by Elmer Childs and E. L. Crook.

**DISCHARGE MEASUREMENTS.**—Made from cable 20 feet above gage for stages below 8 feet (discharge, 4,400 second-feet); above that point it is impossible to obtain measurements. See "Channel and control."

**CHANNEL AND CONTROL.**—Bed sandy and shifting. Above gage height 8 feet right bank is overflowed some distance above gage and river flows around the gage in several channels.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year from water-stage recorder, 14.28 feet at noon March 20 (discharge, 18,000 second-feet); minimum mean daily stage, 0.03 foot October 1 (discharge, 438 second-feet).

1921-1923: Maximum stage recorded, that of March 20, 1923; minimum discharge, estimated 430 second-feet September 30, 1922.

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

**REGULATION.**—Some diurnal fluctuation caused by operation of Houston Power Co.'s plant on Little Choctawhatchee River, 16 miles above.

**ACCURACY.**—Stage-discharge relation practically permanent. Rating curve well defined below 4,400 second-feet; extended above that point on basis of comparison with rating for Choctawhatchee River near Newton. 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 obtained by inspection of recorder graph, except for days of considerable fluctuation in stage, for which it was ascertained by averaging bihourly discharge, and for days on which recorder did not operate. Records good below 4,400 second-feet; above that point they are subject to error on account of uncertain definition of rating curve.

*Discharge measurements of Choctawhatchee River near Bellwood, Ala., during the year ending September 30, 1923*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 8	Warren Withee.....	0.58	605	Mar. 29	P. F. Hanson.....	5.51	2,750
Jan. 25	P. E. Hanson.....	6.47	3,270	June 8	do.....	4.52	2,270
26	do.....	5.57	2,780	Sept. 10	J. P. Clawson.....	2.84	1,400
Mar. 26	do.....	6.79	3,500				

*Daily discharge, in second-feet, of Choctawhatchee River near Bellwood, Ala., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	442	610	555	4,150	1,390	2,540	4,040	1,130	3,070	2,430	2,360	2,320
2.....	442	610	580	4,060	1,340	2,120	3,370	1,510	2,280	2,170	1,970	1,820
3.....	580	595	580	4,160	1,300	1,770	2,880	2,570	1,770	2,090	1,510	1,770
4.....	555	580	568	4,450	1,440	1,620	2,710	2,020	1,670	1,520	1,260	1,520
5.....	530	555	580	3,610	2,550	1,480	2,600	1,820	2,190	1,340	1,260	1,340
6.....	530	530	580	2,880	3,900	1,440	2,600	2,070	2,020	1,210	1,570	1,260
7.....	610	542	568	2,440	3,280	1,720	2,320	1,820	2,700	1,090	1,620	1,130
8.....	640	580	640	2,170	2,600	1,720	2,250	1,570	2,380	1,000	1,340	1,200
9.....	700	580	1,090	1,920	2,270	1,480	3,760	1,300	2,070	1,520	1,090	1,550
10.....	700	580	1,970	1,720	3,920	1,340	3,380	1,090	1,670	1,210	970	1,390
11.....	625	568	1,920	1,620	5,720	1,300	2,510	1,010	1,640	1,050	970	1,130
12.....	568	555	1,670	1,520	4,620	1,260	2,220	970	1,560	935	900	970
13.....	518	530	1,300	1,480	4,140	1,820	2,250	900	1,520	848	830	900
14.....	505	542	1,170	1,440	3,640	2,600	3,560	900	1,390	812	1,570	865
15.....	492	530	1,210	1,620	2,880	2,320	3,090	882	1,260	848	2,070	830
16.....	480	542	1,720	1,620	2,440	2,120	2,440	1,260	1,210	1,000	1,770	778
17.....	530	530	1,870	1,390	2,120	2,880	2,320	1,480	1,170	1,590	1,320	715
18.....	795	530	2,790	1,260	1,920	3,230	2,440	1,870	1,090	1,130	1,010	760
19.....	1,050	530	6,700	1,260	1,770	9,620	2,070	1,530	970	1,170	882	778
20.....	1,340	640	8,400	1,210	1,670	17,300	1,820	1,300	935	1,300	1,780	795
21.....	1,260	715	7,500	1,210	1,620	15,200	2,150	1,210	900	1,300	2,410	830
22.....	1,090	812	4,850	1,170	1,570	10,100	3,340	1,090	848	1,170	2,000	2,620
23.....	848	970	3,040	1,750	1,480	5,860	2,550	1,050	795	1,010	2,750	2,040
24.....	685	830	2,380	4,090	1,390	4,400	2,040	1,010	760	935	2,420	1,340
25.....	610	795	2,020	3,530	1,390	3,980	1,720	3,890	730	900	3,130	1,710
26.....	595	700	1,820	2,760	1,390	3,580	1,570	3,790	1,490	900	3,990	1,960
27.....	595	625	2,070	2,220	2,160	3,220	1,570	3,220	3,020	1,140	4,310	1,310
28.....	568	595	2,710	1,970	2,930	2,930	1,480	4,340	2,500	2,620	3,890	1,050
29.....	542	568	2,220	1,770	-----	2,930	1,340	4,940	3,920	3,140	3,580	900
30.....	555	555	1,970	1,570	-----	3,690	1,300	4,310	3,400	3,630	3,720	812
31.....	580	-----	2,010	1,440	-----	5,000	-----	3,540	-----	3,060	2,980	-----

NOTE.—Recorder not operating Oct. 18-21; gage height estimated. Gage height partly estimated Oct. 1 and 2 because float rested on sand in bottom of well.

*Monthly discharge of Choctawhatchee River near Bellwood, Ala., for the year ending September 30, 1923*

[Drainage area, 1,260 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,340	442	663	0.526	0.61
November.....	970	530	614	.487	.54
December.....	8,400	555	2,230	1.77	2.04
January.....	4,450	1,170	2,240	1.78	2.05
February.....	5,720	1,300	2,460	1.95	2.03
March.....	17,300	1,260	3,950	3.13	3.61
April.....	4,040	1,300	2,450	1.94	2.16
May.....	4,940	882	1,980	1.57	1.81
June.....	3,920	730	1,760	1.40	1.56
July.....	3,630	812	1,490	1.18	1.36
August.....	4,310	830	2,040	1.62	1.87
September.....	2,620	715	1,280	1.02	1.14
The year.....	17,300	442	1,930	1.53	20.78

#### CHOCTAWHATCHEE RIVER NEAR GENEVA, ALA.

LOCATION.—At highway bridge three-fourths mile above mouth of Double Bridge Creek, 1 mile from Geneva, Geneva County, and  $1\frac{1}{2}$  miles above confluence with Pea River.

DRAINAGE AREA.—1,380 square miles (measured on map compiled by United States Geological Survey, scale 1 to 500,000).

RECORDS AVAILABLE.—June 12, 1922, to September 30, 1923. Gage-height records, August 26 to December 31, 1904.

**GAGE.**—Chain gage on downstream side of highway bridge, installed June 18, 1922; read by W. L. McLeod. During 1904 a vertical staff gage attached to right bent of old highway bridge at same site as present bridge was used; datum unknown.

**DISCHARGE MEASUREMENTS.**—Made from downstream side of highway bridge.

**CHANNEL AND CONTROL.**—Channel straight for 200 feet above and half a mile below gage; banks subject to overflow. Bed of stream firm sand and rock; probably permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 24.1 feet at 8.45 a. m. March 21 (discharge, estimated 18,900 second-feet); minimum stage, 2.0 feet at 11.45 a. m. October 19 (discharge, 550 second-feet).

1922–1923: Maximum stage recorded, that of March 21, 1923; minimum stage, 1.97 feet at 11.30 a. m. September 25, 1922 (discharge, 452 second-feet).

**REGULATION.**—Slight regulation caused by small power plants and mills above Bellwood.

**ACCURACY.**—Stage-discharge relation fairly permanent during low and medium stages; affected by backwater during high stages on Pea River. Rating curve fairly well defined between 600 and 4,000 second-feet; extended above 4,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

*Discharge measurements of Choctawhatchee River near Geneva, Ala., during the year ending September 30, 1923*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 10	Warren Withee.....	2.47	668	Mar. 26	P. E. Hanson.....	15.70	4,660
Jan. 22	P. E. Hanson.....	4.54	1,410	29	do.....	9.85	3,190
24	do.....	8.58	2,810	June 8	do.....	8.37	2,830
25	do.....	11.38	4,150	Sept. 7	J. P. Clawson.....	4.82	1,340
Mar. 25	do.....	17.83	5,570				

*Daily discharge, in second-feet, of Choctawhatchee River near Geneva, Ala., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	590	735	630	2,870	1,590	3,140	4,500	1,550	5,750	4,050	3,360	-----
2.....	610	690	610	4,100	1,430	2,690	4,450	1,510	5,400	3,280	2,820	-----
3.....	670	670	630	4,450	1,400	2,200	3,650	2,560	4,050	2,380	2,380	-----
4.....	670	670	630	4,500	1,360	1,950	3,180	2,690	2,820	1,910	2,150	-----
5.....	670	650	630	4,500	1,990	1,750	2,960	2,240	2,110	1,670	1,990	-----
6.....	710	630	630	3,850	3,280	1,630	2,870	2,240	2,380	1,470	1,830	-----
7.....	690	630	610	3,050	4,250	1,590	2,780	2,200	2,640	1,290	1,990	-----
8.....	710	630	630	2,420	3,850	1,870	2,780	1,950	2,690	1,670	1,910	1,220
9.....	710	630	970	2,150	3,320	1,670	2,820	1,710	2,380	1,830	1,400	1,290
10.....	690	630	2,380	1,870	3,140	1,430	3,750	1,510	1,990	1,950	1,220	1,470
11.....	670	630	2,330	1,750	4,600	1,430	3,550	1,400	1,750	1,510	1,180	1,430
12.....	650	630	2,240	1,590	5,400	1,400	2,780	1,290	1,870	1,180	1,220	1,220
13.....	610	610	1,830	1,510	5,450	1,550	2,460	1,180	1,590	1,090	1,090	1,090
14.....	590	610	1,400	1,510	5,200	2,780	2,920	1,150	1,670	970	1,150	1,030
15.....	570	610	1,220	1,510	4,500	2,460	3,500	1,120	1,430	1,030	2,240	1,000
16.....	570	610	1,430	1,510	3,700	2,240	3,460	1,180	1,430	1,150	-----	970
17.....	570	610	1,750	1,470	2,960	2,510	2,510	1,710	1,360	1,630	-----	885
18.....	570	610	1,990	1,430	2,330	3,320	2,510	1,750	1,910	1,590	-----	910
19.....	550	630	3,280	1,290	1,990	4,850	2,560	1,750	1,510	1,510	-----	910
20.....	1,430	630	7,340	1,180	1,910	10,500	2,240	1,830	1,290	1,400	-----	885
21.....	1,360	690	9,200	1,180	1,830	18,900	2,150	1,950	1,180	1,430	-----	910
22.....	1,090	735	8,220	1,180	1,790	16,000	3,280	1,870	1,150	1,360	-----	1,260
23.....	885	610	5,510	1,400	1,680	11,100	3,750	1,550	1,060	1,220	-----	1,360
24.....	735	835	3,600	2,960	1,590	6,420	3,050	1,360	1,030	1,150	-----	1,400
25.....	690	785	2,530	3,300	1,510	4,820	2,080	2,460	970	1,150	-----	1,360
26.....	650	650	1,830	4,450	1,430	4,360	2,070	3,410	1,430	1,470	-----	1,590
27.....	650	670	1,950	3,650	1,830	3,920	2,380	3,800	3,700	1,790	-----	1,360
28.....	670	650	2,330	2,690	2,690	3,530	2,280	3,230	3,320	2,560	-----	1,150
29.....	650	630	2,420	2,150	-----	3,460	1,950	3,650	4,350	2,740	-----	1,030
30.....	630	630	2,070	1,870	-----	3,600	1,710	4,400	4,400	3,050	-----	940
31.....	710	-----	2,600	1,670	-----	4,300	-----	5,350	-----	3,650	-----	-----

**NOTE.**—Discharge estimated Dec. 20–23 and Mar. 20–28 by comparison with records for Bellwood and Newton because of backwater from Pea River. No record Aug. 16 to Sept. 7.

