DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 382

SURFACE WATER SUPPLY OF THE UNITED STATES

1914

PART II. SOUTH ATLANTIC AND EASTERN GULF OF MEXICO BASINS

NATHAN C. GROVER, Chief Hydraulic Engineer
GUY C. STEVENS and WARREN E. HALL, District Engineers

WASHINGTON
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CONTENTS.

ILLUSTRATIONS.

SURFACE WATER SUPPLY OF SOUTH ATLANTIC AND EASTERN GULF OF MEXICO BASINS, 1914.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting results of measurements of flow made on streams in the United States during the year ending September 30, 1914.

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

Provided, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies relating to irrigation in the arid west. Since the fiscal year ending June 30, 1895, successive sundry bills passed by Congress have carried the following item and appropriations:

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

Annual appropriations for the fiscal years ending June 30, 1895–1915.

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1915, inclusive	150,000

In the execution of the work many private and State organizations have cooperated either by furnishing data or by assisting in collecting data. Acknowledgements 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 12.

Measurements of stream flow have been made at about 3,400 points in the United States [1] and also at many points in Alaska and

[1] Wood, B. D., stream-gaging stations and publications relating to water resources, 1885–1913; U. S. Geol. Survey Water-Supply Paper 340.

the Hawaiian Islands. In July, 1914, 1,480 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time. Information in regard to publications relating to water resources is presented in the appendix to this report (pp. 1 et seq.).

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 depth of inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, acre-feet, and millions of cubic feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross-section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the tables of convenient equivalents (p. 7).

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

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

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

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

The following terms not in common use are here defined:

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

"Control," "controlling section," and "point of control," terms used to designate the section or sections of the stream below the gage

which determine the discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

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

CONVENIENT EQUIVALENTS.

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

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

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

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

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

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

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

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

Discharge (second-feet).	Run-off in millions of cubic feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.....	0.0864	2.419	2.506	2.592	2.678
2.....	.1728	4.838	5.012	5.184	5.356
3.....	.2592	7.257	7.518	7.776	8.034
4.....	.3456	9.676	10.02	10.37	10.71
5.....	.4320	12.10	12.53	12.96	13.39
6.....	.5184	15.51	15.04	15.55	16.07
7.....	.6048	16.93	17.54	18.14	18.75
8.....	.6912	19.35	20.05	20.74	21.42
9.....	.7776	21.77	22.55	23.33	24.10

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

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

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

NOTE.—For part of month multiply the run-off for one day by the number of days.

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

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

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

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

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

Tens.	Units.									
	0	1	2	3	4	5	6	7	8	9
0	0.00	0.114	0.227	0.341	0.454	0.568	0.682	0.795	0.909	1.02
1	1.14	1.25	1.36	1.48	1.59	1.70	1.82	1.93	2.04	2.16
2	2.27	2.39	2.50	2.61	2.73	2.84	2.95	3.07	3.18	3.29
3	3.41	3.52	3.64	3.75	3.86	3.98	4.09	4.20	4.32	4.43
4	4.54	4.66	4.77	4.88	5.00	5.11	5.23	5.34	5.45	5.57
5	5.68	5.79	5.91	6.02	6.13	6.25	6.36	6.48	6.59	6.70
6	6.82	6.93	7.04	7.16	7.27	7.38	7.50	7.61	7.72	7.84
7	7.95	8.07	8.18	8.29	8.41	8.52	8.63	8.75	8.86	8.97
8	9.09	9 20	9.32	9.43	9.54	9.66	9.77	9.88	10.0	10.1
9	10.2	10.3	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2

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

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

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

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

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

1 second-foot for one year (365 days) equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one year (365 days) equals 724 acre-feet.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one day equals 86,400 cubic feet.
1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.
1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.
1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.
1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.
1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches for one day equal 4.96 acre-feet.
100 Colorado miner's inches equal 2.60 second-feet.
100 Colorado miner's inches equal 19.5 United States gallons per second.
100 Colorado miner's inches for one day equal 5.17 acre-feet.
100 United States gallons per minute equal 0.223 second-feet.
100 United States gallons per minute for one day equal 0.442 acre-foot.
1,000,000 United States gallons per day equal 1.55 second-feet.
1,000,000 United States gallons equal 3.07 acre-feet.
1,000,000 cubic feet equal 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horse power equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

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

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1913, and ending September 30, 1914. At the first of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow or 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 (Pl. I, *B*) consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder (Pl. II) that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter by the general methods outlined in standard text books on the measurement of river discharge.

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to the gage heights, give the daily discharge from which the monthly and yearly mean discharge is determined.

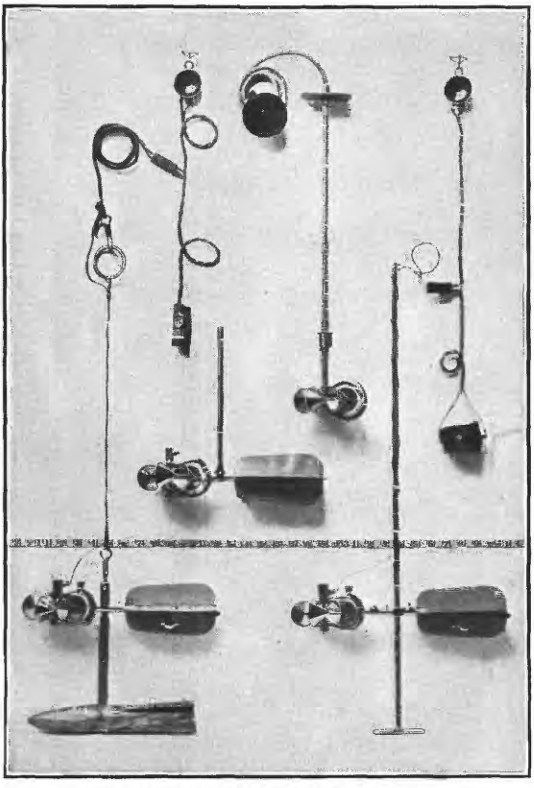
The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving results of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

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

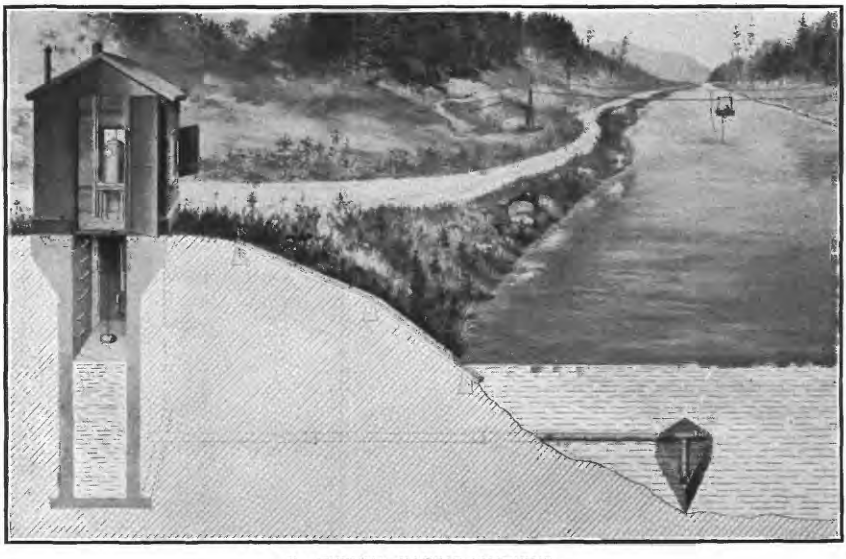
The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the constancy of the discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of channel, 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 the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with automatic gages the true mean daily discharge may be obtained by weighting discharge for parts of the day.

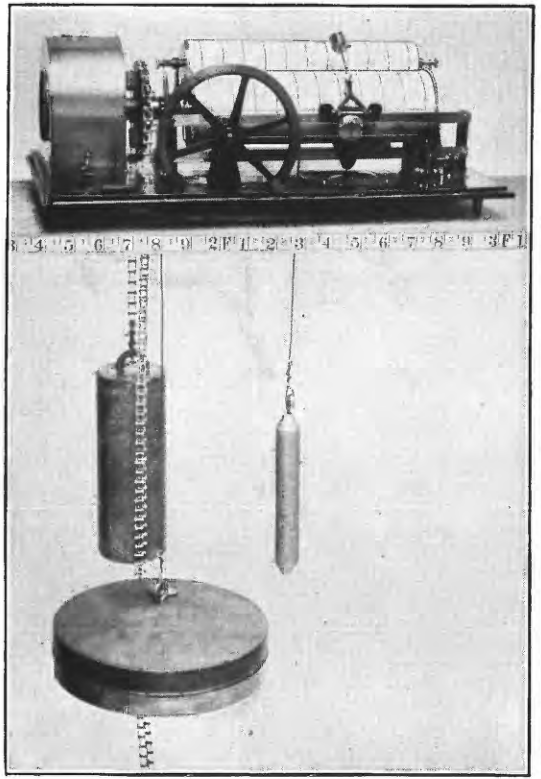
In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger



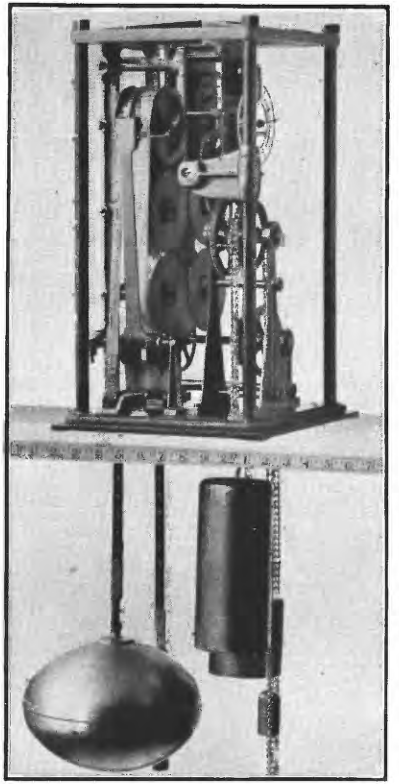
A. PRICE CURRENT METERS.



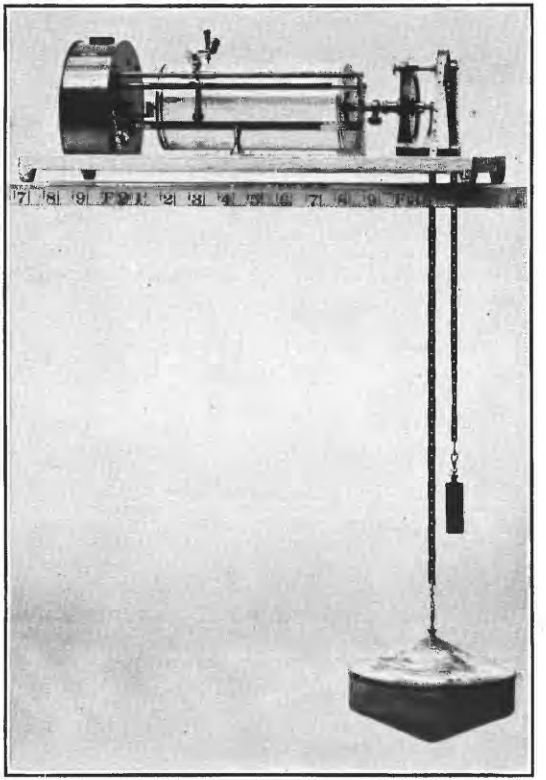
B. TYPICAL GAGING STATIONS.



A. STEVENS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

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 for each second during the month. On this average flow computations recorded in the remaining columns, which are defined on pages 6 and 7, are based.

The deficiency table presented for some of the gaging stations shows the number of days in each year on which the mean daily discharge was less than the discharge given in the table. By subtraction the table gives the number of days each year that the mean daily discharge was between the discharges given in the table and, also by subtraction, the number of days that the mean daily discharge was equal to or greater than the discharge given. If one discharge rating table was used throughout the period covered by the deficiency table, gage heights that correspond to the discharges are also given. For convenience the theoretical horsepower per foot fall corresponding to the discharge is given in the table on page 8. In using the table for studies of power allowance should be made for the various losses, the most important being wheel loss and head loss.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

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

Footnotes added to the daily discharge tables give information regarding the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables, "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The letter in the column headed "Accuracy," in the monthly discharge table, rates the accuracy of the monthly mean and not that of the estimate of maximum or minimum discharge or the discharge for any one day. The rating is determined by considering the accuracy of the rating curve, the probable reliability of the observer, the number of gage readings per day, the range of the fluctuation in stage, and local conditions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large non-contributing 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 (depth 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 (depth in inches)" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

Special acknowledgments are due for financial assistance rendered by the following corporations and individuals: Virginia Railway & Power Co., Alabama Geological Survey, Southern Aluminium Co., Central Georgia Power Co., Columbus Power Co., and Northern Contracting Co.

DIVISION OF WORK.

The data for stations in the James and Roanoke drainage basins were collected and prepared for publication under the direction of G. C. Stevens, assisted by E. S. Fuller, J. G. Mathers, M. I. Walters, James E. Stewart, J. H. Morgan, and H. W. Fear.

The data for all drainage basins south of the Roanoke River were collected and prepared for publication under the direction of Warren E. Hall, by M. R. Hall, B. M. Hall, jr., B. J. Peterson, Frank Lederle, and Miss E. M. Tiller.