*Monthly discharge of Choctawhatchee River near Geneva, Ala., for the year ending September 30, 1923*

[Drainage area, 1,380 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,430	550	717	0.520	0.60
November.....	910	610	664	.481	.54
December.....	9,200	610	2,420	1.75	2.02
January.....	4,500	1,180	2,450	1.78	2.05
February.....	5,450	1,360	2,780	2.01	2.09
March.....	18,900	1,400	4,300	3.12	3.60
April.....	4,500	1,710	2,910	2.11	2.35
May.....	5,350	1,120	2,180	1.58	1.82
June.....	5,750	970	2,350	1.70	1.90
July.....	4,050	970	1,810	1.31	1.51
August 1-15.....	3,360	1,090	1,860	1.35	.75
September 8-30.....	1,590	885	1,160	.841	.72

**PEA RIVER AT PERA, ALA.**

**LOCATION.**—At Elton wagon bridge, 500 feet below Louisville & Nashville Railroad bridge, half a mile west of Pera, Geneva County, and 10 miles above mouth of Flat Creek.

**DRAINAGE AREA.**—1,180 square miles.

**RECORDS AVAILABLE.**—August 27, 1904, to August 31, 1913; June 16, 1922, to September 30, 1923.

**GAGE.**—Gurley seven-day water-stage recorder, installed June 27, 1922, on right bank, downstream side of bridge.

**DISCHARGE MEASUREMENTS.**—Made from upstream side of bridge.

**CHANNEL AND CONTROL.**—Channel is composed of marl and sand. No well-defined control but stage-discharge relation is fairly permanent over a long period.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year from water-stage recorder, 29.9 feet at 4 a. m. March 20 (discharge, 12,200 second-feet); minimum mean daily stage, estimated 1.85 feet October 2 (discharge, 138 second-feet).

1904-1913; 1922-23: Maximum stage recorded, 32.8 feet April 24, 1912 (discharge, 13,200 second-feet); minimum discharge, 133 second-feet at 7.30 a. m. September 25, 1922.

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

**REGULATION.**—Power plants on Pea River at Elba and on Whitewater Creek, cause considerable diurnal fluctuation in stage. The storage of water at Elba over Sunday causes extreme low water at this station on Mondays.

**ACCURACY.**—Stage-discharge relation fairly permanent. Rating curve well defined between 300 and 2,500 second-feet; fairly well defined above 2,500 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 obtained by inspection of recorder graph except for days of considerable fluctuation in stage, for which it is the mean of bihourly discharge, and except for periods during which recorder did not operate. Records good.

*Discharge measurements of Pea River at Pera, Ala., during the year ending September 30, 1923*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
Nov. 9	Warren Withee-----	<i>Feet</i> 3.45	<i>Sec.-ft.</i> 414	Mar. 24	P. E. Hanson-----	<i>Feet</i> 24.33	<i>Sec.-ft.</i> 9,270
11	do-----	3.39	411	30	do-----	14.09	4,060
Jan. 21	P. E. Hanson-----	5.56	980	June 7	do-----	8.91	2,080
24	do-----	18.59	6,610	Sept. 6	J. P. Clawson-----	5.46	966

*Daily discharge, in second-feet, of Pea River at Pera, Ala., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	228	350	187	4,030	1,720	3,050	4,070	1,260	5,760	1,330	2,340	-----
2-----	138	370	330	4,300	1,540	2,680	3,300	1,560	5,070	1,300	2,080	-----
3-----	360	290	350	3,980	1,440	2,520	3,000	2,460	2,450	1,470	2,040	-----
4-----	350	320	280	4,500	1,400	2,080	3,000	1,930	1,820	1,300	1,890	-----
5-----	272	290	272	3,660	3,590	1,890	3,000	2,000	1,720	980	1,560	-----
6-----	272	250	280	2,920	5,420	1,860	3,000	2,080	2,190	770	1,780	-----
7-----	380	272	390	2,560	4,010	2,120	2,680	1,860	2,160	660	1,780	-----
8-----	390	310	635	2,280	3,080	1,860	2,500	1,780	2,200	560	-----	-----
9-----	330	360	1,530	1,960	3,080	1,610	4,480	1,860	2,040	1,620	-----	-----
10-----	430	272	3,030	1,720	5,000	1,540	3,880	1,750	1,920	1,420	-----	685
11-----	430	360	3,240	1,540	6,920	1,470	2,840	1,470	1,890	860	-----	740
12-----	390	300	3,160	1,470	6,900	1,470	2,600	1,220	1,820	622	-----	685
13-----	265	272	2,440	1,330	6,220	1,980	2,520	1,020	1,580	548	-----	660
14-----	262	350	1,800	1,300	5,500	2,860	3,210	950	1,360	522	-----	585
15-----	258	330	1,500	1,440	4,790	2,560	2,820	920	1,190	708	-----	450
16-----	228	265	1,900	1,330	3,720	3,000	2,440	1,450	1,310	1,440	-----	438
17-----	265	258	2,120	1,190	2,960	4,940	2,280	1,840	1,620	1,020	-----	346
18-----	440	290	2,810	1,080	2,520	6,170	2,760	1,260	1,470	710	-----	430
19-----	980	300	5,470	1,050	2,200	9,530	2,640	2,000	1,260	685	-----	450
20-----	860	360	6,020	1,020	2,000	12,000	2,400	3,080	920	740	-----	460
21-----	560	390	5,080	980	1,860	11,600	3,070	2,770	860	800	-----	460
22-----	430	400	4,360	1,020	1,720	11,000	3,930	2,110	740	710	-----	535
23-----	410	498	3,440	2,310	1,640	10,600	2,790	1,630	685	685	-----	499
24-----	420	535	2,720	6,000	1,580	9,510	2,360	1,260	635	740	-----	440
25-----	390	450	2,560	6,220	1,470	7,550	2,160	1,420	660	685	-----	1,090
26-----	250	370	2,120	4,270	1,470	5,360	2,190	1,670	1,060	635	-----	717
27-----	242	330	1,960	3,240	2,980	4,060	2,240	1,610	1,440	1,300	-----	572
28-----	340	390	2,380	2,640	4,010	3,620	1,860	2,380	1,400	1,830	-----	430
29-----	280	390	2,010	2,320	-----	3,930	1,610	3,490	2,870	2,590	-----	460
30-----	290	360	1,700	2,080	-----	4,510	1,440	4,770	1,960	3,280	-----	392
31-----	300	-----	1,790	1,890	-----	4,980	-----	5,210	-----	2,810	-----	-----

NOTE.—Recorder not operating Oct. 2, Dec. 10-17, Jan. 12, Feb. 11, Mar. 19, May 17, and 18; gage height estimated. Gage height partly estimated Oct. 13, Dec. 9, 18, 23-27, Jan. 7, 11, 13, 19, 24, 25, May 16, 19, Sept. 10, 14-17, 23, 24, 28, and 30. Discharge interpolated Oct. 14. No record Aug. 8 to Sept. 9.

*Monthly discharge of Pea River at Pera, Ala., for the year ending September 30, 1923*

[Drainage area, 1,180 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	980	138	369	0.313	0.36
November.....	535	250	343	.291	.32
December.....	6,020	187	2,190	1.86	2.14
January.....	6,220	980	2,500	2.12	2.44
February.....	6,920	1,400	3,240	2.75	2.86
March.....	12,000	1,470	4,640	3.93	4.53
April.....	4,480	1,440	2,770	2.35	2.62
May.....	5,210	920	2,000	1.69	1.95
June.....	5,760	635	1,800	1.53	1.71
July.....	3,280	522	1,140	.966	1.11
August 1-7.....	2,540	1,500	1,920	1.63	.42
September 10-30.....	1,090	346	549	.465	.36

**PEA RIVER NEAR GENEVA, ALA.**

**LOCATION.**—At highway bridge 2 miles west of Geneva, Geneva County, and 3 miles above confluence with Choctawhatchee River.

**DRAINAGE AREA.**—1,560 square miles (measured on maps compiled by United States Geological Survey; scale, 1 to 500,000).

**RECORDS AVAILABLE.**—June 17, 1922, to September 30, 1923.

**GAGE.**—Chain gage attached to upstream handrail of highway bridge; read by J. D. Howell.

**DISCHARGE MEASUREMENTS.**—Made from upstream side of bridge.

**CHANNEL AND CONTROL.**—Channel straight above and below gage. Right bank high; left bank subject to overflow at high stages. Bed of stream firm sand; fairly permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 26.7 feet at 8 a. m. and noon March 21 (discharge, 16,900 second-feet); minimum stage, 2.1 feet at 8 a. m. October 2 (discharge, 345 second-feet).

1922-23: Maximum stage recorded, that of March 21, 1923; minimum stage, 1.97 feet at 7.20 a. m. September 5, 1922 (discharge, 326 second-feet).