GAGING-STATION RECORDS.

JAMES RIVER BASIN.

JAMES RIVER AT BUCHANAN, VA.

Location.—At highway bridge near Chesapeake & Ohio Railway station at Buchanan, Va.

Drainage area.—2,060 square miles.

Records available.—August 18, 1895, to September 30, 1914.

Gage.—Chain gage attached to the highway bridge, installed November 21, 1903, to replace original wire gage read August 18, 1895, to that date; read once daily by D. D. Booze for United States Weather Bureau. Datum of gage lowered 2 feet April 3, 1897, to avoid negative readings. A span of the bridge and the gage were destroyed by flood on the night of March 27, 1913. A temporary gage was used April 22 to September 15, 1913, when a new chain gage was installed.

Discharge measurements.—Made from downstream side of two-span highway bridge.

Channel and control.—Bed of river under bridge composed of rock overlain with a thick deposit of mud. Banks high; do not overflow except in extreme floods. A rock control several hundred feet below station, but discharge relation not constant.

Extremes of discharge.—Maximum stage recorded during year: 8.9 feet, February 20; discharge, 16,100 second-feet. Minimum stage recorded: 2.1 feet on several days in August and September; discharge, 430 second-feet.

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

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

Accuracy.—Depends on frequency of discharge measurements to determine changes in rating curve. Results for 1914 considered good.

Cooperation.—Since July 15, 1906, gage-height records have been furnished by United States Weather Bureau.

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

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

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	515	1,280	1,670	3,610	4,660	4,450	4,450	4,450	930	820	515	610
2	515	1,280	1,820	3,210	11,600	4,020	4,450	4,240	930	1,040	515	610
3	515	1,280	4,450	3,610	7,460	3,610	4,660	4,020	930	715	515	515
4	515	1,160	4,020	4,020	5,560	3,410	5,100	3,820	930	515	515	515
5	515	1,160	3,610	4,240	5,100	3,210	4,660	3,610	820	515	515	515
6	515	1,160	3,410	3,210	5,780	3,020	4,020	3,410	820	515	515	515
7	515	1,040	3,410	2,820	10,100	2,820	6,020	3,210	820	515	515	430
8	515	1,040	3,410	2,820	14,800	2,820	5,780	3,020	820	515	515	430
9	515	5,560	3,210	3,610	9,300	3,020	5,560	2,820	820	515	430	430
10	820	12,500	2,820	7,210	6,720	3,020	5,330	2,640	820	1,040	430	430
11	1,160	4,660	2,460	6,720	5,780	2,820	5,330	2,460	715	820	430	430
12	1,160	4,660	2,120	5,780	5,100	2,820	5,100	2,290	715	515	430	430
13	1,160	4,450	1,960	4,450	4,450	3,820	5,100	2,120	715	515	430	430
14	1,160	4,450	1,820	3,610	4,020	4,880	4,880	1,960	610	2,640	430	430
15	1,040	4,240	1,670	3,210	3,610	4,880	4,880	1,820	610	1,960	430	430
16	930	4,450	1,670	3,020	3,210	4,450	6,250	1,670	610	1,530	430	430
17	930	6,720	1,530	2,820	2,640	4,240	5,560	1,530	610	1,160	430	430
18	930	6,480	1,530	2,640	2,640	9,300	5,560	1,400	515	820	430	430
19	930	5,100	1,400	2,460	5,780	9,850	5,330	1,400	515	715	430	430
20	1,280	4,020	1,400	2,460	16,100	8,760	5,330	1,400	515	715	430	430
21	1,960	3,210	1,400	2,460	15,400	6,720	6,960	1,280	515	610	430	430
22	2,820	2,640	1,280	5,780	8,760	5,560	5,330	1,280	515	610	430	430
23	2,460	2,290	1,280	4,880	8,230	4,880	4,660	1,280	515	610	430	430
24	2,120	1,960	1,400	4,880	7,970	4,880	4,240	1,160	515	515	430	430
25	2,640	1,820	1,670	5,780	6,720	4,880	3,820	1,160	515	515	430	430
26	5,780	1,670	2,460	9,300	5,560	5,100	3,620	1,160	515	515	1,400	430
27	4,020	1,670	8,230	6,720	5,100	4,880	13,100	1,160	515	515	930	430
28	3,210	1,670	5,560	5,560	4,880	4,660	7,210	1,040	715	515	820	430
29	2,460	1,670	4,880	4,660	.....	4,660	6,250	1,040	930	515	820	430
30	1,960	1,670	4,240	4,030	.....	4,660	5,100	1,040	820	515	715	430
31	1,530	.....	3,820	4,030	.....	4,660	.....	1,040	.....	515	715	.....

NOTE.—Discharge computed from a rating curve fairly well defined below 20,000 second-feet, two discharge measurements made Oct. 2, 1914, being used to verify the curve.

Monthly discharge of James River at Buchanan, Va., for the year ending Sept. 30, 1914.

[Drainage area, 2,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	5,780	515	1,520	0.738	0.85	B.
November	12,500	1,040	3,230	1.57	1.75	B.
December	8,230	1,280	2,760	1.34	1.54	B.
January	9,300	2,460	4,310	2.09	2.41	B.
February	16,100	2,640	7,040	3.42	3.56	B.
March	9,850	2,820	4,670	2.27	2.62	B.
April	13,100	3,620	5,450	2.65	2.96	B.
May	4,450	1,040	2,130	1.03	1.19	B.
June	930	515	695	.337	.38	B.
July	2,640	515	775	.376	.43	B.
August	1,400	430	543	.264	.30	A.
September	610	430	453	.220	.25	A.
The year	16,100	430	2,770	1.34	18.24	

Days of deficiency in discharge of James River at Buchanan, Va., for the years ending Sept. 30, 1896–1914.

Discharge in second-feet.	Days of deficient discharge.								
	1896–97	1897–98	1898–99	1899–1900	1900–01	1901–2	1902–3	1903–4	1904–5
260	.....	.....	.....	.....	.....	.....	.....	.....	.....
300	.....	24	.....	17	.....	.....	.....	.....	.....
350	2	33	19	68	.....	.....	.....	.....	22
400	11	42	49	93	.....	18	.....	21	70
450	22	57	68	111	.....	43	14	50	92
500	27	69	69	111	.....	45	14	56	105
550	50	83	81	136	10	77	27	90	114
600	62	99	86	157	16	100	39	132	126
700	72	108	90	174	23	119	56	166	152
800	122	134	100	186	30	145	77	179	173
1,000	161	166	116	211	71	171	104	209	206
1,200	197	212	129	232	103	197	127	225	227
1,400	223	232	146	245	123	218	139	236	239
1,600	233	249	164	260	150	236	153	243	253
1,800	246	257	173	270	168	247	171	255	266
2,000	256	267	198	279	184	262	184	268	275
2,500	273	289	235	295	210	276	212	300	297
3,000	292	307	253	304	236	283	228	314	308
4,000	304	327	287	321	266	296	265	334	327
5,000	313	339	307	341	287	309	292	345	335
6,000	324	344	320	342	302	319	314	350	346
8,000	338	352	337	350	323	337	338	355	351
10,000	349	357	345	356	336	344	349	359	356
15,000	358	362	355	360	346	353	356	364	361
20,000	360	363	359	364	358	356	360	365	362
25,000	361	364	361	365	360	359	361	366	362
30,000	364	365	362	.....	363	359	363	.....	364
40,000	365	.....	364	.....	364	359	363	.....	364
50,000	.....	.....	364	.....	364	363	365	.....	365
70,000	.....	.....	365	.....	365	365	.....	.....	.....

Discharge in second-feet.	Days of deficient discharge.								
	1905–6	1906–7	1907–8	1908–9	1909–10	1910–11	1911–12	1912–13[a]	1913–14
300	.....	.....	.....	.....	.....	.....	.....	.....	.....
350	.....	.....	.....	.....	.....	.....	12	.....	.....
400	7	.....	.....	.....	.....	10	36	6	.....
450	36	.....	.....	.....	.....	10	36	11	41
500	53	.....	.....	.....	13	63	47	54	41
550	59	.....	4	20	40	111	61	66	88
600	69	4	12	43	98	137	65	66	88
700	96	4	23	68	120	155	80	85	97
800	112	12	52	84	133	166	96	97	106
1,000	152	42	78	102	148	203	116	110	129
1,200	178	82	102	122	178	215	141	128	150
1,400	196	103	124	138	210	232	162	141	159
1,600	221	120	134	149	230	246	179	175	172
1,800	230	134	143	166	257	261	196	190	182
2,000	249	147	150	175	266	268	208	219	192
2,500	272	183	172	201	285	281	245	248	205
3,000	292	216	198	228	307	289	271	268	222
4,000	322	257	274	271	324	303	291	294	254
5,000	339	295	297	306	337	318	307	.....	304
6,000	344	313	317	326	345	334	320	.....	335
8,000	353	335	337	345	351	344	336	.....	350
10,000	358	344	348	356	354	349	345	.....	358
15,000	363	356	354	360	358	361	360	.....	363
20,000	365	361	361	362	361	363	362	.....	365
25,000	.....	363	363	364	363	365	364	.....	.....
30,000	.....	363	364	364	363	.....	364	.....	.....
40,000	.....	363	364	365	363	.....	364	.....	.....
50,000	.....	364	364	.....	365	.....	365	.....	.....
70,000	.....	365	366	.....	.....	.....	366	.....	.....

[a] No records Mar. 27 to Apr. 21. Daily discharge probably above 4,000 second-feet for this period.

JAMES RIVER AT HOLCOMB ROCK, VA.

Location.—At works of the Virginia Electrolytic Co., at Holcomb Rock, Va.
Drainage area.—Not measured.
Records available.—Gage heights January 1, 1900, to September 30, 1914.

Gage.—A copper float inclosed in a stilling box, with a vertical rod extending up through power-house floor.

Discharge measurements.—None made at this station.

Cooperation.—Gage heights furnished by the Virginia Electrolytic Co.

Daily gage height, in feet, of James River at Holcomb Rock, Va., for the year ending Sept. 30, 1914.

[R. D. Damson, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	−0.15	0.7	1.2	1.75	9.85	2.7	2.5	2.05	0.3	−0.45	−0.35	−0.3
2	.1	.6	2.25	1.55	7.0	2.7	2.5	1.85	.2	− .4	− .4	− .45
3	− .25	.6	3.1	2.3	4.7	2.4	2.75	1.55	.35	.1	− .5	− .35
4	.0	.35	2.45	3.7	3.7	2.2	2.75	1.55	.2	− .45	− .4	− .3
5	.2	.35	2.0	2.85	3.2	2.15	2.5	1.5	.1	.15	− .45	− .45
6	− .2	.35	1.45	2.35	3.25	2.1	2.3	1.65	.2	.65	− .4	− .6
7	.05	.25	1.5	2.25	5.6	2.1	2.05	1.8	.0	.35	− .4	− .6
8	− .35	.3	1.65	2.2	7.6	1.9	1.9	1.7	.15	.1	− .4	− .6
9	− .4	5.7	1.85	2.35	5.75	2.0	1.9	1.6	.1	.45	− .4	− .55
10	.25	8.05	1.7	3.7	4.35	1.75	1.9	1.25	.0	− .2	− .35	− .5
11	.35	4.3	1.5	5.05	3.6	1.8	1.8	1.3	.05	.3	− .4	− .45
12	.4	3.0	1.35	3.9	2.9	2.1	1.5	1.2	.05	.0	.0	− .35
13	.6	2.3	1.25	2.9	2.55	2.8	1.6	1.1	.05	.8	− .15	− .45
14	.6	2.05	1.05	2.25	2.05	2.9	1.5	1.0	.0	1.15	− .35	− .35
15	.4	2.65	1.05	2.1	2.0	2.65	2.35	.9	.0	1.1	− .3	− .5
16	.45	2.65	1.0	2.0	2.05	3.0	3.25	.85	.0	.9	− .4	− .5
17	.15	3.2	.9	1.8	1.75	4.05	4.3	.6	− .2	.95	− .4	− .6
18	.15	3.35	.9	1.45	1.7	5.65	3.7	.8	− .1	.5	− .4	− .5
19	.1	2.7	.85	1.45	3.15	6.25	2.9	.75	− .35	.25	− .5	− .6
20	.8	2.25	.8	1.4	7.5	4.75	2.7	.6	− .1	.05	− .6	− .6
21	1.1	1.85	.45	1.45	7.2	3.95	3.05	.5	− .4	− .15	− .6	− .5
22	1.55	1.5	.7	4.05	5.25	3.3	3.35	.4	− .25	− .2	− .6	− .6
23	1.35	1.25	.6	3.5	4.85	2.95	2.85	.45	− .25	− .2	− .6	− .5
24	1.15	1.25	.75	2.75	4.7	2.8	2.4	.2	− .3	− .2	− .5	− .6
25	1.95	1.0	.8	3.35	3.8	2.5	2.45	.45	.0	− .4	− .5	− .5
26	2.65	1.0	3.35	6.1	3.8	2.4	1.9	.3	− .2	− .35	.0	− .6
27	2.35	.95	4.9	4.25	3.4	2.5	4.35	.35	− .1	− .4	.05	− .6
28	1.85	.9	3.35	3.3	2.6	3.2	3.1	.2	− .15	− .2	− .1	− .6
29	1.45	.85	2.65	2.75	.....	2.9	2.45	.25	.2	− .35	.05	− .6
30	1.25	.9	2.15	2.35	.....	2.8	2.1	.45	− .1	− .4	.0	− .6
31	.9	.....	1.85	3.8	.....	2.5	.....	.3	.....	− .4	.05	.....

JAMES RIVER AT CARTERSVILLE, VA.

Location.—At highway bridge between Pemberton and Cartersville, about 50 miles above Richmond. Willis River enters from the south about a mile above station, and Rivanna River from the north about 7 miles above.

Drainage area.—6,230 square miles.

Records available.—January 1, 1899, to September 30, 1914.

Gage.—Chain on downstream side and near Cartersville end of bridge; read twice daily by B. W. Palmore. Wire gage used previous to July 24, 1903.

Discharge measurements.—Made from bridge.

Channel and control.—Both banks high; left bank overflows at a stage of about 20 feet. Bed of stream composed of rocks and sand; changes somewhat during floods.

Extremes of discharge.—Maximum stage recorded during year: 13.6 feet at 4 p. m. November 10; discharge, 39,000 second-feet. Minimum stage recorded: 0.57 foot at 10 a. m. September 11; discharge, 905 second-feet.

Maximum stage recorded 1899–1914: 26.7 feet at 6 p. m. December 30, 1901; discharge, approximately 106,000 second-feet. Minimum stage observed: 0.5 foot, October 3, 1914; discharge, 800 second-feet. A discharge of 603 second-feet (gage height, 0.42 foot) was measured September 8, 1897, but gage height corresponding to this measurement is probably subject to error.

Winter flow.—Ice forms only during severe winters, but discharge relation is seldom affected thereby.

Accuracy.—Records good except when changes in discharge relation, caused by shifting channel, have not been well determined by discharge measurements. Estimates at extremely high stages may be subject to considerable error, as discharge above point of overflow has not been accurately determined.

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

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

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,090	4,670	4,040	5,750	26,100	11,400	10,600	10,300	2,450	2,000	1,510	1,910
2	2,830	4,460	4,880	6,190	32,200	11,100	10,000	8,060	2,450	1,740	1,470	1,660
3	2,000	3,630	6,650	6,650	23,700	9,280	9,780	7,580	2,640	2,270	1,540	1,300
4	1,820	3,430	7,580	27,800	16,500	9,280	9,530	7,340	2,360	2,000	1,490	1,250
5	1,740	3,230	8,540	24,400	13,800	9,280	9,530	6,880	2,360	3,030	1,510	1,220
6	1,660	3,030	7,580	15,900	12,400	9,280	9,280	7,110	2,360	4,040	1,570	1,130
7	1,660	2,830	7,110	12,200	17,700	9,780	9,030	6,880	2,360	4,040	1,510	1,100
8	1,570	2,830	5,970	11,400	19,000	9,780	8,540	7,110	2,360	3,230	1,280	1,040
9	1,820	5,530	5,750	9,030	24,000	10,000	8,780	7,340	2,270	3,030	1,330	995
10	2,090	38,600	5,750	8,540	19,000	9,280	8,060	6,650	2,450	2,640	1,120	950
11	3,430	26,400	5,530	9,030	14,100	9,280	7,580	6,190	2,360	2,180	1,070	920
12	2,830	16,500	5,310	12,200	13,000	9,530	7,340	5,970	2,270	2,180	1,250	1,040
13	2,450	13,800	5,090	12,700	13,000	9,780	7,110	5,970	2,180	2,450	1,510	1,130
14	2,640	8,300	4,880	11,100	9,280	10,800	6,880	5,750	2,270	2,830	1,460	1,130
15	2,640	7,340	4,460	8,540	8,780	10,300	7,340	5,530	2,180	3,030	1,660	995
16	2,540	5,970	4,250	7,580	8,540	11,100	14,700	4,880	2,270	4,460	1,440	950
17	2,270	10,600	4,250	7,110	7,820	11,400	13,800	4,460	2,180	4,250	1,380	1,020
18	2,180	10,800	4,040	6,420	8,300	14,100	15,300	4,250	2,270	4,040	1,120	1,070
19	2,090	10,300	3,830	6,420	11,400	25,400	14,100	4,040	2,270	3,630	1,040	1,040
20	2,830	9,280	3,630	5,970	23,000	24,000	11,600	4,040	1,660	2,830	1,160	1,010
21	4,460	7,820	3,430	5,750	30,000	18,000	11,400	3,830	1,570	2,450	1,040	1,190
22	4,250	7,580	3,430	5,310	25,400	16,200	11,600	3,830	3,830	1,820	1,040	1,280
23	4,040	7,110	3,430	5,750	20,600	14,100	11,600	3,630	2,180	1,660	1,190	1,220
24	5,310	5,530	5,310	6,420	18,600	13,500	10,300	3,430	2,000	1,520	1,470	1,160
25	10,800	5,090	6,190	18,000	15,900	13,300	9,030	3,230	1,820	1,570	1,510	1,190
26	12,400	4,460	13,300	12,700	15,600	10,800	9,030	3,030	2,270	1,520	1,310	1,190
27	10,000	4,250	13,000	17,100	13,800	10,300	10,300	3,230	2,640	1,520	2,090	1,180
28	9,780	4,250	12,700	12,200	11,900	9,780	12,400	3,030	3,030	1,390	2,450	1,220
29	9,280	4,460	11,600	10,800	.....	9,530	14,700	2,640	3,230	1,360	2,360	1,160
30	9,280	4,250	9,280	9,030	.....	9,280	11,400	2,640	2,270	1,520	2,180	1,020
31	5,310	.....	8,060	10,600	.....	8,540	.....	2,450	.....	1,660	2,000	.....

NOTE—Daily discharge determined from a rating curve well defined below 10,000 second-feet and fairly well defined between 10,000 and 40,000.

Monthly discharge of James River at Cartersville, Va., for the year ending Sept. 30, 1914.

[Drainage area, 6,230 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	12,400	1,570	4,200	0.674	0.78	A.
November	38,600	2,830	8,210	1.32	1.47	A.
December	13,300	3,430	6,410	1.03	1.19	A.
January	27,800	5,310	10,600	1.70	1.96	A.
February	32,200	7,820	16,900	2.71	2.82	B.
March	25,400	8,540	11,900	1.91	2.20	A.
April	15,300	6,880	10,400	1.67	1.86	A.
May	10,300	2,450	5,200	.835	.96	A.
June	3,830	1,570	2,360	.379	.42	B.
July	4,460	1,360	2,510	.403	.46	B.
August	2,450	1,040	1,490	.239	.28	B.
September	1,910	920	1,160	.186	.21	B.
The year	38,600	920	6,700	1.08	14.61	

Days of deficiency in discharge of James River at Cartersville, Va., for the years ending Sept. 30, 1900–1904, and 1906–1914.

Discharge in second-feet.	Days of deficient discharge.						
	1899–1900	1900–1	1901–2	1902–3	1903–4	1905–6	1906–7
840	.....	.....	.....	.....	.....	.....	.....
900	3	.....	.....	.....	.....	.....	.....
1,000	7	.....	8	.....	.....	.....	.....
1,100	12	.....	13	.....	.....	.....	.....
1,200	16	.....	15	.....	2	.....	.....
1,400	27	.....	28	.....	13	.....	.....
1,600	33	.....	35	.....	23	1	.....
1,800	64	14	47	1	31	14	.....
2,000	83	20	51	1	35	28	.....
2,200	119	26	68	12	71	50	2
2,500	125	35	100	26	115	57	8
3,000	144	56	136	52	159	79	41
3,500	167	83	164	67	197	99	54
4,000	184	117	179	84	222	131	66
4,500	207	133	188	104	232	160	84
5,000	217	149	200	115	243	177	101
6,000	248	174	228	144	270	211	136
7,000	272	190	255	167	299	237	175
8,000	284	209	262	183	317	258	208
10,000	305	233	282	212	337	285	258
12,000	325	254	298	235	346	310	289
15,000	332	286	308	268	356	327	314
20,000	346	315	331	322	359	345	338
25,000	352	326	343	337	362	355	343
30,000	356	339	352	343	365	361	348
40,000	364	352	352	353	366	364	355
50,000	365	359	355	358	.....	364	359
60,000	.....	362	359	364	.....	365	360
80,000	.....	364	362	365	.....	.....	364
100,000	.....	365	365	.....	.....	.....	365

Discharge in second-feet.	Days of deficient discharge.						
	1907–8	1908–9	1909–10	1910–11	1911–12	1912–13	1913–14
840	.....	.....	.....	.....	.....	.....	.....
900	.....	.....	.....	.....	3	.....	.....
1,000	.....	.....	.....	5	12	.....	5
1,100	.....	.....	1	16	20	.....	16
1,200	.....	.....	1	20	24	.....	30
1,400	.....	3	8	44	34	3	43
1,600	.....	9	25	63	49	14	62
1,800	1	20	69	88	63	32	71
2,000	14	38	111	118	73	45	76
2,200	27	51	121	151	73	63	93
2,500	42	71	132	175	84	93	118
3,000	71	89	145	196	101	113	133
3,500	79	103	173	208	123	153	151
4,000	95	116	198	220	134	176	159
4,500	110	123	222	236	157	209	182
5,000	127	141	240	250	170	223	186
6,000	145	171	263	271	205	253	208
7,000	173	198	288	285	225	268	220
8,000	208	216	303	300	241	284	239
10,000	243	247	320	322	275	310	281
12,000	273	281	327	338	288	326	312
15,000	308	312	337	347	313	334	337
20,000	330	346	346	356	328	340	351
25,000	346	359	353	360	340	344	357
30,000	355	360	359	361	347	350	362
40,000	361	364	361	364	356	357	365
50,000	362	365	361	365	361	361	.....
60,000	363	.....	363	.....	362	362	.....
80,000	366	.....	365	.....	366	365	.....
100,000	.....	.....	.....	.....	.....	.....	.....

ROANOKE RIVER BASIN.

ROANOKE RIVER AT ROANOKE, VA.

Location.—At Walnut Street highway bridge in Roanoke.

Drainage area.—388 square miles.

Gage.—Chain on downstream side of Walnut Street Bridge; read once daily by employees of Roanoke Railway & Electric Co. Wire gage used previous to November 28, 1903.

Records available.—July 10, 1896, to July 15, 1906; May 7, 1907, to September 30, 1914.

Discharge measurements.—Made from downstream side of Walnut Street Bridge or from Jefferson Street Bridge, about one-third mile above. Measurement of overflow from Crystal Spring, which enters river between the two bridges, added when discharge measurements are made at Jefferson Street Bridge.

Channel and control.—Bed composed of coarse gravel and small bowlders. Both banks may overflow at extreme flood stages. Control, loose bowlders; shifts slightly.

Extremes of discharge.—Maximum stage recorded during year: 3.7 feet, February 20; discharge, 2,520 second-feet. Minimum stage recorded: 0.5 foot, August 25; discharge, 43 second-feet.

Maximum stage recorded 1896–1914: 14.34 feet, August 6, 1901; discharge, 16,860 second-feet. Minimum stage recorded: 0.0, on morning of December 23, 1909, when flow was retarded by freezing; reported that practically no water was flowing.

Winter flow.—Ice seldom forms at station, but flow is sometimes retarded by freezing of headwaters.

Accuracy.—Frequent measurements necessary to adequately define rating curve at low stages. Rating curves at high stages not well defined and estimates of discharge only fair, except for periods during which frequent measurements were made.

Cooperation.—Gage-height records furnished by Roanoke Railway & Electric Co., J. W. Hancock, general manager.

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

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

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	89	143	173	282	1,130	620	1,330	282	143	89	143	115
2	89	143	690	242	770	490	1,230	282	143	770	143	65
3	89	143	490	242	620	490	940	282	115	242	143	173
4	89	129	375	326	490	490	770	282	115	143	143	173
5	89	115	326	326	490	430	620	282	115	143	89	115
6	77	115	282	326	620	430	550	282	143	143	115	115
7	89	115	282	375	2,020	430	490	282	143	143	115	89
8	77	115	326	375	1,330	430	490	282	143	143	115	65
9	115	1,660	282	690	940	430	620	282	143	115	124	89
10	242	940	242	1,900	770	375	430	282	143	770	133	89
11	242	550	242	1,030	620	430	430	242	115	206	143	89
12	206	375	206	850	550	1,130	375	242	115	143	115	65
13	206	375	206	550	490	1,230	375	206	115	143	143	115
14	143	282	173	430	375	940	375	206	115	1,660	115	89
15	143	282	173	430	375	850	490	206	115	620	89	65
16	115	242	173	375	430	850	850	206	115	550	89	89
17	115	242	173	375	282	850	690	206	115	1,330	89	89
18	115	242	173	326	430	1,330	620	206	89	1,330	65	65
19	129	242	173	326	1,330	1,230	550	173	89	326	89	115
20	282	206	143	326	2,520	1,030	550	173	89	206	65	143
21	490	206	143	490	2,140	850	550	173	89	206	65	115
22	326	206	143	620	1,440	770	490	173	89	173	143	65
23	242	173	143	490	1,230	690	430	173	89	143	115	89
24	242	173	173	430	1,030	620	430	173	89	143	89	89
25	326	173	173	430	770	490	375	173	89	115	43	65
26	282	143	940	690	690	550	375	143	89	115	173	89
27	242	143	550	550	690	490	375	143	89	326	143	89
28	206	143	490	490	620	430	326	143	89	206	115	65
29	206	143	326	430	.....	490	326	143	89	206	173	89
30	173	143	326	326	.....	490	282	143	89	115	173	89
31	143	.....	282	620	.....	550	.....	143	.....	143	143	.....