**REGULATION.**—Considerable regulation at power plants above Pera, Ala.

**ACCURACY.**—Stage-discharge relation fairly permanent; may be affected by backwater during extreme high water on Choctawhatchee River. Rating curve well defined between 300 and 11,000 second-feet; extended above 11,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

*Discharge measurements of Pea River near Geneva, Ala., during the year ending September 30, 1923*

Date	Made by—	Gage height	Dis- charge	Date	Made by—	Gage height	Dis- charge
Nov. 10	Warren Withee.....	2.78	422	Mar. 26	P. E. Hanson.....	19.60	10,500
Jan. 22	P. E. Hanson.....	5.68	1,280	29	-----do-----	12.06	4,330
24	-----do-----	10.63	3,420	June 8	-----do-----	9.79	2,780
25	-----do-----	13.87	5,400	Sept. 8	J. P. Clawson.....	5.56	1,310



*Daily discharge, in second-feet, of Pea River near Geneva, Ala., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	360	500	520	3,440	1,970	4,110	6,580	1,850	8,510	4,530	4,250	-----
2	345	500	420	4,880	1,810	3,680	6,100	1,650	8,330	2,860	3,440	-----
3	420	520	480	6,100	1,650	2,860	4,740	2,660	7,700	2,570	3,210	-----
4	560	460	500	5,940	1,650	2,480	3,740	3,320	4,110	2,210	2,570	-----
5	520	460	460	6,100	1,930	2,170	3,500	2,710	2,960	1,970	2,440	-----
6	460	440	460	5,230	3,800	1,970	3,440	2,620	2,480	1,650	2,340	-----
7	460	420	460	4,460	5,860	1,930	3,440	2,620	3,010	1,370	2,520	-----
8	560	420	520	3,010	5,620	2,130	3,060	2,260	2,960	1,200	2,620	-----
9	560	460	890	2,570	3,920	1,970	3,010	2,050	2,710	1,510	1,650	1,580
10	520	480	2,260	2,210	3,800	1,730	4,460	1,930	2,300	2,390	1,400	1,690
11	560	460	2,960	1,930	5,460	1,650	4,670	1,770	2,050	2,090	1,340	1,510
12	520	460	3,060	1,770	7,540	1,580	3,440	1,580	2,050	1,440	1,410	1,300
13	520	460	2,570	1,650	8,150	1,650	2,910	1,370	1,810	1,100	1,480	1,070
14	440	420	2,050	1,580	7,620	2,300	3,210	1,230	1,810	980	1,260	980
15	400	460	1,620	1,510	6,660	2,960	3,980	1,200	1,580	1,130	2,660	860
16	400	480	1,650	1,770	5,540	2,660	3,740	1,260	1,400	1,510	-----	810
17	440	420	1,970	1,650	4,250	2,960	2,910	1,810	1,370	2,050	-----	760
18	480	420	2,130	1,480	2,960	4,740	2,660	1,930	2,010	1,770	-----	660
19	810	440	3,500	1,370	2,570	6,900	2,960	2,010	1,850	1,440	-----	710
20	1,100	460	6,020	1,340	2,300	13,200	2,760	2,440	1,580	1,400	-----	735
21	1,070	540	7,460	1,300	2,130	16,900	2,520	2,810	1,340	1,370	-----	760
22	760	500	7,380	1,230	1,970	16,800	4,460	2,810	1,260	1,300	-----	810
23	660	610	6,020	1,440	1,890	15,700	5,020	2,300	1,100	1,200	-----	980
24	560	660	3,980	3,210	1,810	14,000	4,250	1,810	1,010	1,130	-----	1,070
25	540	635	2,860	5,380	1,650	12,400	2,960	3,210	920	1,300	-----	920
26	540	560	2,480	6,660	1,650	10,400	2,520	3,260	1,260	1,340	-----	1,580
27	460	540	2,210	5,540	1,970	7,970	3,740	3,560	4,530	1,440	-----	1,340
28	440	480	2,520	3,380	3,060	5,620	3,260	3,260	4,180	2,910	-----	950
29	420	520	2,860	2,810	-----	4,390	2,570	3,860	4,300	3,260	-----	785
30	420	520	2,440	2,390	-----	4,390	2,130	6,380	4,410	3,320	-----	785
31	480	-----	2,010	2,130	-----	5,540	-----	6,900	3,740	-----	-----	-----

NOTE.—Gage not read June 24, 29, 30, and Aug. 12; discharge interpolated. No record Aug. 16 to Sept. 8.

*Monthly discharge of Pea River near Geneva, Ala., for the year ending September 30, 1923*

[Drainage area, 1,560 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,100	345	541	0.347	0.40
November	660	420	492	3.15	.35
December	7,460	420	2,470	1.58	1.82
January	6,660	1,230	3,080	1.97	2.27
February	8,150	1,650	3,610	2.31	2.40
March	16,900	1,580	5,800	3.72	4.29
April	6,580	2,130	3,620	2.32	2.59
May	6,900	1,200	2,560	1.64	1.89
June	8,510	920	2,900	1.86	2.08
July	4,530	980	1,920	1.23	1.42
August 1-15	4,250	1,260	2,310	1.48	.83
September 9-30	1,690	660	1,080	.660	.54

## MOBILE RIVER BASIN

COOSAWATTEE RIVER AT CARTERS, GA.

LOCATION.—At iron highway bridge at Carters, Murray County, 1,000 feet above Louisville & Nashville Railroad bridge and half a mile below mouth of Talking Rock Creek.

DRAINAGE AREA.—531 square miles.

RECORDS AVAILABLE.—August 15, 1896, to December 31, 1908; December 20, 1918, to September 30, 1923, when the station was discontinued.

GAGE.—Chain gage on downstream side of bridge; read by R. P. Messer.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Channel is curved above and below bridge. Current is swift and broken. Banks fairly high but subject to overflow during extremely high stages. Bed of stream mostly rock and gravel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 22.5 feet at 4 p. m. December 17 (discharge, 16,100 second-feet); minimum stage, 1.0 foot October 4, 5, November 12–14, 26, 27, and December 2 (discharge, 340 second-feet).

1896–1908; 1919–1923: Maximum stage recorded, 28.6 feet at 6 a. m. November 19, 1906 (discharge, not determined); minimum stage, 0.4 foot September 20–22, October 9 to November 3, and November 11–21, 1904 (discharge, 184 second-feet).

ICE.—Practically none.

DIVERSIONS.—None.

REGULATION.—Operation of a few small mills on tributary streams probably has no effect on stage at the gage.

ACCURACY.—Stage-discharge relation probably permanent, but no measurements have been made since February 6, 1920. Rating curve previously developed fairly well defined between 500 and 3,000 second-feet; extended above 6,000 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair except those for stages above 6,000 second-feet, which are subject to error.

*Daily discharge, in second-feet, of Coosawattee River at Carters, Ga., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	370	435	370	1,100	1,000	1,150	1,150	2,350	2,630	1,400	2,560	1,150
2.....	370	435	340	1,050	910	1,050	1,150	2,000	2,350	1,250	2,420	955
3.....	355	400	540	1,000	1,400	1,000	1,100	2,350	2,000	1,200	2,210	955
4.....	340	400	1,700	955	6,500	1,100	2,350	2,770	1,880	1,640	1,760	910
5.....	340	370	910	910	6,100	1,400	1,700	3,120	1,760	1,460	1,150	865
6.....	370	370	820	865	5,300	1,460	1,400	2,000	1,700	1,350	955	865
7.....	1,200	370	775	820	3,750	1,350	1,300	2,140	2,000	1,250	910	820
8.....	695	400	735	775	2,000	1,200	1,460	1,940	2,350	1,100	955	820
9.....	540	400	695	735	1,300	1,460	1,880	1,820	1,940	1,350	910	775
10.....	505	370	910	695	1,580	1,520	1,400	1,760	1,820	1,250	910	775
11.....	470	370	820	695	1,400	1,580	1,250	1,700	1,760	1,150	865	735
12.....	435	340	910	655	1,520	1,400	1,150	1,640	1,760	1,100	955	695
13.....	435	340	865	615	2,560	2,210	2,350	1,580	1,700	1,050	955	655
14.....	400	340	1,150	615	2,350	1,150	5,300	1,520	1,700	1,050	910	615
15.....	400	370	1,700	615	2,210	1,050	2,560	1,460	1,640	1,250	910	615
16.....	400	695	2,000	655	1,940	955	2,000	4,500	1,580	1,200	865	575
17.....	505	655	11,700	615	1,820	4,500	1,700	3,050	1,520	1,150	865	575
18.....	540	575	4,500	615	1,700	2,770	1,520	1,640	1,460	1,100	820	540
19.....	470	540	1,700	575	1,580	2,910	1,460	1,580	1,400	1,050	820	530
20.....	435	470	1,400	575	1,520	2,000	1,460	2,350	1,350	955	820	575
21.....	400	435	1,150	615	1,460	1,580	1,400	3,050	1,250	910	910	540
22.....	400	400	1,050	695	1,400	1,640	1,350	2,560	1,250	865	1,050	540
23.....	435	370	865	1,150	1,300	1,820	1,350	2,000	1,200	3,050	1,150	505
24.....	400	370	820	3,540	1,250	1,700	1,700	1,700	2,700	1,700	955	505
25.....	400	355	775	2,350	910	1,400	2,000	2,630	2,350	1,150	910	615
26.....	370	340	735	1,200	865	1,350	1,700	3,050	2,280	1,050	865	575
27.....	370	340	695	1,100	2,210	1,300	1,580	3,750	2,070	1,150	820	540
28.....	370	400	1,700	1,000	1,580	1,250	2,000	3,400	4,500	1,200	820	505
29.....	370	435	1,150	910	-----	1,200	4,820	3,050	3,050	2,770	2,000	505
30.....	355	400	910	865	-----	1,200	3,750	3,400	1,700	2,700	1,460	505
31.....	370	-----	695	955	-----	1,150	-----	2,910	-----	2,630	1,250	-----

*Monthly discharge of Coosawattee River at Carters, Ga., for the year ending September 30, 1923*

[Drainage area, 531 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,200	340	446	0.840	0.97
November.....	695	340	416	.783	.87
December.....	11,700	340	1,450	2.73	3.15
January.....	3,540	575	952	1.79	2.06
February.....	6,500	865	2,120	3.99	4.16
March.....	4,500	955	1,570	2.96	3.41
April.....	5,300	1,100	1,910	3.60	4.02
May.....	4,500	1,460	2,410	4.54	5.23
June.....	4,500	1,200	1,960	3.69	4.12
July.....	3,050	865	1,400	2.64	3.04
August.....	2,560	820	1,150	2.17	2.50
September.....	1,150	505	678	1.28	1.43
The year.....	11,700	340	1,370	2.58	34.96

**OOSTANAULA RIVER AT RESACA, GA.**

**LOCATION.**—At Dixie Highway bridge at Resaca, Gordon County 400 feet below Nashville, Chattanooga & St. Louis Railroad bridge and 3 miles below point where Coosawattee and Connasauga Rivers unite to form Oostanaula River.

**DRAINAGE AREA.**—1,610 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—1891–1898 (gage heights by United States Weather Bureau and discharge measurements by United States Geological Survey); 1894–1904 incomplete records of gage heights only; continuous records January 1, 1905, to September 30, 1923, when station was discontinued.

**GAGE.**—Chain gage on downstream handrail of bridge. Prior to March 23, 1919, when chain gage was installed, the gage was a rod attached to downstream end of midstream pier of Nashville, Chattanooga & St. Louis Railroad bridge 400 feet upstream from present gage. Gage read by observer for United States Weather Bureau.

**DISCHARGE MEASUREMENTS.**—Made from downstream side of bridge.

**CHANNEL AND CONTROL.**—Bed composed of rock and sand. Right bank high and is not overflowed; left bank is overflowed at very high stages. Control practically permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 19.5 feet at 8 a. m. December 19 (discharge, 16,200 second-feet); minimum stage, 1.7 feet October 4–6 (discharge, 540 second-feet).