NOTE.—Discharge determined from a rating curve well defined below 2,000 second-feet. Discharge interpolated because of missing gage heights Aug. 1–3 and 9–10.

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

[Drainage area, 388 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	490	77	181	0.466	0.54	A.
November	1,660	115	277	.714	.80	A.
December	940	143	290	.747	.86	A.
January	1,900	242	505	1.30	1.50	B.
February	2,520	282	900	2.32	2.42	B.
March	1,330	375	674	1.74	2.01	A.
April	1,330	282	558	1.44	1.61	A.
May	282	143	213	.549	.63	A.
June	143	89	110	.283	.31	A.
July	1,660	89	358	.923	1.06	A.
August	173	43	117	.302	.35	B.
September	173	65	95.2	.245	.27	A.
The period	2,520	43	353	.910	12.36	

ROANOKE RIVER AT OLD GASTON, N. C.

Location.—At bridge of Roanoke Railway Co. at Old Gaston, N. C., 1¼ miles north of Thelma, N. C., about three-fourths mile below mouth of Indian Creek, and 2½ miles above mouth of Deep Creek.

Drainage area.—8,350 square miles.

Records available.—December 7, 1911, to September 30, 1914.

Gage.—Chain gage attached to outside of guard timber on downstream side of second span from right end of deck-plate girder railroad bridge of Roanoke Railway Co.; read once daily by R. A. Howell.

Discharge measurements.—Made from downstream side of bridge to which gage is attached. Measuring section broken by 11 bridge piers.

Channel and control.—Channel fairly permanent; point of control, about 1 mile below gage, is of rock and probably permanent. Left bank overflows in extreme floods, but a fair determination can be made of the overflow discharge around the bridge.

Extremes of discharge.—Maximum stage recorded during year: 8.9 feet, November 11; discharge, 51,300 second-feet. Minimum stage recorded: 1.0 foot on several days in September; discharge, 900 second-feet.

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

Flood of 1877 highest known in this locality. No definite marks preserved at Old Gaston, but from authentic information regarding the crest height as observed in 1877 the approximate height has been determined as about 19 feet, referred to present gage datum. The corresponding discharge is about 275,000 second-feet.

Winter flow.—Ice sometimes forms to considerable thickness at this station, but the discharge relation is seldom affected thereby.

Regulation.—Persons engaged in the operation of power plants at Roanoke Rapids and Weldon have observed on Tuesday or Wednesday during periods of low water a trough probably due to the weekly shut-down of large power plants farther upstream.

Accuracy.—Rating curve believed to be reliable and results excellent.

The following discharge measurement was made by Mathers and Morgan:
September 28, 1914: Gage height, 1.24 feet; discharge, 1,430 second-feet.

Daily discharge, in second-feet, of Roanoke River at Old Gaston, N. C., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,020	4,260	3,580	7,400	8,630	11,900	8,210	5,500	4,960	5,870	4,080	3,090
2	2,620	3,580	4,600	7,400	11,400	12,500	8,630	4,780	3,580	7,400	3,580	2,620
3	2,160	3,250	13,000	7,800	13,600	10,400	10,400	4,960	3,090	7,400	2,770	2,310
4	2,310	3,250	22,100	29,000	10,400	9,060	10,400	4,780	2,460	6,620	2,930	2,460
5	2,020	3,410	13,000	45,400	8,630	8,210	9,500	5,500	1,880	7,400	4,960	1,750
6	1,750	3,090	9,060	37,800	8,210	8,210	8,630	5,870	3,580	7,800	4,430	1,750
7	1,500	2,770	7,400	16,600	11,900	9,060	7,400	8,210	3,250	7,400	3,580	2,770
8	1,250	2,930	7,010	10,900	29,000	11,400	8,210	9,500	2,620	5,320	3,740	1,250
9	2,160	5,870	6,240	9,500	25,100	9,060	7,400	7,400	2,930	5,140	2,160	900
10	3,090	30,700	7,400	8,630	15,300	8,210	8,210	6,620	3,580	4,780	2,020	900
11	3,910	51,300	5,140	8,210	13,600	8,210	9,060	5,140	2,770	3,740	1,620	1,020
12	8,630	32,400	5,870	7,400	9,960	9,500	8,210	4,780	2,160	4,780	2,460	900
13	7,010	12,500	3,580	7,800	11,900	11,900	7,010	5,500	2,310	4,960	2,310	1,370
14	3,910	9,500	4,780	7,400	9,060	14,700	5,870	6,240	2,020	4,960	2,160	1,500
15	5,500	7,400	4,430	6,620	7,400	16,600	7,400	4,960	2,930	5,870	2,310	1,620
16	3,740	6,620	3,740	5,500	8,210	15,900	10,400	7,010	3,250	27,400	2,310	1,500
17	2,930	5,870	3,580	4,600	8,630	13,600	16,600	7,400	2,460	22,800	1,880	1,130
18	2,770	5,870	4,080	4,600	8,210	11,400	14,200	3,740	3,410	14,700	1,620	1,020
19	3,090	7,400	3,580	5,870	9,960	11,900	10,400	3,250	2,620	9,500	1,250	900
20	2,460	6,620	3,910	4,780	13,000	12,500	8,210	4,430	2,460	7,200	1,500	1,020
21	2,770	5,870	3,580	5,870	39,700	13,000	10,900	3,580	2,160	4,430	1,500	1,130
22	16,600	4,960	3,410	4,600	44,400	11,900	11,900	3,740	2,310	3,580	1,370	1,020
23	9,960	4,600	3,410	4,430	31,500	11,900	10,900	3,580	2,160	1,370	1,370	1,020
24	9,060	4,260	3,910	4,600	20,600	12,500	9,060	3,740	1,880	3,250	1,620	1,250
25	9,060	3,740	7,400	5,870	16,600	13,000	8,210	3,410	1,750	2,930	1,880	1,130
26	22,100	3,580	13,600	6,620	11,900	10,900	7,400	3,410	2,460	2,620	1,620	1,620
27	19,900	2,930	17,200	7,400	10,900	9,960	7,010	2,930	1,750	2,460	1,620	1,250
28	16,600	3,740	17,900	7,800	10,900	9,060	6,240	3,250	3,740	2,620	1,880	1,620
29	8,210	3,580	11,900	7,400	.....	8,210	7,400	3,090	7,010	3,250	1,880	1,250
30	6,240	3,580	9,060	7,400	.....	8,210	7,010	2,930	5,870	3,910	2,620	1,250
31	5,320	.....	8,630	7,400	.....	8,210	.....	3,740	.....	4,260	2,460	.....

NOTE.—Discharge determined from a rating curve well defined below 33,300 second-feet and fairly well defined up to 181,000 second-feet.

Monthly discharge of Roanoke River at Old Gaston, N. C., for the year ending Sept. 30, 1914.

[Drainage area, 8,350 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	22,100	1,250	6,150	0.737	0.85	A.
November	51,300	2,770	8,310	.995	1.11	A.
December	22,100	3,410	7,620	.913	1.05	A.
January	45,400	4,430	10,100	1.21	1.40	A.
February	44,400	7,400	15,300	1.83	1.91	A.
March	16,600	8,210	11,000	1.32	1.52	A.
April	16,600	5,870	9,010	1.08	1.20	A.
May	9,500	2,930	4,930	.590	.68	A.
June	7,010	1,750	2,980	.357	.40	A.
July	27,400	1,370	6,640	.795	.92	A.
August	4,960	1,250	2,370	.284	.33	A.
September	3,090	900	1,480	.177	.20	A.
The year	51,300	900	7,110	.851	11.57	

PEEDEE RIVER BASIN.

YADKIN RIVER AT DONNAHA, N. C.

Location.—At toll bridge in Donnaha, on road between Donnaha and East Bend, N. C., about a quarter of a mile west of Donnaha railway station, and about 6 miles downstream from mouth of Ararat River, which enters on left side of river. Station about 60 miles upstream from gaging station at Salisbury, N. C.

Drainage area.—1,600 square miles.

Records available.—April 11, 1913, to September 30, 1914.

Gage.—Vertical gage in four sections, on left bank 150 feet downstream from left end of toll bridge; read twice daily by J. F. Goolsby.

Discharge measurements.—Made from three-span toll bridge with two piers in stream and two on banks. Bridge has steel trestle approaches at both ends. Flood water confined under bridge except during extreme floods above about 28 feet.

Channel and control.—Channel consists of sand and bedrock; probably permanent. Current slightly obstructed by two old steel trusses lying about 150 and 400 feet, respectively, below bridge; obstructions probably permanent. Control is a rock ledge extending across river and forming a shoal about 450 feet below gage.

Extremes of discharge.—Maximum stage recorded during year: 11.0 feet at 8 a. m. and 6 p. m. October 20; discharge, approximately 10,700 second-feet, based on extension of rating curve. Minimum stage recorded: 4.65 feet at 4 p. m. September 30; discharge, 678 second-feet.

Maximum stage recorded 1913–1914: 16.8 feet at 8 a. m. May 24, 1913; discharge, approximately 20,600 second-feet. Minimum stage recorded: 4.65 feet at 4 p. m. September 30, 1914; discharge, 678 second-feet.

Winter flow.—Discharge relation not affected by ice.

Regulation.—None except a few small mill dams on tributaries.

Accuracy.—Results good for medium and ordinary low stages.

Discharge measurements of Yadkin River at Donnaha, N.C., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 29	Warren E. Hall	5.23	1,400	Apr. 17	B. M. Hall, jr	6.78	3,630
Apr. 17	B. M. Hall, jr	6.95	3,820	18	do	6.50	3,280

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

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,320	1,600	4,960	2,770	4,640	6,950	2,470	2,030	1,880	1,320	815	1,180
2	1,320	1,600	6,610	3,070	3,220	7,630	2,470	2,170	1,740	1,600	1,050	1,050
3	1,180	1,600	3,680	6,100	2,320	6,610	2,170	2,170	1,740	1,600	815	1,050
4	1,180	1,600	2,920	4,320	2,030	5,120	2,030	2,030	1,600	1,600	925	1,050
5	1,180	1,600	2,170	3,680	2,170	2,770	2,170	2,620	1,600	1,600	1,050	1,050
6	1,050	1,600	2,320	2,770	2,770	2,170	2,030	3,370	1,600	1,880	1,050	1,050
7	1,050	1,600	1,880	2,320	5,770	2,170	2,030	3,070	1,740	3,070	1,320	925
8	1,050	1,880	1,740	2,170	4,320	2,030	2,770	2,920	1,600	2,770	1,050	1,050
9	1,050	5,290	1,600	1,880	3,220	1,880	5,120	2,770	1,600	2,170	1,050	1,320
10	1,320	3,070	1,600	2,170	2,470	2,030	3,070	3,070	1,600	1,880	1,320	1,050
11	1,320	2,470	1,600	2,170	2,470	2,030	2,470	3,370	1,600	1,600	1,460	1,050
12	1,880	1,880	1,600	2,030	2,770	1,880	2,470	3,680	1,600	1,740	1,880	1,050
13	2,170	1,740	1,600	1,880	2,470	2,030	2,620	4,160	1,460	1,740	1,320	1,050
14	1,600	1,600	1,460	1,880	2,470	2,170	3,680	3,530	1,320	1,880	1,320	1,050
15	1,320	1,600	1,600	1,880	2,470	2,170	6,610	2,470	1,320	2,170	1,180	1,050
16	1,320	1,600	1,600	1,880	2,770	2,170	4,640	1,880	1,180	7,630	1,050	925
17	1,320	1,460	1,600	1,740	2,030	2,170	3,680	1,600	1,320	5,770	1,050	1,050
18	1,320	1,460	1,460	1,740	1,880	2,170	3,370	1,600	1,320	3,070	1,050	925
19	2,470	1,460	1,600	1,740	2,030	2,170	3,370	1,460	1,180	2,470	815	1,050
20	10,700	1,320	1,880	1,600	5,610	2,170	3,370	1,600	1,180	1,880	815	1,050
21	3,680	1,320	1,880	1,600	5,290	2,470	3,070	1,600	1,880	1,600	1,050	925
22	2,320	1,320	1,880	1,600	4,960	2,170	2,770	1,460	1,320	1,600	1,050	1,050
23	2,170	1,320	1,740	1,600	4,160	2,170	2,620	1,600	1,320	1,460	1,050	1,050
24	2,170	1,320	1,600	1,600	4,000	1,880	2,470	1,600	1,320	1,320	1,320	925
25	3,680	1,320	1,740	2,170	4,000	1,880	2,470	1,600	1,320	1,320	1,180	815
26	2,170	1,320	3,220	1,880	2,920	1,880	2,320	1,460	1,320	1,050	1,740	815
27	1,880	1,320	2,920	1,740	2,470	1,880	2,170	1,460	1,320	1,050	2,320	815
28	1,740	1,320	2,320	1,740	2,470	1,880	2,170	1,320	1,320	1,050	1,880	815
29	1,740	1,320	1,880	1,740	.....	1,880	2,030	1,320	1,320	1,050	1,600	815
30	1,740	1,320	1,880	1,880	.....	2,470	2,030	1,460	1,320	1,050	1,600	720
31	1,600	.....	3,220	3,070	.....	2,170	.....	1,600	.....	1,050	1,320	.....