1896–1923: Maximum stage recorded,<sup>2</sup> 33.0 feet February 11, 1921 (discharge, 29,700 second-feet); Minimum stage, 0.95 foot during discharge measurement made September 26, 1904 (discharge, 273 second-feet).

**ICE.**—None.

**DIVERSIONS.**—None.

**REGULATION.**—Practically none from the few small mills upstream.

**ACCURACY.**—Stage-discharge relation practically permanent. Rating curve well defined between 450 and 8,000 second-feet; extended above 8,000 second-feet on a tangent. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records below 9,000 second-feet good; above that stage they should be used with caution.

No discharge measurements have been made at this station since October 16, 1919.

<sup>2</sup> Gage-height records not obtained during the following periods: May 1 to July 31, 1896; May 1 to October 31, 1899; July 1 to October 31, 00; May 1 to November 12, 1901, and January 1, to December 31, 1904.

*Daily discharge, in second-feet, of Oostanaula River at Resaca, Ga., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	600	600	600	4, 100	3, 220	3, 380	2, 470	7, 200	6, 400	2, 820	2, 400	1, 390
2-----	570	600	600	6, 900	2, 900	2, 750	2, 330	4, 280	5, 180	2, 610	2, 400	1, 270
3-----	570	600	600	4, 370	5, 000	2, 470	2, 190	3, 540	4, 020	2, 400	2, 260	1, 330
4-----	540	600	990	2, 980	4, 820	2, 330	2, 610	3, 300	3, 460	3, 140	1, 840	1, 270
5-----	540	600	3, 060	2, 470	10, 300	2, 330	5, 180	4, 910	3, 220	2, 470	1, 700	1, 840
6-----	540	570	1, 570	2, 050	12, 000	2, 260	4, 640	8, 800	3, 780	2, 190	1, 840	1, 840
7-----	1, 510	600	1, 040	1, 910	10, 800	5, 720	3, 860	6, 200	3, 300	2, 120	3, 300	1, 330
8-----	2, 120	600	990	1, 770	7, 700	7, 600	3, 060	4, 280	5, 630	2, 120	2, 050	1, 270
9-----	1, 390	600	1, 270	1, 630	4, 820	6, 400	2, 980	5, 360	3, 940	3, 140	1, 770	1, 210
10-----	1, 040	570	1, 390	1, 570	4, 020	3, 620	3, 140	3, 860	3, 220	2, 980	4, 280	1, 210
11-----	795	570	1, 510	1, 450	3, 620	3, 380	2, 610	3, 380	3, 540	1, 980	3, 940	1, 090
12-----	710	570	1, 330	1, 330	3, 460	3, 540	2, 610	3, 060	4, 910	1, 770	2, 330	1, 040
13-----	670	570	1, 450	1, 270	4, 460	5, 000	3, 380	3, 380	6, 300	1, 700	1, 980	1, 040
14-----	635	570	1, 450	1, 210	12, 300	5, 360	13, 200	4, 910	4, 910	3, 060	1, 980	990
15-----	600	570	2, 260	1, 450	11, 000	4, 640	15, 000	3, 860	3, 220	3, 780	1, 700	940
16-----	600	600	7, 200	1, 700	9, 500	3, 620	10, 700	11, 000	2, 820	2, 610	1, 570	940
17-----	600	750	9, 900	1, 450	5, 090	12, 200	5, 270	12, 100	2, 540	2, 400	1, 450	890
18-----	635	710	15, 800	1, 270	3, 060	10, 800	3, 380	11, 000	2, 400	4, 370	1, 700	840
19-----	670	710	16, 200	1, 210	2, 750	8, 900	3, 460	11, 100	2, 260	7, 300	1, 630	840
20-----	635	710	11, 000	1, 570	2, 610	7, 500	3, 060	12, 800	2, 120	8, 700	1, 510	840
21-----	635	670	5, 720	1, 150	2, 540	5, 000	2, 980	13, 000	2, 050	5, 720	1, 390	840
22-----	635	670	2, 330	1, 510	2, 400	4, 100	4, 020	11, 300	2, 190	3, 700	1, 330	1, 090
23-----	600	670	2, 050	2, 980	2, 260	3, 700	4, 020	8, 100	2, 120	2, 820	1, 630	990
24-----	670	670	1, 770	10, 800	2, 120	4, 730	4, 820	8, 000	2, 120	2, 750	4, 460	890
25-----	710	635	1, 570	10, 500	2, 050	5, 900	3, 860	7, 700	2, 900	2, 260	2, 820	890
26-----	710	635	1, 450	9, 800	1, 980	4, 190	3, 220	6, 200	2, 330	1, 840	1, 840	940
27-----	670	600	1, 390	8, 300	3, 300	3, 620	2, 750	6, 800	2, 120	1, 700	1, 700	890
28-----	670	600	1, 450	3, 300	4, 730	3, 220	5, 270	7, 700	3, 540	1, 630	1, 630	890
29-----	635	635	2, 260	3, 220	-----	2, 820	6, 400	8, 200	8, 500	3, 940	2, 190	840
30-----	635	635	1, 770	3, 900	-----	2, 680	11, 100	7, 700	4, 730	5, 270	2, 400	795
31-----	600	-----	1, 630	2, 820	-----	2, 900	-----	8, 200	-----	3, 620	1, 570	-----

*Monthly discharge of Oostanaula River at Resaca, Ga., for the year ending September 30, 1923*

[Drainage area, 1,610 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October-----	2, 120	540	746	0. 463	0. 53
November-----	750	570	623	. 387	. 43
December-----	16, 200	600	3, 340	2. 07	2. 39
January-----	10, 800	1, 150	3, 240	2. 01	2. 32
February-----	12, 300	1, 980	5, 170	3. 21	3. 34
March-----	12, 200	2, 260	4, 730	2. 94	3. 39
April-----	15, 000	2, 190	4, 800	2. 98	3. 32
May-----	13, 000	3, 060	7, 140	4. 43	5. 11
June-----	8, 500	2, 050	3, 660	2. 27	2. 53
July-----	8, 700	1, 630	3, 190	1. 98	2. 28
August-----	4, 460	1, 330	2, 150	1. 34	1. 54
September-----	1, 840	795	1, 080	. 671	. 75
The year-----	16, 200	540	3, 320	2. 06	27. 93

# MOBILE RIVER BASIN

## COOSA RIVER AT CHILDERSBURG, ALA.

**LOCATION.**—At Central of Georgia Railway bridge half a mile west of Childersburg, Talladega County.

**DRAINAGE AREA.**—8,390 square miles (determined by Alabama Power Co.).

**RECORDS AVAILABLE.**—February 22, 1914, to September 30, 1923.

**GAGE.**—Gurley printing water-stage recorder attached to downstream end of second pier from right bank of river, installed on May 5, 1914. Prior to that date readings were taken from a vertical staff gage fastened to upstream side of same pier to which the Gurley gage is now attached. Datum of Gurley gage is about 0.1 foot higher than that of the staff gage. This difference in datum is believed constant since 1914. All records from 1915 to 1923 are referred to datum of Gurley gage. Sea-level elevation of zero of staff gage is 421.00 feet (United States Engineer Corps datum).

**DISCHARGE MEASUREMENTS.**—Made from bridge.

**CHANNEL AND CONTROL.**—Channel straight for half a mile below gage. Left bank high; right bank subject to overflow at extremely high stages. Control not well defined; bed of stream probably permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 19.4 feet from 5 to 9 a. m. February 14 (discharge, 86,900 second-feet); minimum stage, 1.5 feet October 2-5, November 5, 6, 29, 30 (discharge, 3,000 second-feet).

1914-1923: Maximum stage from water-stage recorder, 24.7 feet from 3 to 9 and 11 to 12 p. m. July 11, 1916 (discharge, 121,000 second-feet); minimum discharge, 2,370 second-feet, September 20, 1914.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation practically permanent. Rating curve well defined between 3,000 and 70,000 second-feet; extended above 70,000 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 averaging hourly gage heights. Records good below 70,000 second-feet; fair above that point.

**COOPERATION.**—Gage-height record furnished by the Alabama Power Co.

*Discharge measurements of Coosa River at Childersburg, Ala., during the year ending September 30, 1923*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 26	P. E. Hanson.....	1. 66	3, 180	Dec. 20	Warren Withee.....	14. 36	56, 600
Dec. 19	Warren Withee.....	14. 98	60, 600	20	-----de-----	14. 16	54, 800

*Daily discharge, in second-feet, of Coosa River at Childersburg, Ala., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	3,250	3,250	3,250	13,000	13,300	14,800	12,600	30,700	51,000	10,500	7,930	7,630
2.....	3,000	3,250	3,250	14,400	12,200	17,400	11,600	31,200	44,700	14,000	10,200	7,630
3.....	3,000	3,250	3,250	15,100	11,900	16,600	11,600	27,500	33,500	11,900	9,190	6,460
4.....	3,000	3,250	3,250	18,500	13,300	14,000	14,400	24,500	24,500	9,520	8,240	5,340
5.....	3,000	3,000	3,250	17,000	26,200	12,200	19,300	24,000	20,800	8,240	7,040	5,070
6.....	3,750	3,000	3,250	13,700	36,800	11,600	18,500	20,800	18,500	5,900	6,750	4,800
7.....	4,270	3,250	3,250	11,200	42,200	16,200	18,500	22,000	16,200	8,870	6,180	5,900
8.....	4,530	3,250	4,270	9,850	42,200	19,300	18,100	28,000	14,800	8,240	6,180	7,040
9.....	4,010	3,250	5,340	8,870	38,200	22,400	15,100	27,100	14,400	7,930	6,460	6,750
10.....	6,750	3,250	5,070	8,240	31,600	22,000	15,100	22,800	14,800	8,240	8,240	5,620
11.....	7,330	3,250	4,530	7,630	33,900	20,400	13,300	19,300	15,100	9,520	8,240	4,800
12.....	6,180	3,250	5,070	7,040	33,500	17,700	11,900	17,000	11,900	9,190	8,550	4,530
13.....	5,070	3,250	5,900	7,630	60,400	20,000	15,900	15,100	11,200	8,240	10,900	4,530
14.....	4,270	3,250	5,620	6,460	86,300	19,600	49,900	14,800	13,700	7,040	11,200	4,270
15.....	4,010	3,250	6,460	7,630	66,200	19,600	50,500	14,800	17,000	6,750	7,930	4,010
16.....	3,750	3,250	8,870	8,240	55,900	22,000	50,500	29,300	15,500	7,930	6,750	3,750
17.....	3,500	3,250	25,700	7,630	48,900	29,800	46,300	31,600	13,000	9,520	6,460	3,750
18.....	3,500	3,500	55,900	7,330	44,700	33,000	40,200	32,100	11,600	9,850	6,180	3,750
19.....	3,500	4,010	59,300	7,630	29,800	36,300	30,700	32,100	10,500	9,190	6,750	3,750
20.....	3,500	3,750	56,500	6,750	21,200	36,300	21,200	28,900	9,520	10,500	7,040	3,750
21.....	3,500	3,500	47,800	6,460	16,200	33,000	17,400	34,900	8,870	13,000	6,460	3,750
22.....	3,500	3,500	47,800	6,750	14,000	28,900	19,300	39,700	8,240	13,300	6,460	3,500
23.....	3,250	3,500	40,700	14,800	13,000	24,500	18,900	42,200	8,550	13,000	7,040	3,500
24.....	2,250	3,250	24,900	31,600	11,900	27,500	17,400	38,200	9,190	10,500	6,750	3,500
25.....	3,250	3,250	12,200	39,200	11,200	28,000	15,900	41,700	9,520	7,930	6,460	3,750
26.....	3,250	3,250	9,190	40,200	11,200	27,100	14,800	37,800	9,850	6,750	6,180	4,270
27.....	3,500	3,250	8,240	36,300	12,200	23,200	13,300	37,800	10,000	7,040	7,040	4,270
28.....	3,500	3,250	8,240	28,900	13,700	18,900	13,000	43,200	10,200	6,750	7,330	3,750
29.....	3,500	3,000	7,930	24,000	-----	17,000	22,400	52,100	10,900	6,750	7,040	3,750
30.....	3,500	3,000	7,930	19,600	-----	15,100	27,500	51,000	9,190	6,180	6,180	3,750
31.....	3,250	-----	8,550	13,300	-----	11,900	-----	50,500	-----	5,900	6,460	-----