NOTE.—Daily discharge determined from a rating curve well defined between 1,000 and 4,000 second-feet; below 1,000 second-feet the curve is based on a fairly accurate determination of the point of zero flow; above 5,000 second-feet it is approximate, and discharge estimates above this value should be used with caution.

Monthly discharge of Yadkin River at Donnaha, N. C., for the year ending Sept. 30, 1914.

[Drainage area, 1,600 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	10,700	1,050	2,000	1.25	1.44	A.
November	5,290	1,320	1,710	1.07	1.19	A.
December	6,610	1,460	2,250	1.41	1.63	A.
January	6,100	1,600	2,270	1.42	1.64	A.
February	5,770	1,880	3,220	2.01	2.09	B.
March	7,630	1,880	2,680	1.68	1.94	A.
April	6,610	2,030	2,890	1.81	2.02	A.
May	4,160	1,320	2,200	1.38	1.59	A.
June	1,880	1,180	1,460	.912	1.02	A.
July	7,630	1,050	2,030	1.27	1.46	B.
August	2,320	815	1,240	.775	.89	A.
September	1,320	720	992	.620	.69	B.
The year	10,700	720	2,070	1.29	17.60	

YADKIN RIVER NEAR SALISBURY, N. C.

Location.—At highway bridge known as the Piedmont toll bridge, 1,000 feet above Southern Railway bridge, 6 miles east of Salisbury, and about 5 miles below mouth of South Yadkin River.

Drainage area.—3,400 square miles.

Records available.—September 24, 1895, to December 31, 1909; September 1, 1911, to September 30, 1914.

Gage.—Standard chain gage attached to highway bridge; read twice daily by J. T. Yarbrough. From the date of establishment to May 31, 1899, the gage was at the Southern Railway bridge, and from the latter date it was at the highway bridge until moved back to the railroad bridge early in the year 1903, where it remained until the end of the year 1905. Since January 1, 1906, the gage has been at the highway bridge on the same datum as originally established there in 1899. The last gage at the railroad bridge read the same as the gage at the highway bridge at gage height 3.2 feet, but was not the same for higher and lower stages. Datum of original gage at railroad bridge somewhat uncertain.

Discharge measurements.—Made from highway bridge. During the time that gage was at the railroad bridge most of the measurements were made from that bridge.

Channel and control.—Channel wide and rather rough; control, a rock ledge about 500 feet below bridge, extending entirely across river.

Extremes of discharge.—Maximum stage recorded during year: 7.6 feet at 7 a. m., January 4; discharge, 24,800 second-feet. Minimum stage recorded: 1.65 feet at 6 p. m., August 9 and at 7 a. m. August 22; discharge, 1,080 second-feet.

Maximum stage recorded 1895–1914: 17.8 feet, March 20, 1899; discharge, 107,000 second-feet. Minimum stage recorded: 1.2 feet, September 20, October 5, November 22 and 26, 1897; dischage, 900 second-feet.

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

Regulation.—Flow during low stages may be slightly affected by developed powers on the river and tributaries above station.

Accuracy.—Owing to the fact that station has an excellent natural control, the rating curve for low and medium stages is good. No discharge measurements were made during year ending September 30, 1914, but a measurement made September 23, 1915, checks the rating curve.

Daily discharge, in second-feet, of Yadkin River near Salisbury, N. C., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,660	2,660	3,940	4,240	7,210	5,050	4,400	3,500	2,660	1,530	1,380	2,290
2	2,290	2,410	19,200	3,790	6,460	4,720	5,050	3,210	2,660	1,530	1,200	1,690
3	2,170	2,660	13,900	12,200	4,400	4,090	4,400	3,210	2,170	2,410	1,490	1,570
4	1,730	2,170	6,460	24,300	3,790	3,940	3,500	3,360	1,940	2,930	1,530	1,530
5	1,940	2,410	4,400	14,900	3,500	3,790	3,790	3,070	1,940	2,060	1,530	1,940
6	1,840	2,170	3,500	7,210	3,790	3,790	3,640	5,050	1,940	2,800	1,630	2,540
7	1,940	2,410	3,790	5,050	9,170	4,090	3,790	5,050	1,940	3,210	1,380	1,570
8	1,730	2,170	4,400	4,720	10,400	4,090	4,400	3,640	2,930	4,090	1,340	1,380
9	1,940	12,200	3,940	4,090	6,460	3,790	7,980	4,240	2,410	2,410	1,130	1,940
10	2,170	12,600	3,070	3,790	5,050	3,500	8,370	3,210	2,170	3,210	1,380	2,170
11	2,410	7,210	3,210	3,940	5,050	3,360	5,390	3,210	2,170	4,720	2,170	1,730
12	2,170	3,940	2,660	3,790	5,050	6,830	4,400	2,930	2,170	2,410	2,930	1,530
13	3,210	3,360	2,930	3,500	4,240	9,580	4,090	2,930	1,940	2,290	2,660	1,530
14	2,170	2,930	2,660	3,070	3,640	7,980	4,400	2,930	2,170	1,730	2,410	1,940
15	1,940	2,930	2,930	3,210	4,400	6,460	9,990	3,210	2,410	2,170	2,930	1,490
16	1,730	2,660	2,540	3,210	4,400	5,050	15,800	2,660	1,940	3,500	2,660	1,380
17	1,940	2,930	2,660	2,930	4,090	4,720	9,990	2,660	1,840	6,100	1,940	1,340
18	1,630	2,660	2,410	2,930	4,090	4,400	6,460	2,800	1,730	2,930	1,490	1,530
19	2,060	2,800	2,660	2,930	6,100	3,790	5,390	2,540	1,730	2,660	1,380	1,490
20	12,200	2,410	2,170	2,930	11,300	4,090	5,740	2,410	1,840	2,660	1,340	1,440
21	12,200	2,630	2,660	2,930	18,200	4,240	6,460	2,410	1,940	1,940	1,250	1,940
22	5,050	2,170	2,410	2,800	12,600	4,240	5,740	2,410	1,940	1,730	1,200	1,690
23	3,500	2,540	3,790	2,660	7,590	3,940	4,720	2,290	1,730	1,570	1,840	1,530
24	2,930	2,410	3,360	2,660	6,460	3,790	4,400	2,410	1,730	1,490	1,630	1,380
25	11,300	2,290	3,940	3,210	5,740	3,500	3,790	2,410	1,630	1,380	1,340	1,940
26	9,170	2,170	3,500	3,500	5,050	3,640	3,940	2,170	1,730	1,160	1,340	2,060
27	5,390	2,410	7,980	3,210	5,050	3,360	4,090	2,170	2,290	1,490	2,930	1,440
28	3,790	2,170	5,050	2,930	5,050	3,360	3,640	2,170	2,170	1,440	3,500	1,570
29	3,500	2,290	4,090	2,930	.....	3,500	3,500	2,170	1,940	1,530	2,660	1,380
30	3,210	2,170	5,050	2,800	.....	3,790	3,500	2,410	1,690	1,690	6,100	1,300
31	2,930	.....	5,050	3,210	.....	4,400	.....	2,540	.....	1,530	4,400	.....

NOTE.—Daily discharge determined from a rating curve fairly well defined below 22,000 second-feet.

Monthly discharge of Yadkin River near Salisbury, N. C., for the year ending Sept. 30, 1914.

[Drainage area, 3,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	12,200	1,630	3,700	1.09	1.26	A.
November	12,600	2,170	3,360	.988	1.10	A.
December	19,200	2,170	4,530	1.33	1.53	B.
January	24,300	2,660	4,820	1.42	1.64	B.
February	18,200	3,500	6,370	1.87	1.95	B.
March	9,580	3,360	4,480	1.32	1.52	A.
April	15,800	3,500	5,490	1.61	1.80	B.
May	5,050	2,170	2,950	.868	1.00	A.
June	2,930	1,630	2,050	.603	.67	A.
July	6,100	1,160	2,400	.706	.81	A.
August	6,100	1,130	2,070	.609	.70	B.
September	2,540	1,300	1,680	.494	.55	A.
The year	24,300	1,130	3,640	1.07	14.53	

Days of deficiency in discharge of Yadkin River near Salisbury, N. C., for the years ending Sept. 30, 1896–1914.

Discharge in second-feet.	Days of deficient discharge.									
	1895–96	1896–97	1897–98	1898–99	1899–1900	1900–1	1901–2	1902–3	1903–4	1904–5
900	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1,000	.....	.....	3	.....	.....	.....	.....	.....	.....	.....
1,200	5	8	8	.....	.....	.....	.....	.....	.....	7
1,400	32	16	20	.....	.....	.....	.....	2	2	36
1,600	63	23	56	9	9	.....	3	2	8	41
1,800	112	34	87	30	22	.....	10	2	34	67
2,000	138	50	135	65	67	.....	22	11	83	96
2,300	138	53	170	96	132	9	42	31	151	129
2,600	165	64	233	124	153	25	56	54	206	170
2,900	200	94	252	137	172	53	63	69	239	211
3,200	235	127	269	154	208	91	73	82	258	229
3,500	255	151	282	166	228	108	105	88	279	242
3,800	282	167	285	176	258	124	125	99	292	249
4,200	290	184	298	182	269	144	157	111	305	272
4,600	298	205	302	188	276	162	184	141	315	282
5,000	308	223	312	198	292	181	219	155	322	293
5,500	320	243	318	221	297	205	241	195	332	306
6,000	324	259	333	232	304	224	267	212	338	312
7,000	331	282	337	259	314	252	308	242	344	318
9,000	341	309	342	287	329	280	329	290	352	331
11,000	346	325	355	313	345	297	337	316	358	343
15,000	354	344	362	336	350	325	346	332	364	352
20,000	356	355	362	347	357	340	354	346	366	357
25,000	359	360	362	350	361	348	356	352	.....	360
30,000	361	362	363	356	361	352	360	356	.....	364
40,000	364	365	363	359	362	360	362	364	.....	365
60,000	365	.....	363	361	365	363	363	364	.....	.....
80,000	366	.....	365	364	.....	364	364	365	.....	.....
100,000	.....	.....	.....	364	.....	365	364	.....	.....	.....
120,000	.....	.....	.....	365	.....	.....	365	.....	.....	.....

Discharge in second-feet.	Days of deficient discharge.								
	1905–6	1906–7	1907–8	1908–9	1909–10[a]	1910–11[b]	1911–12	1912–13	1913–14
900	.....	.....	.....	.....	.....	.....	.....	.....	.....
1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....
1,200	.....	.....	.....	.....	.....	.....	.....	.....	2
1,400	.....	.....	.....	.....	.....	5	3	.....	20
1,600	.....	1	.....	.....	1	7	20	1	44
1,800	29	5	1	.....	1	11	31	7	63
2,000	51	17	7	.....	2	15	45	28	88
2,300	60	24	29	1	11	20	86	91	123
2,600	77	37	46	15	43	20	110	139	149
2,900	89	56	73	30	67	23	128	176	176
3,200	100	75	93	49	76	23	148	201	202
3,500	120	121	106	56	85	24	168	225	223
3,800	136	173	145	102	87	25	201	263	261
4,200	179	214	169	123	87	27	222	281	280
4,600	199	249	202	166	87	28	250	294	299
5,000	230	274	223	197	88	28	265	296	304
5,500	243	294	252	239	90	28	283	306	323
6,000	259	311	272	261	90	28	288	310	326
7,000	288	329	291	280	90	29	310	317	337
9,000	313	346	318	312	92	30	330	338	345
11,000	326	351	332	327	.....	.....	339	345	351
15,000	345	356	340	343	.....	.....	350	355	361
20,000	354	358	350	352	.....	.....	357	359	364
25,000	357	362	357	358	.....	.....	360	361	365
30,000	358	363	360	361	.....	.....	361	362	.....
40,000	363	365	363	363	.....	.....	363	362	.....
60,000	365	.....	364	365	.....	.....	364	363	.....
80,000	.....	.....	366	.....	.....	.....	365	365	.....
100,000	.....	.....	.....	.....	.....	.....	365	.....	.....
120,000	.....	.....	.....	.....	.....	.....	366	.....	.....

[a] Oct. 1 to Dec. 31, 1909. No record from Jan. 1, 1910, to Aug. 31, 1911.
[b] Sept. 1–30.

SAVANNAH RIVER BASIN.

TALLULAH RIVER AT MATHIS, GA.

Location.—About a quarter of a mile southeast of Mathis station on the Tallulah Falls Railway, about 900 feet below mouth of Tiger Creek, about 1 mile below the Mathis storage dam of the Georgia Railway & Power Co., and about 5 miles upstream from Tallulah Falls, Ga., where a station was formerly located.

Drainage area.—186 square miles.

Records available.—October 31, 1912, to September 30, 1914.

Gage.—Vertical staff in eight sections on left bank, 900 feet below mouth of Tiger Creek; installed March 27, 1913, after original gage, 400 feet upstream, had been washed out on March 16, 1913; low-water stages hard to read because of silt which collects around lower sections of gage. Gage read twice daily by Miles Phillips.