*Monthly discharge of Coosa River at Childersburg, Ala., for the year ending September 30, 1923*

[Drainage area, 8,390 square miles]

Month.	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	7,330	3,000	3,880	0.462	0.53
November.....	4,010	3,000	3,290	.392	.44
December.....	59,300	3,250	16,000	1.91	2.20
January.....	40,200	6,460	15,000	1.79	2.06
February.....	86,300	11,200	30,400	3.62	3.77
March.....	36,300	11,600	21,800	2.60	3.00
April.....	50,500	11,600	22,200	2.65	2.96
May.....	52,100	14,800	31,100	3.71	4.28
June.....	51,000	8,240	15,900	1.90	2.12
July.....	14,000	5,900	8,970	1.07	1.23
August.....	11,200	6,180	7,410	.883	1.02
September.....	7,630	3,500	4,700	.560	.62
The year.....	86,300	3,000	15,000	1.79	24.23

#### TALLAPOOSA RIVER AT STURDIVANT, ALA.

LOCATION.—2,000 feet above bridge of Central of Georgia Railway, which is one-fourth mile west of Sturdivant, Tallapoosa County, 1 mile below Stow's Ferry, and 5 miles below mouth of Hillabee Creek.

DRAINAGE AREA.—2,460 square miles.

RECORDS AVAILABLE.—July 19, 1900, to September 30, 1923.

GAGE.—Slope gage installed September 22, 1923, on right bank 2,000 feet upstream from bridge; replacing a staff gage in several sections at same site which was used prior to that date. Datum of gage lowered 0.07 foot on September 22, 1923, but readings September 22–30, 1923, have been reduced to datum of previous gage. Gage read by B. F. Neighbours. For description of earlier gages see Water-Supply Paper 542.

**DISCHARGE MEASUREMENTS.**—Made from a plank walk resting on lower members of deck of railroad bridge.

**CHANNEL AND CONTROL.**—Bed rough and rocky; permanent. At extreme high stages water overflows banks. Control is a series of rock ledges and shoals below gage; permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 17.4 feet at 7 a. m. February 14 (discharge, 46,200 second-feet); minimum stage, 0.05 foot at 5 p. m. October 3, 7 a. m. and 5 p. m. October 4 and 5 (discharge, 430 second-feet).

1900-1923: Maximum stage recorded, 33.3 feet at noon December 11, 1919 (discharge, 104,000 second-feet); minimum stage, -0.2 foot (old datum) October 25-29, 1904 (discharge, 250 second-feet).

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

**REGULATION.**—Practically none.

**ACCURACY.**—Stage-discharge relation fairly permanent. Rating curve well defined between 600 and 30,000 second-feet; extended above 30,000 second-feet on basis of crest run-off of Chattahoochee River during flood of December 11, 1919. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

*Discharge measurements of Tallapoosa River at Sturdivant, Ala., during the year ending September 30, 1923*

[Made by P. E. Hanson]

Date	Gage height	Discharge	Date	Gage height	Discharge
	<i>Feet</i>	<i>Sec.-ft.</i>		<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 27.....	1.07	980	Aug. 4.....	2.40	2,260
May 14.....	3.70	3,930	Sept. 21.....	.50	600
Aug. 3.....	2.38	2,160			

*Daily discharge, in second-feet, of Tallapoosa River at Sturdivant, Ala., for the year ending September 30, 1923*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	470	920	3,840	9,130	2,160	8,410	3,840	6,140	10,900	3,510	1,370	2,390
2.....	470	990	5,320	7,470	2,160	5,320	3,200	5,320	6,570	3,350	2,910	2,260
3.....	450	1,060	13,600	7,240	2,050	3,510	3,840	5,320	5,520	2,640	2,160	1,840
4.....	430	1,460	16,000	3,840	2,510	2,390	8,890	5,320	4,550	2,390	2,050	1,640
5.....	430	4,370	14,500	3,200	9,880	1,940	13,900	5,120	4,930	2,160	1,640	1,370
6.....	2,390	2,910	9,880	1,840	14,800	3,510	7,240	5,520	5,120	2,160	1,550	1,210
7.....	8,170	1,130	3,510	2,390	9,630	3,510	5,720	5,320	4,740	1,940	1,550	1,210
8.....	4,550	1,460	3,350	2,160	5,930	4,930	5,320	4,550	4,190	2,910	1,640	1,210
9.....	3,200	1,290	2,390	2,270	4,550	4,190	4,740	3,510	3,670	2,770	2,510	1,210
10.....	2,160	1,210	1,940	2,160	4,370	2,770	4,010	3,350	3,510	3,050	4,740	1,060
11.....	1,460	1,290	1,940	2,050	5,720	1,940	4,010	3,510	3,510	2,640	2,910	920
12.....	1,740	1,060	1,640	1,940	14,200	4,370	3,510	3,670	3,200	2,160	2,640	890
13.....	1,210	1,130	1,640	1,840	12,500	18,600	3,350	4,190	3,350	1,940	2,510	830
14.....	1,130	1,060	1,550	1,740	45,500	12,500	3,840	4,010	3,200	2,050	1,640	800
15.....	1,060	1,060	1,370	1,940	30,800	11,700	10,600	3,200	3,200	1,940	1,460	740
16.....	1,060	1,060	1,060	2,640	20,900	12,200	9,880	19,200	3,200	1,740	1,370	710
17.....	920	1,060	920	2,390	8,410	17,000	10,400	18,600	4,010	1,940	1,460	655
18.....	920	1,060	6,570	2,050	5,320	12,800	8,650	8,410	3,840	2,910	1,640	630
19.....	1,130	1,060	11,400	1,940	4,190	9,880	8,410	5,930	3,200	5,320	2,390	655
20.....	920	1,060	5,720	1,840	3,840	7,930	7,700	5,120	2,510	2,160	4,740	605
21.....	860	1,060	4,010	1,840	3,510	7,470	5,320	8,890	2,270	1,840	2,160	605
22.....	860	1,060	2,640	1,740	3,840	5,320	3,510	5,120	2,270	1,840	2,160	555
23.....	800	1,130	1,370	3,510	3,350	5,720	3,200	4,190	2,160	1,550	2,770	490
24.....	800	1,130	1,130	13,100	3,200	7,700	3,200	4,190	5,320	1,460	4,550	530
25.....	880	1,550	1,060	8,170	2,910	6,570	3,050	6,140	9,630	1,460	4,010	605
26.....	830	1,940	1,060	6,570	5,120	5,320	2,910	4,740	6,140	1,370	2,390	655
27.....	860	2,270	1,460	4,550	17,300	4,550	3,200	7,930	6,140	1,370	1,840	655
28.....	860	1,370	1,940	3,200	11,400	4,930	4,010	12,000	8,890	2,390	2,770	555
29.....	1,550	1,460	1,370	2,640	-----	4,010	20,900	17,600	17,000	3,840	7,470	470
30.....	1,210	1,370	1,840	2,510	-----	4,010	13,900	15,400	4,930	2,640	4,550	555
31.....	990	-----	1,840	2,390	-----	4,010	-----	10,900	-----	1,640	2,640	-----

*Monthly discharge of Tallapoosa River at Sturdivant, Ala., for the year ending September 30, 1923*

[Drainage area, 2,460 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	8,170	430	1,440	0.585	0.67
November.....	4,370	920	1,400	.569	.63
December.....	16,000	920	4,120	1.67	1.92
January.....	13,100	1,740	3,620	1.47	1.70
February.....	45,500	2,050	9,290	3.78	3.94
March.....	18,600	1,940	6,720	2.73	3.15
April.....	20,900	2,910	6,480	2.63	2.93
May.....	19,200	3,200	7,170	2.91	3.26
June.....	17,000	2,160	5,060	2.06	2.30
July.....	5,320	1,370	2,360	.959	1.11
August.....	7,470	1,370	2,680	1.09	1.26
September.....	2,390	470	947	.385	.43
The year.....	45,500	430	4,240	1.72	23.40

### MISCELLANEOUS DISCHARGE MEASUREMENTS

In addition to the records of flow obtained at the gaging stations and reported in the preceding pages, measurements were made at other points, as shown by the following table:

*Miscellaneous discharge measurements in south Atlantic and eastern Gulf of Mexico drainage basins during the year ending September 30, 1923*

#### Streams draining into south Atlantic Ocean

Date	Stream	Tributary to—	Locality	Gage height	Dis-charge
				<i>Feet</i>	<i>Sec.-ft.</i>
Jan. 22	Cape Fear River.....	Atlantic Ocean.....	Former gaging station at Fayetteville, N. C.	6.22	1,850
Mar. 3	do.....	do.....	do.....	20.94	11,700
4	do.....	do.....	do.....	16.34	8,120
5	do.....	do.....	do.....	13.07	6,110
5	do.....	do.....	do.....	12.63	5,850
6	do.....	do.....	do.....	11.06	4,920
July 17	do.....	do.....	do.....	5.29	1,910
18	do.....	do.....	do.....	7.07	3,730
18	do.....	do.....	do.....	11.26	7,400
18	do.....	do.....	do.....	11.91	7,500
Sept. 25	do.....	do.....	do.....	10.96	4,360
15	Deep River.....	Cape Fear River.....	At Chiltons mill, half a mile below Twomile Creek, and 6 miles east of High Point, N. C.	.98	42.8
Oct. 9	do.....	do.....	At bridge 4 miles above Coleridge, N. C.	1.84	168
10	do.....	do.....	do.....	2.51	369

#### Streams draining into eastern Gulf of Mexico

Nov. 10	Double Bridges Creek.....	Choctawhatchee River	Geneva, Ala.....	.72	100
Jan. 22	do.....	do.....	do.....	1.13	235
24	do.....	do.....	do.....	7.22	1,010
Mar. 26	do.....	do.....	do.....	12.36	571
June 8	do.....	do.....	do.....	5.46	658
Sept. 7	do.....	do.....	do.....	1.97	200



# 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 bulletins, professional papers, monographs, 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 volumes:

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 of 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.  
Madison, Wis., c/o Railroad Commission of Wisconsin.  
Chicago, Ill., 950 Transportation Building.  
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.  
Tucson, Ariz., 210 Agricultural Building, University of Arizona.  
Salt Lake City, Utah, 313 Federal Building.  
Boise, Idaho, Federal Building.  
Idaho Falls, Idaho, 228 Federal Building.  
Tacoma, Wash., 404 Federal Building.  
Portland, Oreg., 606 Post Office Building.  
San Francisco, Calif., 303 Customhouse.  
Los Angeles, Calif., 600 Federal Building.  
Austin, Tex., Capitol Building.  
Honolulu, Hawaii, 25 Capitol Building.

A list of the Geological Survey's publications may be obtained by applying to the Director, United States Geological Survey, Washington, D. C.

#### STREAM-FLOW REPORTS

Stream-flow records have been obtained at about 5,600 points in the United States, and the data obtained have been published in the reports tabulated below.

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

[A=Annual report; B=Bulletin; 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 Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years)	1895.
W 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	Descriptions, 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	1908.
W 124 to 135	do	1904.
W 165 to 178	do	1906.
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 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The following table gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1923. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for 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, 371, 501, and 521, which contain records for the New England streams from 1903 to 1921. Results of miscellaneous measurements are published by drainage basins.

# SURFACE WATER SUPPLY, 1923, PART II

Numbers of water-supply papers containing results of stream measurements, 1899-1923

[For basins included see p. 65]

Year	I		II		III		IV		V		VI		VII		VIII		IX		X		XI		XII		
																							A	B	C
1899 <sup>a</sup> .....	35	35, 36			36				36		36, 37		37		37		d 37, 38		38, e 39		38, f 39		38		38
1900 <sup>a</sup> .....	47, 48	48, 49			49				49		49, i 50		50		50		50		51		51		51		51
1901.....	65, 75	65, 75			65, 75				65, 75		65, 75		66, 75		66, 75		66, 75		66, 75		66, 75		66, 75		66, 75
1902.....	82, 83	82, 83			82, 83				82, 83		82, 83		84		84		85		85		85		85		85
1903.....	97	97, 98			98				98		98		99		99		100		100		100		100		100
1904.....	124, p 125	125, 127			129				129		130, e 131		128, 131		132		133		133, r 134		134		135		135
1905.....	165, p 166	167, 168			170				171		172		169, 173		174		175, e 177		176, r 177		177		178		178
1906.....	201, p 202	203, 204			206				207		208		205, 209		210		211		212, r 213		213		214		214
1907-8.....	241	242			244				245		246		247		248		249		250, r 251		251		252		252
1909.....	261	262			264				265		266		267		268		269		270, r 271		271		272		272
1910.....	281	282			284				285		286		287		288		289		290		291		292		292
1911.....	301	302			304				305		306		307		308		309		310		311		312		312
1912.....	321	322			324				325		326		327		328		329		330		331		332-B		332-B
1913.....	351	352			354				355		356		357		358		359		360		361		362-A		362-A
1914.....	381	382			384				385		386		387		388		389		390		391		392		392
1915.....	401	402			404				405		406		407		408		409		410		411		412		412
1916.....	431	432			434				435		436		437		438		439		440		441		442		442
1917.....	451	452			454				455		456		457		458		459		460		461		462		462
1918.....	471	472			474				475		476		477		478		479		480		481		482		482
1919-20.....	501	502			504				505		506		507		508		509		510		511		512		512
1921.....	521	522			524				525		526		527		528		529		530		531		532		532
1922.....	541	542			544				545		546		547		548		549		550		551		552		552
1923.....	561	562			564				565		566		567		568		569		570		571		572		572

<sup>a</sup> 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.

<sup>b</sup> James River only.

<sup>c</sup> Gallatin River.

<sup>d</sup> Green and Gunnison Rivers and Grand River above junction with Gunnison.

<sup>e</sup> Mohave River only.

<sup>f</sup> Kings and Kern rivers and south Pacific slope basins.

<sup>g</sup> 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.

<sup>h</sup> Tables of monthly discharge for 1900 in Twenty-second Annual Report, Part IV.

<sup>i</sup> Wissahickon and Schuylkill Rivers to James River.

<sup>j</sup> Scioto River.

<sup>k</sup> Loup and Platte Rivers near Columbus, Nebr., an all tributaries below junction with Platte.

<sup>l</sup> Tributaries of Mississippi from east.

<sup>m</sup> Lake Ontario and tributaries to St. Lawrence River proper.

<sup>n</sup> Hudson Bay only.

<sup>o</sup> New England rivers only.

<sup>p</sup> Hudson River to Delaware River inclusive.

<sup>q</sup> Susquehanna River to Yackin River, inclusive.

<sup>r</sup> Platte and Kansas Rivers.

<sup>s</sup> Great Basin in California except Truckee and Carson River basins.

<sup>t</sup> Below junction with Gila.

<sup>u</sup> Regue, Umpqua, and Siletz Rivers only.

In these papers and in the following lists the stations are arranged in downstream order. The main stem of any river is determined by measuring or estimating its drainage area—that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and 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 65, and the records for large lakes are taken up in order of streams around the rim of the lake.

### PRINCIPAL STREAMS

The south Atlantic slope and eastern Gulf of Mexico drainage basins include streams flowing into the Atlantic Ocean and Gulf of Mexico from York River, Va., to Pearl River, Miss., inclusive. The principal streams in this division are James, Roanoke, Cape Fear, Yadkin, Santee, Savannah, Altamaha, Apalachicola, Choctawhatchee, Mobile, and Pearl. The streams drain wholly or in part the States of Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Virginia.

In addition to the annotated list of publications relating specifically to the section, these pages contain brief references to reports published by State and other organizations. (See p. 79.)

### GAGING STATIONS

NOTE.—Dash after a date indicates that station was being maintained September 30, 1923; period after a date indicates discontinuance. Tributaries are indicated by indentation.

#### JAMES RIVER BASIN

Jackson River (head of James) at Covington, Va., 1907–8.

James River at Buchanan, Va., 1895–

James River at Holcomb Rock, Va., 1900–1915.

James River at Cartersville, Va., 1899–

Cowpasture River near Clifton Forge, Va., 1907–8.

North River near Glasgow, Va., 1895–1905.

Appomattox River at Mattoax, Va., 1900–1905.

#### ROANOKE RIVER BASIN

Roanoke River at Roanoke, Va., 1896–

Roanoke River at Brookneal, Va., 1923–

Roanoke River at Randolph, Va., 1900–1906.

Roanoke River above Dan River, at Clarksville, Va., 1895–1898.

Roanoke River at Bugg's Island, Va., 1921–1923.

Roanoke River at Old Gaston, N. C., 1911–

Roanoke River near Weldon, N. C., 1912.

Roanoke River at Neal, N. C., 1896-1903.

Tinker Creek at Roanoke, Va., 1907-8.

Back Creek near Roanoke, Va., 1907-8.

Dan River near Pinnacles, Va., 1920-21.

Dan River at Madison, N. C., 1903-1908.

Dan River at South Boston, Va., 1900-1907; 1923-

Dan River at Clarksville, Va., 1895-1898.

Banister River at Houston, Va., 1904-5.

#### TAR RIVER BASIN

Tar River near Tarboro, N. C., 1896-1900.

#### NEUSE RIVER BASIN

Neuse River near Selma, N. C., 1896-1900.

#### CAPE FEAR RIVER BASIN

Haw River (head of Cape Fear River) near Moncure, N. C., 1898-99.

Cape Fear River near Fayetteville, N. C., 1889-1903.

New Hope River:

Morgan Creek near Chapel Hill, N. C., 1923-

Deep River at Ramseur, N. C., 1922-

Deep River near Cumnock, N. C., 1900-1902.

Deep River near Moncure, N. C., 1898-99.

West Fork of Deep River near High Point, N. C., 1923-

Rockfish Creek near Brunt, N. C., 1902-3.

#### YADKIN (OR PEEDEE) RIVER BASIN

Yadkin River (head of Peedee River) at North Wilkesboro, N. C., 1903-1909; 1920-

Yadkin River at Siloam, N. C., 1900-1901.

Yadkin River at Donnahaha, N. C., 1913-1918; 1920-1923.

Yadkin River near Salisbury, N. C., 1895-1909; 1911-

Yadkin River at High Rock, N. C., 1919-

Yadkin River near Norwood, N. C., 1896-1899.

Yadkin River near Peedee, N. C., 1906-1912.

Peedee River at Cheraw, S. C., 1909-1912.

Fisher River near Dobson, N. C., 1920-

Ararat River near Pilot Mountain, N. C., 1920-1922.

#### SANTEE RIVER BASIN

Catawba River (head of Santee River) at Old Fort, N. C., 1907.

Catawba River near Morganton, N. C., 1900; 1903-1909.

Catawba River at Rhodhiss, N. C., 1917-1920.

Catawba River at Catawba, N. C., 1896-1902.

Catawba River near Catawba, S. C., 1903-1905.

Catawba River near Rock Hill, S. C., 1895-1903.

Wateree River (lower part of Catawba) near Camden, S. C., 1903-1910.

Santee River at Ferguson, S. C., 1907-

Mill Creek at Old Fort, N. C., 1907.

Linville River at Branch, N. C., 1922-

Linville River at Fonta Flora, N. C., 1907-8.

Linville River near Bridgewater, N. C., 1900.

John River at Collettsville, N. C., 1907.

## Santee River tributaries—Continued.

John River near Morganton, N. C., 1900-1901.

Wilson Creek near Adako, N. C., 1921-22.

Broad River (of the Carolinas), head of Congaree River, at Uree, N. C., 1907-1909.

Broad River (of the Carolinas) at Dellinger, S. C., 1900-1901.

Broad River (of the Carolinas) near Gaffney, S. C., 1896-1899.

Broad River (of the Carolinas) at Alston, S. C., 1896-1907.

Green River near Saluda, N. C., 1907-1909.

Second Broad River near Logans Store, N. C., 1907-8.

Saluda River near Waterloo, S. C., 1896-1905.

Saluda River near Ninety Six, S. C., 1905.

## EDISTO RIVER BASIN

Four Hole Creek near Ridgeville, S. C., 1914-1917.

## SAVANNAH RIVER BASIN

Chattooga River (head of Savannah River) near Clayton, Ga., 1907-8.

Chattooga River near Tallulah Falls, Ga., 1917-

Tugaloo River (continuation of Chattooga River) near Toccoa, Ga., 1907-8.

Tugaloo River near Madison, S. C., 1898-1901; 1903-1910.

Savannah River near Calhoun Falls, S. C., 1896-1903.