Discharge measurements.—Made heretofore from a rough railroad trestle 400 feet upstream. A cable has been erected about 1,000 feet downstream by the Georgia Railway & Power Co., but the section is poor. Cable must be moved to better section before it can be used to advantage.

Channel and control.—Channel composed of sand, gravel, and bowlders. A good control, which has remained permanent, is formed by a gravel and bowlder shoal 150 feet downstream from gage.

Extremes of dischage.—Maximum stage recorded during year: 3.5 feet at 8 a. m. April 8; discharge, 1,520 second-feet. Minimum stage recorded: 0.4 foot at 7 p. m. August 22 and 7 a. m. August 23; discharge, approximately 80 second-feet.

Maximum stage recorded 1913–14: 8.5 feet about 4 a. m. March 27, 1913; discharge, 8,970 second-feet. Minimum stage recorded: 0.4 foot at 7 p. m. August 22 and 7 a. m. August 23, 1914; discharge, approximately 80 second-feet.

Winter flow.—Discharge relation but slightly affected by ice.

Regulation.—Small diurnal fluctuation caused by operation of small mills on Tiger Creek. Mathis storage dam, 1 mile above on Tallulah River, causes considerable fluctuation.

Accuracy.—Gage heights as good as could be obtained with two gage readings daily. Rating very good for low water, but additional measurements are needed to develop upper part of rating curve.

Discharge measurements of Tallulah River at Mathis, Ga., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 29	Warren E. Hall and B. M. Hall, jr	1.64	421
30	do	1.62	422
Aug. 19	Warren E. Hall	1.12	245

Daily discharge, in second-feet, of Tallulah River at Mathis, Ga., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	248	218	449	314	538	388	515	428	264	164	118	129
2	218	218	388	314	388	350	492	388	280	164	140	152
3	164	218	264	314	350	350	470	314	264	264	190	140
4	140	218	280	314	314	350	428	297	264	280	164	118
5	140	204	264	280	314	350	388	538	248	190	190	118
6	140	248	248	314	515	350	350	792	264	190	140	108
7	140	248	610	492	685	350	350	470	264	164	118	98
8	152	248	369	449	492	350	1,170	428	264	280	218	98
9	164	248	297	369	408	314	660	388	248	248	140	98
10	164	248	280	297	428	314	492	350	204	280	118	108
11	164	248	280	280	408	350	428	350	190	190	118	118
12	164	190	280	248	350	848	470	350	218	190	118	140
13	164	190	248	248	449	538	428	388	190	164	118	118
14	164	190	248	248	560	470	1,110	388	190	164	280	118
15	164	190	248	248	470	449	1,170	350	190	233	314	98
16	164	190	248	248	428	428	930	314	248	248	314	98
17	164	190	218	248	369	388	738	314	248	264	297	98
18	164	190	204	248	350	350	635	314	264	218	280	140
19	177	190	248	248	470	350	610	314	314	177	280	164
20	332	177	218	248	685	350	1,170	280	248	190	359	204
21	610	164	190	248	538	350	738	280	233	164	190	140
22	190	164	190	248	492	388	738	280	204	177	108	140
23	190	164	350	248	470	350	560	280	190	140	177	118
24	610	164	280	280	449	350	560	280	190	140	428	129
25	332	164	792	332	428	350	515	280	164	140	140	140
26	280	164	538	470	428	388	515	264	164	118	140	118
27	264	164	388	248	388	388	470	248	190	118	140	118
28	314	164	332	248	369	428	470	248	140	129	140	108
29	248	164	470	248	.....	388	449	248	140	190	152	108
30	248	248	538	332	.....	492	449	248	204	140	140	98
31	248	.....	470	685	.....	610	.....	248	.....	140	129	.....

NOTE.—Daily discharge determined from a rating curve fairly well defined above 150 second-feet and approximate below this value.

Monthly discharge of Tallulah River at Mathis, Ga., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
October	610	140	227	B.
November	248	164	200	B.
December	792	190	336	A.
January	685	248	308	A.
February	685	314	448	A.
March	848	314	402	B.
April	1,170	350	616	B.
May	792	248	344	B.
June	314	140	223	B.
July	280	118	189	B.
August	428	108	190	B.
September	204	98	123	C.
The year	1,170	98	299	

ALTAMAHA RIVER BASIN.

OCMULGEE RIVER NEAR JACKSON, GA.

Location.—At Pittmans Ferry, 8 miles southeast of Jackson, half a mile above mouth of Yellow Water Creek, and a short distance below Heards Creek; 1½ miles below dam and power plant of Central Georgia Power Co.

Drainage area.—1,400 square miles.

Records available.—May 18, 1906, to September 30, 1914.

Gage.—Vertical staff in three sections on right bank at upstream side of ferry landing; read by C. A. Pittman twice daily to half-tenths.

Discharge measurements.—Made at ferry, either from ferry or from a small boat held in place by ferry cable.

Channel and control.—Bed of river sandy; shifts considerably; shifting has little if any effect on discharge relation, as control is a rocky ledge about 400 feet below gage. Point of zero flow is at gage height about 2.75 feet.

Extremes of discharge.—Maximum stage recorded during year: 5.55 feet at 5 p. m. April 16 and 17; discharge, 2,950 second-feet. Minimum stage recorded: 3.6 feet at 6 p. m. July 26; discharge, 170 second-feet.

Maximum stage recorded 1906–1914: 20.75 feet at 6 p. m. March 16, 1912; discharge, 34,700 second-feet. Minimum stage recorded: 2.78 feet, November 20, 1910; discharge, 18 second-feet. This low stage was due to cutting off of water at the dam about 1½ miles upstream.

Regulation.—Flow at low stages since 1911 greatly affected by operation of power plant of Central Georgia Power Co.

Accuracy.—On account of fluctuations in stage caused by operation of power plant estimates of flow as determined from the mean daily gage height obtained from two readings of the gage per day, may be considerably in error.

No discharge measurements made during the year.

Daily discharge, in second-feet, of Ocmulgee River near Jackson, Ga., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	912	1,000	925	1,240	618	858	1,620	1,080	858	670	430	1,160
2	1,160	790	1,080	1,330	858	1,420	1,420	790	790	390	290	730
3	1,160	1,000	1,080	1,160	1,240	1,920	1,420	670	670	406	489	790
4	1,080	706	1,000	430	1,160	1,420	1,240	858	730	355	858	618
5	804	638	1,080	1,000	1,080	1,620	1,000	1,000	925	518	470	670
6	1,240	649	790	1,520	1,420	1,420	1,330	790	858	470	470	470
7	1,240	670	694	1,520	858	1,080	1,160	730	618	586	390	565
8	1,240	660	898	1,420	470	898	1,240	766	586	670	355	618
9	1,240	556	1,240	1,420	1,920	1,720	1,240	565	670	730	260	670
10	1,160	804	1,240	1,160	2,230	1,080	1,080	790	730	858	565	618
11	1,080	706	1,240	586	1,820	1,080	858	730	858	518	670	858
12	607	706	1,420	1,330	1,820	1,420	694	766	1,080	565	470	618
13	1,160	730	790	1,240	2,020	1,520	1,080	858	618	320	618	858
14	1,000	706	730	1,420	1,820	1,240	1,240	925	489	355	858	1,080
15	706	742	1,240	1,330	1,080	790	2,230	817	618	290	618	1,000
16	694	706	1,420	1,240	1,420	1,620	2,840	618	470	290	649	618
17	649	858	1,330	1,240	2,020	1,420	2,840	790	618	355	858	858
18	638	742	1,620	1,080	1,820	1,420	1,820	618	518	320	618	1,000
19	414	576	1,520	1,620	1,420	1,080	1,620	670	790	260	730	730
20	694	618	1,080	1,620	1,720	1,420	1,820	730	518	390	670	430
21	754	638	925	1,620	1,330	1,080	1,620	618	518	320	790	730
22	718	546	1,000	1,420	817	670	1,420	518	430	290	618	1,420
23	790	362	730	1,720	898	1,240	1,420	518	430	430	730	1,080
24	742	618	546	1,240	1,620	1,080	618	790	390	390	1,000	790
25	660	638	390	618	1,820	925	1,240	925	390	260	925	1,330
26	638	649	518	1,420	1,420	1,080	1,240	518	470	210	1,000	730
27	536	556	586	1,160	1,620	1,080	790	730	430	430	858	430
28	1,000	576	618	1,240	1,240	730	1,000	618	430	355	730	790
29	1,080	438	1,420	1,240	.....	489	1,000	670	390	470	670	1,240
30	1,080	327	1,420	1,240	.....	1,080	1,080	565	430	390	858	858
31	1,000	.....	1,420	790	.....	1,080	.....	565	.....	430	730	.....

NOTE.—Daily discharge determined from a rating curve fairly well defined below 10,000 second-feet. Discharge for October and November determined from mean daily gage heights obtained from water-stage recorder. Discharge for the other months determined from readings of staff gage.

Monthly discharge of Ocmulgee River near Jackson, Ga., for the year ending Sept. 30, 1914.

[Drainage area, 1,400 square miles.[a]]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
October	1,240	414	899	C.
November	1,000	327	664	C.
December	1,620	390	1,030	B.
January	1,720	430	1,250	C.
February	2,230	470	1,410	C.
March	1,920	489	1,190	C.
April	2,840	618	1,370	C.
May	1,080	518	729	C.
June	1,080	390	611	C.
July	858	210	429	C.
August	1,000	260	653	C.
September	1,420	430	812	C.
The year	2,840	210	918	C.

[a] "Second-feet per square mile" and "Run-off (depth in inches)" are not published for this station, because such figures do not represent the natural flow due to storage at the dam of the Central Georgia Power Co., about 1½ miles upstream.

OCONEE RIVER NEAR GREENSBORO, GA.

Location.—At the highway bridge 5 miles west of Greensboro on the road to Madison, Ga., about 4 miles above the mouth of Apalachee River, and 1½ miles below Town Creek.

Drainage area.—1,100 square miles.

Records available.—July 25, 1903, to September 30, 1914.

Gage.—Standard chain gage attached to the bridge; read twice daily by W. E. Strickland from October 1 to December 31, and by F. M. Chambers from May 10 to September 30.

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

Channel and control.—Bed composed chiefly of sand; slightly shifting. Control section not known.

Extremes of stage.—Maximum stage recorded during the partial year (October 1 to December 31, 1913, and May 10 to September 30, 1914): 12.0 feet at 7 a. m. December 31. Minimum stage recorded: 1.4 feet at 7 a. m. and 6 p. m. July 27.

Maximum stage recorded 1903–1914: 35.4 feet on August 26, 1908; discharge, approximately 28,000 second-feet. Minimum mean daily stage recorded: 0.35 foot, September 18 and October 8, 1911; discharge, 172 second-feet.

Regulation.—Flow affected by operation of power plants above station.

Accuracy.—Gage-height record not very good because of difficulty of securing good observer. A discharge measurement made on December 10, 1914, indicates that there has been a decided change in the discharge relation as expressed by the 1913 rating curve. Estimates of discharge are therefore withheld until additional data are obtained for developing a new rating curve.

The following discharge measurement was made by B. M. Hall, jr.:

January 8, 1914: Gage height, 3.38 feet; discharge, 1,070 second-feet.

Daily gage height, in feet, of Oconee River near Greensboro, Ga., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1	5.5	2.4	3.4	.....	2.3	2.0	1.8	1.7
2	4.8	2.2	3.4	.....	2.5	2.1	2.3	1.7
3	4.0	2.2	2.8	.....	2.5	2.1	3.5	2.2
4	3.2	2.1	2.6	.....	2.9	2.3	2.7	2.9
5	2.4	1.8	2.5	.....	2.7	4.2	2.4	2.5
6	2.2	1.8	2.6	.....	5.0	3.1	2.0	2.3
7	2.0	1.8	2.4	.....	4.7	3.2	2.0	1.9
8	2.0	2.3	1.9	.....	3.7	2.7	1.9	1.8
9	2.0	2.8	2.0	.....	2.9	2.7	2.0	1.7
10	2.1	2.6	2.4	2.9	2.8	2.6	2.1	1.7
11	1.8	2.4	2.4	2.7	2.9	2.6	3.1	1.7
12	1.8	2.2	2.4	3.0	3.1	2.5	3.9	1.9
13	1.8	2.0	2.6	3.0	2.8	2.3	4.1	1.8
14	1.8	1.7	2.8	2.7	2.7	2.1	6.1	1.9
15	1.8	1.6	2.6	2.4	2.5	2.0	5.7	1.7
16	1.7	1.7	2.5	2.7	2.5	2.1	3.2	1.9
17	1.6	1.8	2.5	2.5	2.4	2.0	3.0	2.1
18	1.9	1.8	2.5	2.2	2.1	2.9	2.7	2.1
19	2.2	2.0	2.4	2.2	2.3	3.1	2.7	2.1
20	3.7	2.0	2.2	2.1	2.1	3.3	2.7	3.0
21	4.6	2.2	2.6	2.5	2.2	3.1	2.6	3.4
22	3.4	2.1	2.4	2.2	2.2	2.6	2.7	2.6
23	3.4	1.9	3.0	2.3	2.1	2.0	3.4	2.1
24	4.6	1.8	3.2	2.3	2.1	2.0	3.1	1.9
25	5.8	2.0	3.3	1.9	2.0	1.9	2.8	2.3
26	4.6	2.1	3.8	2.1	2.1	1.5	2.6	2.0
27	3.2	1.8	3.6	2.6	2.1	1.4	2.3	1.9
28	2.8	1.6	3.6	2.7	2.1	1.7	2.1	1.9
29	2.7	1.8	5.6	2.2	2.7	2.3	2.3	2.0
30	2.6	2.0	11.2	2.3	2.5	1.9	2.5	2.1
31	2.4	.....	11.6	2.0	.....	1.6	1.7	.....

OCONEE RIVER AT FRALEYS FERRY, NEAR MILLEDGEVILLE, GA.

Location.—At Fraleys Ferry, 6 miles above Milledgeville, and about 4 miles below mouth of Little River.

Drainage area.—2,840 square miles.

Records available.—May 23, 1906, to December 31, 1908; October 6, 1909, to September 30, 1914.

Gage.—A combination sloping and vertical rod gage in four sections. Section 0 to 8 feet is the old sloping gage bolted to solid rock on left bank above Fraleys Ferry. Vertical sections were added up to 20 feet, November 13–14, 1913. Gage read twice daily by H. A. Taylor.

Discharge measurements.—Made from ferryboat.

Channel and control.—Sandy and shifting at measuring section; excellent rock control below. Top of control is approximately 3 feet above zero of gage. The point of zero flow is therefore at about gage height 3 feet.

Extremes of discharge.—Maximum stage recorded during year: 9.35 feet at 6 a. m. April 15; discharge, 8,380 second-feet. Minimum stage recorded: 4.1 feet at 6 a. m. September 17; discharge, 410 second-feet.

Maximum stage recorded May 23, 1906, to December 31, 1908, and October 6, 1909, to September 30, 1914: Approximately 24.6 feet, March 17, 1913; discharge, approximately 49,700 second-feet. Minimum stage recorded: 4.1 feet at 6 a. m. September 17, 1914; discharge, 410 second-feet.

Regulation.—None below vicinity of Athens, Ga., where storage may cause low daily discharge at this station at times.

Accuracy.—Low-water records excellent, due to good control.

The following discharge measurement was made by Warren E. Hall and B. M. Hall, jr.:

November 14: Gage height, 5.39 feet; discharge, 1,370 second-feet.

Daily discharge, in second-feet, of Oconee River at Fraleys Ferry, near Milledgeville, Ga., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5,450	1,610	1,380	5,850	1,870	6,050	3,250	1,490	760	830	690	795
2	4,690	1,380	1,870	4,130	2,010	4,130	3,080	1,440	630	830	795	870
3	3,080	1,440	2,010	7,050	1,870	3,080	2,450	1,380	950	760	1,270	910
4	1,870	1,490	1,870	5,650	1,870	2,760	2,010	1,380	1,080	630	1,870	2,010
5	1,490	1,610	1,610	4,130	1,740	2,760	2,010	1,380	1,120	1,870	2,450	1,440
6	1,380	1,610	1,440	3,250	2,010	2,920	2,010	1,440	910	2,300	1,610	990
7	1,320	1,380	1,490	2,760	4,310	2,600	2,010	1,440	1,610	2,150	950	795
8	1,220	1,490	2,150	2,600	5,650	2,450	1,870	1,380	1,610	1,740	1,220	600
9	1,270	2,600	2,300	2,300	5,260	2,300	2,150	1,320	1,170	1,320	1,220	660
10	1,170	1,380	1,870	2,450	3,770	2,150	2,450	1,270	1,080	1,320	1,220	600
11	1,120	1,610	1,610	2,150	2,760	2,150	2,300	1,170	870	1,270	3,590	488
12	1,080	1,440	1,490	2,010	2,600	3,080	2,150	1,170	1,040	1,610	4,130	460
13	1,440	1,380	1,380	1,870	2,760	3,950	2,010	1,170	1,220	1,270	2,150	570
14	1,220	1,380	1,380	1,870	4,130	3,420	3,080	1,270	1,440	830	3,420	630
15	1,080	1,270	1,490	1,870	3,420	2,760	8,070	1,080	1,080	1,270	4,130	488
16	1,040	1,320	1,490	1,870	3,080	2,600	6,450	1,040	830	910	3,420	488
17	1,040	1,380	1,490	1,870	2,760	2,450	6,050	990	1,320	990	2,450	460
18	1,040	1,490	1,490	1,870	2,600	2,300	4,130	950	990	1,610	1,870	488
19	1,080	1,380	1,440	1,870	2,450	2,150	3,250	950	2,150	1,870	1,320	830
20	2,450	1,380	1,440	1,870	2,760	2,150	2,600	910	1,610	1,490	1,170	1,120
21	3,420	1,380	1,490	1,870	2,920	2,010	2,450	910	1,220	1,610	2,920	1,270
22	2,450	1,380	1,380	1,870	2,600	2,010	2,300	910	950	1,040	2,450	950
23	1,740	1,320	1,490	1,740	2,450	2,300	2,150	830	795	795	1,740	910
24	3,770	1,380	1,740	1,870	2,300	2,150	2,010	760	870	630	2,300	725
25	6,650	1,440	2,150	2,150	2,150	2,010	1,870	725	795	542	1,740	1,610
26	3,770	1,440	3,770	2,150	2,450	1,870	1,870	690	660	600	1,080	1,610
27	2,450	1,270	2,920	2,010	3,080	1,870	1,870	830	795	504	1,080	910
28	1,870	1,380	2,450	1,870	3,250	1,870	1,740	910	660	618	990	830
29	1,740	1,380	2,450	1,740	.....	1,870	1,610	910	618	1,080	1,120	630
30	1,740	1,380	7,050	1,740	.....	1,870	1,490	760	990	1,610	1,380	630
31	1,610	.....	7,250	1,870	.....	2,010	.....	830	.....	870	1,080	.....

NOTE.—Daily discharge determined from a rating curve fairly well defined below 6,000 second-feet. Above 7,000 second-feet the curve is approximate.

Monthly discharge of Oconee River at Fraleys Ferry, near Milledgeville, Ga., for the year ending Sept. 30, 1914.

[Drainage area, 2,840 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	6,650	1,040	2,150	0.757	0.87	A.
November	2,600	1,270	1,460	.514	.57	A.
December	7,250	1,380	2,160	.761	.88	A.
January	7,050	1,740	2,590	.912	1.05	A.
February	5,650	1,740	2,890	1.02	1.06	B.
March	6,050	1,870	2,580	.908	1.05	A.
April	8,070	1,490	2,760	.972	1.08	A.
May	1,490	690	1,090	.384	.44	A.
June	2,150	618	1,060	.373	.42	A.
July	2,300	504	1,190	.419	.48	A.
August	4,130	690	1,900	.669	.77	A.
September	2,010	460	859	.302	.34	B.
The year	8,070	460	1,890	.665	9.01	

APALACHICOLA RIVER BASIN.

CHATTAHOOCHEE RIVER NEAR NORCROSS, GA.

Location.—At Medlock's bridge, 4½ miles north of Norcross, 1½ miles above the mouth of John Creek, and about 5 miles above Suwanee Creek.

Drainage area.—1,170 square miles.

Records available.—January 9, 1903, to September 30, 1914.

Gage.—Standard chain gage on the toll bridge; read twice daily by W. O. Medlock. Original gage was a vertical staff attached to oak tree on right bank about 100 feet above bridge. A chain gage established March 14, 1903, was read in connection with the vertical gage until June 28, 1905, when present gage was installed.

Discharge measurements.—Made from downstream side of bridge.

Chanel and control.—Bed of stream sandy and changeable; right bank is high and overflows only slightly; the left bank will overflow for about 800 feet at a gage height of 16 to 18 feet. A rock shoal about 2½ miles below gage forms part of the control.

Extremes of dischage.—Maximum stage recorded during year: 10.5 feet at 5 p. m. April 15; discharge, 11,300 second-feet. Minimum stage recorded: 0.95 foot at 6 p. m. July 27; discharge, 388 second-feet.

Maximum stage recorded 1903–1914: 19.3 feet at 1.30 p. m. March 16, 1912; discharge, approximately 26,300 second-feet. Minimum mean daily stage recorded: 1.02 feet, October 2, 1911; discharge, 294 second-feet.

Regulation.—Dams near Gainesville, Ga., and on Chestatee River affect natural flow, but the two readings probably give a good mean daily gage height.

Accuracy.—Except for possible error in mean daily gage heights due to artificial control, results are excellent, but rating curve must be shifted occasionally.

The following discharge measurement was made by Warren E. Hall:

January 16, 1914: Gage height, 2.06 feet; discharge, 1,020 second-feet.

Daily discharge, in second-feet, of Chattahoochee River near Norcross, Ga., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,190	995	930	1,780	1,260	1,400	1,620	1,190	832	510	565	592
2	1,260	832	1,470	1,540	1,260	1,400	1,540	1,260	800	592	538	898
3	995	800	1,470	1,620	1,120	1,260	1,400	1,260	770	740	538	832
4	1,060	930	1,260	1,540	1,060	1,260	1,330	1,260	740	710	1,260	680
5	930	865	995	1,400	995	1,260	1,260	1,260	770	1,540	592	620
6	800	865	995	1,330	1,260	1,260	1,190	1,190	962	1,060	592	485
7	1,060	898	1,260	1,260	2,730	1,260	1,190	1,330	995	865	538	538
8	800	800	1,470	1,260	2,370	1,260	2,370	1,260	995	770	538	435
9	865	995	1,470	1,260	1,700	1,190	2,370	1,120	930	680	710	538
10	898	1,060	930	1,260	1,400	1,120	1,860	1,120	898	832	3,030	460
11	930	1,120	1,120	1,120	1,400	1,120	1,470	1,060	770	800	3,790	510
12	740	800	995	1,060	1,400	1,400	1,400	1,060	740	710	1,700	485
13	620	930	930	1,060	1,330	1,540	1,400	1,060	740	650	1,060	538
14	800	865	995	1,060	1,470	1,400	2,550	995	740	592	1,470	510
15	740	930	930	1,060	1,700	1,260	10,800	995	710	592	1,470	435
16	995	800	930	1,060	1,700	1,260	5,670	962	650	1,400	1,060	485
17	832	930	995	995	1,540	1,190	3,130	962	710	1,260	770	435
18	832	865	930	962	1,400	1,120	2,280	995	710	1,400	770	832
19	930	995	898	930	1,330	1,120	2,020	962	1,260	865	770	770
20	1,260	800	865	995	1,700	1,260	2,730	930	1,060	800	740	1,060
21	1,540	865	930	962	3,460	1,330	2,460	898	832	680	592	770
22	995	770	865	962	2,190	1,330	2,020	898	740	650	620	650
23	832	800	898	930	1,860	1,260	1,780	930	680	565	770	565
24	1,120	800	1,060	995	1,700	1,260	1,620	930	650	538	680	565
25	1,190	832	1,190	995	1,540	1,190	1,540	898	620	538	650	538
26	1,190	865	1,330	1,060	1,470	1,120	1,470	898	592	510	592	592
27	1,060	865	1,860	995	1,400	1,190	1,400	832	592	460	592	592
28	995	680	1,330	962	1,400	1,330	1,400	832	592	650	592	538
29	995	770	1,620	930	.....	1,260	1,330	800	620	930	565	485
30	995	930	2,460	930	.....	1,260	1,330	800	538	1,120	995	538
31	1,060	.....	2,190	995	.....	1,700	.....	832	.....	740	620	.....

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge for individual days may be somewhat in error because of fluctuations due to operation of power plants. Daily and monthly discharge records for October, November, and December, 1913, differ from those published in Water Supply Paper 352 because of a revision of the rating curve.

Monthly discharge of Chattahoochee River near Norcross, Ga., for the year ending Sept. 30, 1914.

[Drainage area, 1,170 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	2,190	620	1,020	0.872	1.01	B.
November	1,120	680	875	.748	.83	B.
December	2,460	865	1,210	1.03	1.19	B.
January	1,780	930	1,140	.974	1.12	B.
February	3,460	995	1,610	1.38	1.44	B.
March	1,700	1,120	1,280	1.09	1.26	B.
April	10,800	1,190	2,200	1.88	2.10	B.
May	1,330	800	1,030	.880	1.01	B.
June	1,260	538	775	.662	.74	B.
July	1,540	460	798	.682	.79	B.
August	3,790	538	960	.821	.95	B.
September	1,060	435	599	.512	.57	C.
The year	10,800	435	1,120	.957	13.01	

CHATTAHOOCHEE RIVER AT WEST POINT, GA.

Location.—About a mile upstream from the Montgomery Street Bridge, West Point, just below the mouth of Oseligee Creek, about 300 feet east of the West Point waterworks pumping plant, and about 4 miles above Long Cane Creek. Prior to October 21, 1912, station was located at the Montgomery Street Bridge.

Drainage area.—3,300 square miles.

Records available.—July 30, 1896, to September 30, 1914.

Gage.—Staff gage in two sections; the lower section, reading from 0 to 6 feet, is near the right bank; the upper section, reading from 6 to 25 feet, is fastened to a tree on the left bank; datum of staff gage different from that of chain gage used at Montgomery Street Bridge prior to October 21, 1912. Gage read three times a day by J. H. Miller.

Discharge measurements.—Made from a boat at a section near staff gage, or from highway bridge to which chain gage was attached. No tributaries enter between the two sections.