Savannah River at Woodlawn, S. C., 1905-1910.

Savannah River at Augusta, Ga., 1884-1906.

Stekoa Creek near Clayton, Ga., 1907-8.

Tallulah River near Seed, Ga., 1916-1920.

Tallulah River near Lakemont, Ga., 1916-1918.

Tallulah River at Mathis, Ga., 1912-1916.

Tallulah River at Tallulah Falls, Ga., 1900-1901; 1904-1912.

Tiger Creek at Lakemont, Ga., 1916-1918.

Chauga River near Madison, S. C., 1907.

Seneca River near Clemson College, S. C., 1903-1905.

Broad River (of Georgia) near Carlton, Ga., 1897-1913.

## OGEECHEE RIVER BASIN

Ogeechee River near Millen, Ga., 1903.

Williamsons Swamp Creek near Davisboro, Ga., 1903-4.

Canochee River near Groveland, Ga., 1903-1907.

## ALTAMAHA RIVER BASIN

South River (head of Ocmulgee River, which is head of Altamaha River) near Lithonia, Ga., 1903-4.

Ocmulgee River near Jackson, Ga., 1906-1915.

Ocmulgee River near Flovilla, Ga., 1901-1905.

Ocmulgee River at Juliette, Ga., 1916-1921.

Ocmulgee River at Macon, Ga., 1893-1913.

Yellow River at Almon, Ga., 1897; 1899-1901.

Alcovy River near Covington, Ga., 1901-1904.

Alcovy River near Stewart, Ga., 1905-6.

Towaliga River near Juliette, Ga., 1899-1901.

Oconee River at Barnett Shoals, near Watkinsville, Ga., 1902.

Oconee River near Greensboro, Ga., 1903-

Oconee River at Carey, Ga., 1896-1898.

## Ocmulgee River tributaries—Continued.

Oconee River at Fraleys Ferry, near Milledgeville, Ga., 1906-1908; 1909-

Oconee River at Milledgeville, Ga., 1903-1905.

Oconee River at Dublin, Ga., 1894-1913.

Middle Oconee River near Athens, Ga., 1901-2.

Apalachee River near Buckhead, Ga., 1901-1908.

Ohoopsee River near Reidsville, Ga., 1903-1907.

## ST. MARYS RIVER BASIN

St. Marys River at Moniac, Ga., 1921-1923.

## ST. JOHNS RIVER BASIN

Silver Springs near Silver Springs, Fla., 1906-7.

## FLORIDA EVERGLADES DRAINAGE CANALS

North New River canal near Fort Lauderdale, Fla., 1913.

North New River canal near Rita, Fla., 1913.

South New River canal near Zona, Fla., 1913.

South New River canal near Rita, Fla., 1913.

Miami canal near Miami, Fla., 1913.

## SUWANNEE RIVER BASIN

Suwannee River at Fargo, Ga., 1921-1923.

Suwannee River near White Springs, Fla., 1906-1908.

Allapaha River at Statenville, Ga., 1921.

Withlacoochee River near Ousley, Ga., 1920-21.

## APALACHICOLA RIVER BASIN

Chattahoochee River (head of Apalachicola River) near Ariel, Ga., 1907-1909.

Chattahoochee River near Leaf, Ga., 1907.

Chattahoochee River near Gainesville, Ga., 1901-1903; 1917-18.

Chattahoochee River near Buford, Ga., 1901.

Chattahoochee River near Norcross, Ga., 1903-1923.

Chattahoochee River at Oakdale, Ga., 1895-1904.

Chattahoochee River at West Point, Ga., 1896-1910; 1912-1923.

Chattahoochee River at Columbus, Ga., 1912.

Chattahoochee River at Alaga, Ala., 1908-1912.

Soque River near Demorest, Ga., 1904-1909.

Chestatee River at New Bridge, Ga., 1917-18.

Sweetwater Creek near Austell, Ga., 1904-5; 1913.

Flint River near Molina, Ga., 1897-98.

Flint River near Woodbury, Ga., 1900-

Flint River near Musella, Ga., 1907.

Flint River near Culloden, Ga., 1911-

Flint River near Montezuma, Ga., 1905-1909; 1911-12.

Flint River at Albany, Ga., 1897-1921.

Flint River at Bainbridge, Ga., 1908-1913.

Little Potato (Tobler) Creek near Yatesville, Ga., 1914-1918.

Kinchafoonee Creek near Leesburg, Ga., 1905-1909; 1920-21.

Kinchafoonee Creek near Albany, Ga., 1903.

Muckalee Creek near Albany, Ga., 1903.

Ichawaynochaway Creek at Milford, Ga., 1905-1907.

Ichawaynochaway Creek near Newton, Ga., 1920-21.

Spring Creek near Iron City, Ga., 1920-21.

Chipola River near Altha, Fla., 1912-13; 1921-



## CHOCTAWHATCHEE RIVER BASIN

Choctawhatchee River near Newton, Ala., 1906-1908; 1911-12; 1921-  
Choctawhatchee River near Bellwood, Ala., 1921-  
Choctawhatchee River near Geneva, Ala., 1904; 1922-  
Double Bridges Creek at Geneva, Ala., 1904.  
Pea River at Elba, Ala., 1906.  
Pea River at Pera, Ala., 1904-1913; 1922-  
Pea River near Geneva, Ala., 1922-

## ESCAMBIA RIVER BASIN

Conecuh River at Beck, Ala., 1904-1919.

## PERDIDO RIVER BASIN

Perdido River at Muscogee, Fla., 1922.  
Blackwater River near Seminole, Ala., 1922.

## MOBILE RIVER BASIN

Cartecay River (head of Mobile River) near Cartecay, Ga., 1904-5; 1907; 1918-1921.  
Coosawattee River (continuation of Cartecay River) at Carters, Ga., 1896-1908; 1918-1923.  
Oostanaula River (continuation of Coosawattee River) at Resaca, Ga., 1892-1901; 1905-1923.  
Coosa River (continuation of Oostanaula River) at Rome, Ga., 1897-1903.  
Coosa River at Lock No. 4, above Riverside, Ala., 1890-1901.  
Coosa River at Riverside, Ala., 1896-1916.  
Coosa River at Lock No. 5, near Riverside, Ala., 1892-1899.  
Coosa River at Childersburg, Ala., 1914-  
Coosa River at Lock No. 12, near Clanton, Ala., 1912-1914.  
Coosa River at Lock No. 18, near Wetumpka, Ala., 1912-1914.  
Coosa River near Wetumpka, Ala., 1896-1898.  
Alabama River (continuation of Coosa River) at Montgomery, Ala., 1899-1903.  
Alabama River at Selma, Ala., 1899-1913.  
Ellijay River at Ellijay, Ga., 1907; 1918-1921.  
Conasauga River at Beaverdale, Ga., 1907-8.  
Etowah River near Ball Ground, Ga., 1907-1915; 1918-1921.  
Etowah River at Canton, Ga., 1892-1905.  
Etowah River near Rome, Ga., 1904-1921.  
Etowah River at Rome, Ga., 1903.  
Amicalola River near Potts Mountain, Ga., 1907-8; 1910-1913.  
Longswamp Creek near Ball Ground, Ga., 1918-1921.  
Choccolocco Creek near Jenifer, Ala., 1903-1908.  
Talladega Creek at Nottingham, Ala., 1900-1904.  
Tallapoosa River at Sturdivant, Ala., 1900-  
Tallapoosa River near Susanna, Ala., 1900-1901.  
Tallapoosa River at Cherokee Bluffs, near Tallassee, Ala., 1912-1914.  
Tallapoosa River at Milstead, Ala., 1897-1903.  
Little Tallapoosa River near Wedowee, Ala., 1913-14.  
Hillabee Creek near Alexander City, Ala., 1900-1903.  
Big Sandy Creek near Dadeville, Ala., 1900-1901.  
Cahaba River at Centerville, Ala., 1901-1908.  
Tombigbee River at Columbus, Miss., 1900-1912.

## Alabama River tributaries—Continued.

Tombigbee River at Epes, Ala., 1900–1901; 1905–1913.

Black Warrior River (Mulberry Fork of Black Warrior River) near Cordova, Ala., 1900–1912.

Black Warrior River near Coal, Ala., 1908–1910.

Black Warrior River at Tuscaloosa, Ala., 1889–1905.

Sipsey Fork of Black Warrior River:

Clear Creek near Elk, Ala., 1904–5.

Locust Fork of Black Warrior River at Palos, Ala., 1902–1905.

Village Creek near Mulga, Ala., 1909–10.

Camp Branch near Ensley, Ala., 1908–1910.

Venison Branch near Mulga, Ala., 1908–9.

## PEARL RIVER BASIN

Pearl River at Jackson, Miss., 1901–1913.

Bogue Chitto at Warnerton, La., 1906.

REPORTS ON WATER RESOURCES OF THE SOUTH ATLANTIC AND  
EASTERN GULF STATES

## 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.

- \*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 Roanoke, Cape Fear, Pee Dee, Santee, Savannah, Oconee, Apalachicola, Chattahoochee, Coosa, Tallapoosa, and Black Warrior Rivers.

- \*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.

- \*67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls.

Describes artesian wells at Savannah, Ga.

96. Destructive floods in the United States in 1903, by E. C. Murphy. 1904. 81 pp., 13 pls. 15c.

Contains an account of flood on tributaries of Broad River (of the Carolinas) in Spartanburg County, S. C.

101. *Underground waters of southern Louisiana*, by G. D. Harris, with discussions of their uses for water supplies and for rice irrigation, by M. L. Fuller. 1904. 98 pp., 11 pls. 20c.
- Describes the geology and ground-water conditions of the area, gives data in regard to artesian wells, and outlines methods of well drilling, pumping, and rice irrigation. Includes 23 analyses of ground water.
- \*102. *Contributions to the hydrology of eastern United States, 1903*; M. L. Fuller, geologist in charge. 1904. 522 pp.
- Contains brief reports on municipal water supplies, wells, and springs of Georgia, Florida, Alabama, and Mississippi. 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. Superseded by *Water-Supply Paper 152*.
- Cites statutory restrictions of water pollution in Alabama, Florida, Georgia, Mississippi, North Carolina, and 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, and estimates of monthly discharge at stations on Tallapoosa, Coosa, Alabama, Cahaba, Black Warrior, and Tombigbee 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 reports as follows:  
 Experiment relating to problems of well contamination at Quitman, Ga., by S. W. McCallie. Scope indicated by title.  
 Water resources of the Cowee and Pisgah quadrangles, North Carolina, by Hoyt S. Gale. Discusses drainage, springs, and mineral waters of one of the units of the geologic atlas of the United States.
- \*114. *Underground waters of eastern United States*; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls.
- Contains brief reports relating to south Atlantic slope and eastern Gulf of Mexico drainage areas, as follows:  
 Virginia, by N. H. Darton and M. L. Fuller.  
 North Carolina, by M. L. Fuller.  
 South Carolina, by L. C. Glenn.  
 Georgia, by S. W. McCallie.  
 Florida, by M. L. Fuller.  
 Alabama, by A. E. Smith.  
 Mississippi, by L. C. Johnson.  
 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 Catawba, Tallulah, Chattooga, Tugaloo, Savannah, Broad, Ocmulgee, Yellow, South, Alcovy, Towaliga, and Chattahoochee Rivers.
- \*145. *Contributions to the hydrology of eastern United States, 1905*; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls.
- Contains "Notes on certain hot springs of the southern United States," by Walter Harvey Weed, including the "Warm springs of Georgia." Describes the location of the springs, the geologic conditions, and the composition of the waters (with analyses); estimates discharge.
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, Georgia, Florida, Mississippi, North Carolina, and 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 requisites, and special conditions in the Coastal Plain formation; gives notes on wells by counties, deep well records, and selected records in detail; treats of sanitary aspects of wells and gives analyses.

- \*160. Underground-water papers, 1906; M. L. Fuller, geologist in charge. 1906 104 pp., 1 pl.

Contains brief report entitled "Peculiar mineral waters from crystalline rocks of Georgia," by Myron L. Fuller, discussing origin of certain mineral springs and wells near Austell; gives analyses.

- \*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency, and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

Gives estimates of flood discharge and frequency on Cape Fear, Savannah, Alabama, and Black Warrior Rivers.

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.

- \*236. The quality of surface waters in the United States: Part I, Analyses of water east of the one hundredth meridian, by R. B. Dole. 1909. 123 pp.

Describes collection of samples, methods of examination, preparation of solutions, accuracy of estimates, and expression of analytical results; gives results of analyses of waters of James, Roanoke, Dan, Neuse, Cape Fear, Pee Dee, Wateree, Saluda, Savannah, Ocmulgee, Oconee, Chattahoochee, Flint, Oostanaula, Alabama, Cahaba, Tombigbee, and Pearl Rivers.

- \*258. Underground-water papers, 1910; by M. L. Fuller, F. G. Clapp, G. C. Matson, Samuel Sanford, and H. C. Wolff. 1911. 123 pp., 2 pls., 15c. Contains:

Saline artesian waters of the Atlantic Coastal Plain, by Samuel Sanford. Discusses briefly the geology of the coastal plain, the artesian waters, the occurrence and character of the salt waters, the causes of salinity, and lateral changes in salinity.

- \*319. Geology and ground waters of Florida, by G. C. Matson and Samuel Sanford. 1913. 445 pp., 17 pls.

Describes the characteristic upland, lowland, and coastal features of the State—the springs, lakes, caverns, sand dunes, coral reefs, bars, inlets, tidal runways, pine lands, swamps, keys, and ocean currents; discusses in detail the stratigraphic position, lithologic character, thickness, physiographic expression, structure, and areal distribution of the geologic formations; treats of the source, amount, depth, circulation, and recovery of ground waters, the artesian waters, and public water supplies; and gives details concerning source, quality, and development of the water supplies by counties. Discusses briefly the quality of the well waters.

341. Underground waters of the Coastal Plain of Georgia, by L. W. Stephenson and J. O. Veatch, and a discussion of the quality of the waters, by R. B. Dole. 1915. 530 pp., 21 pls. 50c.

Describes the physiographic features of the State, the geologic provinces, the areal distribution, stratigraphic position, and lithologic character of the rocks belonging to the geologic systems; discusses the source and amount of the ground waters, the uses of the springs and shallow and artesian wells, and the distribution of the ground waters in the rocks of the various formations; gives details concerning each county. The chapter on the chemical character of the waters describes standards for classification and the general requisites of waters for miscellaneous industrial uses and for domestic use; treats also of methods of purifying water and of the relation of quality to geographic position, to water-bearing stratum, and to depth.

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 in Virginia, North Carolina, South Carolina, and Florida, and of water from the Gulf of Mexico.

## ANNUAL REPORTS

Each of the papers contained in the annual reports was also issued in separate form.

Annual reports 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.

- Tenth Annual Report of the United States Geological Survey, 1888-89, J. W. Powell, Director. 1890. 2 parts. Pt. I. Geology, xv, 774 pp., 98 pls. \$2.35. Contains:

\* General account of the fresh-water morasses of the United States, with a description of the Dismal Swamp district of Virginia and North Carolina, by N. S. Shaler, pp. 235-339, pls. 6-19. Scope indicated by title.

- 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, xx, 597 pp., 73 pls. \$2.10. Contains:

\* Potable waters of eastern United States, by W. J. McGee, pp. 1-47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

## PROFESSIONAL PAPERS

Professional papers 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. Professional papers are of quarto size.

- \*37. The Southern Appalachian forests, by H. B. Ayers 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, Chattooga, Toxaway, Saluda, and First and Second Broad Rivers, Catawba, and Yadkin Rivers, describing many of the tributaries of each of the main 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.

- \*90. Shorter contributions to general geology, 1914; David White, chief geologist. 1915. 199 pp; 21 pls.

Issued also in separate chapters. The following paper relates in part to ground water:

(b) A deep well at Charleston, S. C., by L. W. Stephenson, with a report on the mineralogy of the water, by Chase Palmer, pp. 69-94, 10c.

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 waters of the principal streams in this region.

## BULLETINS

Bulletins 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. Bulletins are of octavo size.

- \*138. Artesian-well prospects in the Atlantic Coastal Plain region, by N. H. Darton. 1896. 232 pp., 19 pls.

Describes the general geologic structure of the Atlantic Coastal Plain region and summarizes the conditions affecting subterranean water in the Coastal Plain; discusses the general geologic relations in New York, southern New Jersey, Delaware, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, and eastern Georgia; gives for each of the States a list of the deep wells and discusses well prospects. The notes on the wells that follow the tabulated lists contain many sections and analyses of the waters.

- \*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 methods of work; gives tabulated records of wells in Alabama, Florida, Georgia, Mississippi, and North Carolina, and detailed records of wells in Hancock and Jackson Counties, Mississippi. These wells were selected because they give definite stratigraphic information.

- \*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp.

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Virginia; and detailed records of wells in Madison, Marengo, and Mobile Counties, Alabama; Duval, Escambia, Sumter, and Volusia Counties, Florida; Chatham, Decatur, Fulton, Pierce, and Tattnall Counties, Georgia; Lenoir, New Hanover, and Moore Counties, North Carolina; Hancock, Harrison, Jackson, Jones, Marshall, Newton, and Panola Counties, Mississippi; and Aiken, Barnwell, Charleston, Hampton, Lee, and Orangeburg Counties, South Carolina. The wells of which detailed sections are given were selected because they afford valuable 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.<sup>1</sup> 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 octavo edition (6 by 9 inches). Owing

<sup>1</sup> Index maps showing areas in the South Atlantic States covered by topographic maps and by geologic folios will be mailed on receipt of request addressed to the Director, U. S. Geol. Survey, Washington, D. C.

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 are usable. The damaged folios 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 sells for 50 cents a copy, except folio 193, which sells for 75 cents a copy. A discount of 40 per cent is allowed on an order for folios or for folios together with topographic maps amounting to \$5 or more at the retail rate.

All the folios contain descriptions of the drainage of the quadrangles. The folios in the following list contain also brief discussions of the ground waters in connection with the economic resources of the areas and more or less information concerning the utilization of the water resources.

\*80. Norfolk, Virginia-North Carolina.

Describes the plains, Dismal Swamp, and the tidal marshes; discusses the reclamation of swamp lands and gives an account of the ground waters; gives sections of wells near Norfolk and at Fort Monroe, and analyses of waters from the test boring at Norfolk and the boring at Lambert Point.

\*90. Cranberry, North Carolina-Tennessee.

\*124. Mount Mitchell, North Carolina-Tennessee.

\*147. Pisgah, North Carolina-South Carolina.

\*175. Birmingham, Alabama.

187. Ellijay, Georgia-North Carolina-Tennessee.<sup>2</sup> 25c.

#### 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 South Atlantic States are the reports of the State surveys of North Carolina, Georgia, Florida, and Alabama, and the Tenth Census (vol. 16).

The following deserve special mention:

Hydrography of Virginia, by N. C. Grover and R. H. Bolster: Virginia Geol. Survey Bull. 3, 1906.

Underground waters of the Coastal Plain province of Virginia, by Samuel Sanford: Virginia Geol. Survey Bull. 5, 1913.

Surface water supply of Virginia, by G. C. Stevens: Virginia Geol. Survey Bull. 10, 1916.

A preliminary report on the water powers of Georgia, by B. M. Hall: Georgia Geol. Survey Bull. 3-A, 1896.

A preliminary report on the artesian-well system of Georgia, by S. W. McCallie: Georgia Geol. Survey Bull. 7, 1898.

A preliminary report on the underground waters of Georgia, by S. W. McCallie: Georgia Geol. Survey Bull. 15, 1908.

Second report on the water powers of Georgia, by B. M. Hall and M. R. Hall: Georgia Geol. Survey Bull. 16, 1908.

A preliminary report on the mineral springs of Georgia, by S. W. McCallie: Georgia Geol. Survey Bull. 20, 1913.

<sup>2</sup> Octavo edition, 50c.

Reports on condition of water supply at Savannah, Ga. Mayor of Savannah Ann. Rept., 1915.

Contains the following papers submitted by the United States Geological Survey:

Preliminary report on Savannah water supply, by L. W. Stephenson and R. B. Dole. Pp. 1-14.

The water supply of Savannah, Ga., by R. B. Dole. Pp. 15-89.

These papers discuss the yield and head of the artesian wells of Savannah, the consumption of water, the sanitary and chemical quality of the water, and the cost of operation. They give the results of fluorescein tests and several analyses of surface and ground waters. They conclude with recommendations for future development.

A preliminary report on the underground water supply of central Florida, by E. H. Sellards: Florida Geol. Survey Bull. 1, 1908.

Underground waters of Mississippi; a preliminary report by W. N. Logan and W. R. Perkins: Mississippi Agr. Exper. Sta. Bull. 89, 1905.

Report of the Secretary of Agriculture in relation to the forests, rivers, and mountains of the Southern Appalachian region: 57th Cong., 1st sess., S. Doc. 84, 1902.

Underground water resources of Alabama, by E. A. Smith. Montgomery, Ala., 1907.

Preliminary report on part of the water powers of Alabama, by B. M. Hall: Alabama Geol. Survey Bull. 7, 1903.

Papers on the water power in North Carolina, a preliminary report by George F. Swain, J. A. Holmes, and E. W. Myers: North Carolina Geol. Survey Bull. 8, 1899.

The Coastal Plain of North Carolina, by W. B. Clark, B. L. Miller, L. W. Stephenson, B. L. Johnson, and H. N. Parker: North Carolina Geol. and Econ. Survey Rept., vol. 3, 1912.

Many of these reports can be obtained by applying to the several organizations, and most of them can be consulted in the public libraries of the larger cities.



## AREAS AND PUBLICATIONS COVERED

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<sup>3</sup> Many analyses of river, spring, and well waters are scattered through publications, as noted in abstracts

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