Channel and control.—Bottom rough, rocky, and fairly permanent; banks are overflowed at high stages; control a rock ledge extending entirely across river just below gage.

Extremes of discharge.—Maximum mean daily stage recorded during year: 8.9 feet, April 17; discharge, 16,800 second-feet. Minimum mean daily stage recorded: 1.7 feet, September 10, 12, and 17; discharge, 1,200 second-feet.

Maximum stage recorded 1896–1914: 25.0 feet on December 30, 1901; discharge, 88,600 second-feet. Minimum stage recorded: 0.8 foot September, 18 to 21, 1896 (gage height refers to gage at old location of station); discharge, 780 second-feet.

Regulation.—Operation of power plants at points above causes some diurnal fluctuation. The Langdale dam, 5 miles below station, forms a pond reaching back as far as West Point. This affected the gage heights at the highway bridge. The new gage established in October, 1912, is not affected by backwater.

Accuracy.—Rating curve well developed from fairly low to medium flood stages. No records of discharge at extreme floods have yet been obtained. Diurnal fluctuation caused by hydroelectric plants above will cause some error in discharge for individual days during low water.

Cooperation.—Gage heights after October 20, 1912, furnished by the Columbus Power Co., of Columbus, Ga.

No discharge measurements made during the year.

Daily discharge, in second-feet, of Chattahoochee River at West Point, Ga., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,370	2,130	2,130	5,560	2,680	4,150	7,500	2,830	1,660	1,280	1,770	2,130
2	5,800	2,130	2,990	4,600	2,680	3,530	5,560	2,680	1,560	1,560	1,770	2,000
3	3,730	2,260	3,340	5,800	2,830	3,340	4,370	2,680	1,660	1,460	1,560	2,510
4	2,540	1,880	2,990	5,320	2,680	3,160	3,730	2 680	1 770	1 560	1 880	2 540
5	2,260	1,880	3,160	4,370	2,680	2,990	3,340	2,680	2,540	1,880	1,880	2,000
6	1,880	1,880	4,150	3,530	2,540	2,990	3,160	2,830	2,990	2,540	2,130	1,660
7	1,880	1,880	2,990	3,530	4,370	2,830	2,830	2,680	2,540	2,130	1,660	1,460
8	1,880	2,000	3,530	3,160	9,750	2,830	3,340	2,680	2,130	2,260	2,000	1,280
9	1,660	2,000	2,680	2,830	7,250	2,680	3,340	2,830	1,880	1,660	2,540	1,370
10	1,880	1,880	2,540	2,830	5,560	2,400	5,080	2,680	2,000	2,400	8,000	1,200
11	1,660	1,880	2,680	2,990	3,940	2,830	4,150	2,540	1,880	1,880	6,280	1,200
12	1,560	2,130	2,400	2,540	3,340	3,730	3,730	2,000	1,770	1,880	5,560	1,200
13	1,460	2,000	2,400	2,680	3,340	4,370	3,530	2,260	1,770	1,660	9,500	1,460
14	1,460	2,000	2,260	2,540	3,530	4,150	6,520	2,000	2,400	1,560	7,250	1,370
15	1,560	1,880	2,130	2,540	3,530	3,530	15,800	2,000	1,880	1,370	5,320	1,280
16	1,560	2,000	2,540	2,400	3,340	3,160	15,500	1,880	2,400	1,280	7,750	1,280
17	1,420	1,880	2,130	2,400	3,340	2,990	16,800	1,880	2,260	3,340	4,370	1,200
18	1,560	2,000	2,130	2,400	3,340	2,990	8,750	2,130	2,260	5,560	2,540	1,280
19	2,540	1,880	2,130	2,260	2,990	2,680	6,040	2,000	5,320	3,940	2,130	1,660
20	4,150	1,880	2,130	2,400	3,160	2,990	8,750	1,770	3,940	3,160	2,000	4,370
21	3,730	1,880	2,130	2,400	2,990	2,830	9,250	1,770	2,680	2,130	2,400	2,130
22	2,680	2,130	2,130	2,260	3,340	3,340	7,000	1,460	2,260	1,880	2,540	1,880
23	2,830	1,880	2,260	2,400	4,600	3,340	5,320	1,770	1,880	1,660	1,880	1,770
24	4,150	2,000	2,260	2,400	3,530	2,680	4,370	1,880	1,660	1,460	2,260	1,560
25	4,370	1,770	2,680	2,830	3,340	2,830	3,940	1,770	1,560	1,370	2,400	1,560
26	2,990	1,880	2,830	2,990	3,340	2,540	3,730	1,880	1,460	1,370	2,000	1,560
27	2,400	1,880	3,340	2,540	3,530	2,680	3,530	1,660	1,370	1,280	1,880	1,460
28	2,990	1,880	3,160	2,400	3,530	3,160	3,160	1,560	1,370	1,880	1,560	1,370
29	2,260	1,880	4,150	2,540	.....	2,990	3,160	1,660	1,660	2,130	1,460	1,370
30	2,130	2,000	7,000	2,400	.....	2,680	2,990	1,660	1,460	2,400	1,560	1,370
31	2,260	.....	7,000	2,830	.....	5,080	.....	1,880	.....	2,400	1,660	.....

NOTE.—Daily discharge determined from a rating curve well defined between 2,500 and 18,000 second-feet.

Monthly discharge of Chattahoochee River at West Point, Ga., for the year ending Sept. 30, 1914.

[Drainage area, 3,300 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	5,800	1,420	2,570	0.779	0.90	B.
November	2,260	1,770	1,950	.591	.66	B.
December	7,000	2,130	2,980	.903	1.04	A.
January	5,800	2,260	3,050	.924	1.07	A.
February	9,750	2,540	3,750	1.14	1.19	A.
March	5,080	2,400	3,180	.964	1.11	A.
April	16,800	2,830	5,940	1.80	2.01	A.
May	2,830	1,460	2,150	.652	.75	B.
June	5,320	1,370	2,130	.645	.72	B.
July	5,560	1,280	2,070	.627	.72	B.
August	9,500	1,460	3,210	.973	1.12	B.
September	4,370	1,200	1,680	.509	.57	B.
The year	16,800	1,200	2,880	.873	11.86	

Days of deficiency in discharge of Chattahoochee River at West Point, Ga., for the years ending Sept. 30, 1896–1914.

Discharge in second-feet.	Days of deficient discharge.									
	1895–96[a]	1896–97	1897–98	1898–99	1899–1900	1900–01	1901–02	1902–03	1903–04	1904–05
775	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
900	14	.....	6	.....	.....	.....	.....	.....	.....	11
1,100	21	28	30	5	4	.....	2	.....	11	41
1,300	27	38	52	6	6	.....	5	.....	33	55
1,500	36	49	69	10	6	.....	9	.....	49	90
1,700	40	57	83	13	7	.....	13	.....	58	105
1,900	44	91	103	20	23	.....	32	15	97	125
2,100	44	100	140	25	35	.....	38	25	112	133
2,300	45	112	164	35	47	.....	56	49	157	154
2,500	46	121	180	45	55	.....	64	58	188	163
2,700	47	140	209	56	67	5	97	69	222	196
2 900	49	156	214	62	73	11	111	79	242	210
3,100	49	173	230	73	90	23	124	84	253	225
3,400	51	205	253	99	115	47	151	105	276	257
3,700	53	210	262	108	120	54	163	110	286	270
4,000	53	218	277	134	139	68	189	129	301	289
4,300	55	229	291	152	164	88	203	143	312	299
4,600	56	244	297	178	176	97	211	158	319	307
5,000	56	256	305	204	188	132	228	181	327	313
5,500	57	271	317	224	206	182	251	196	333	323
6,000	58	280	322	235	222	207	258	211	339	327
7,000	59	294	327	250	256	235	282	239	342	334
9,000	60	309	333	293	291	271	310	267	355	343
12,000	61	326	346	323	324	310	331	307	362	349
16,000	.....	338	351	342	340	336	339	325	362	354
20,000	.....	352	358	347	353	342	345	334	362	362
30,000	.....	363	361	356	356	351	347	349	366	365
40,000	.....	365	361	362	359	360	348	356	.....	.....
60,000	.....	.....	365	365	363	365	360	364	.....	.....
80,000	.....	.....	.....	.....	365	.....	364	365	.....	.....
100,000	.....	.....	.....	.....	.....	.....	365	.....	.....	.....

Discharge in second-feet.	Days of deficient discharge.								
	1905–06	1906–07	1907–08	1908–09	1909–10	1910–11[b]	1911–12[c]	1912–13	1913–14
775	.....	.....	.....	.....	.....	.....	.....	.....	.....
900	.....	.....	.....	.....	.....	.....	.....	.....	.....
1,100	.....	.....	.....	.....	.....	.....	.....	.....	.....
1,300	1	.....	.....	.....	.....	.....	.....	.....	11
1,500	7	5	2	7	.....	.....	.....	.....	33
1,700	20	10	20	9	.....	2	.....	11	65
1,900	39	16	36	18	3	23	5	23	115
2,100	50	19	52	24	5	39	7	27	133
2,300	51	30	68	33	28	50	11	36	170
2,500	53	39	81	44	42	55	16	42	190
2,700	63	51	94	59	69	68	19	65	232
2,900	68	64	101	69	82	72	25	83	248
3,100	80	76	110	80	98	73	27	108	265
3,400	92	88	122	97	136	77	38	146	293
3,700	101	94	129	111	170	82	44	158	305
4,000	113	138	149	129	197	84	64	201	315
4,300	137	174	152	146	222	85	73	216	322
4,600	150	207	161	152	241	88	86	231	331
5,000	171	232	186	167	256	88	99	253	333
5,500	197	260	208	184	282	89	109	265	339
6,000	228	283	241	211	295	89	121	280	346
7,000	253	301	264	244	308	91	145	298	349
9,000	291	329	310	284	333	92	189	325	359
12,000	323	339	330	312	349	.....	221	340	362
16,000	336	353	343	331	362	.....	237	350	364
20,000	345	358	352	342	363	.....	249	354	365
30,000	358	365	364	354	365	.....	264	359	.....
40,000	363	.....	365	362	.....	.....	269	363	.....
60,000	365	.....	366	365	.....	.....	273	365	.....
80,000	.....	.....	.....	.....	.....	.....	274	.....	.....
100,000	.....	.....	.....	.....	.....	.....	.....	.....	.....

[a] Aug. 1 to Sept. 30, 1896. [b] Oct. 1 to Dec. 31, 1910. [c] Jan. 1 to Sept. 30, 1912.

PEACHTREE SEWAGE PLANT AT ATLANTA, GA.

Location.—Just north of city limits, between Peachtree Street and Howell Mill Road, about 700 feet north of Collin Road.

Drainage area.—Not known. Sewage from northern half of city of Atlanta is treated at this plant.

Records available.—July 11 to September 30, 1914.

Gage.—Gurley Simplex water-stage recorder set in a stilling chamber on left side of intake channel just below the lower end of the sand collection chambers.

Discharge measurements.—Made from a plank across the inlet channel about 10 feet below gage.

Channel and control.—The intake channel, which is rectangular in section and formed by concrete walls, carries the sewage to an underground pipe, through which it flows to the distributing system of the Imhoff tanks. There are two controls formed by steel weirs over which the sewage flows when leaving the Imhoff tanks. When the sewage enters the tanks over the weirs at the north end, the north control is said to determine the discharge relation at the gage. When the sewage flows in the opposite direction and enters the tanks over the weirs at the south end, the south control is said to determine this relation. The point of zero flow is the same for each control, being at gage height 1.30 feet.

Although the point of zero flow is the same for both controls, the discharge relations as determined by the two controls differ considerably. This is probably due to the increased distance which the sewage travels when the north control is in use.

Regulation.—The data given in the following tables do not show the total amount of sewage flow of this drainage basin, but are merely a record of the amount of sewage treated by the plant. During periods when the rainfall produces a sufficient dilution of the sewage, the Imhoff tanks are not in operation and the diluted sewage is diverted into Peachtree Creek through a by-pass above the gage. The data will be valuable chiefly in determining amount of sewage dilution in the stream below.

Accuracy.—Estimates of hourly flow have been used in obtaining the records given in the following tables. The results are believed to be good.

Cooperation.—Computation of daily flow made by engineers of the city of Atlanta under supervision of engineers of the United States Geological Survey.

Discharge measurements of Peachtree sewage plant at Atlanta, Ga., during the year ending Sept. 30, 1914.

[North control.]

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 19	W. E. Hall and Hommon	1.68	13.2	July 17	Hommon and Mackey	1.66	12.8
19	do	1.68	13.2	18	do	1.80	14.8
July 10	do	1.74	14.3	20	W. E. Hall and Mackey	1.33	2.24
10	do	1.42	6.1	20	do	1.39	4.91
10	do	1.51	9.8	23	Hommon and Mackey	1.35	2.41
10	do	1.57	11.2	23	do	1.45	7.5
10	do	1.71	14.1	23	do	1.55	10.4
15	do	2.06	20.3	23	do	1.65	12.2
17	Hommon and Mackey	1.35	3.81	23	do	1.82	15.6
17	do	1.48	8.7	23	do	1.81	15.2
17	do	1.62	12.3	23	do	1.77	14.5

Daily discharge, in second-feet, of Peachtree sewage plant at Atlanta, Ga., for the year ending Sept. 30, 1914.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	12.3	8.1	11	a 9.4	10.5	5.3	21	12.2	6.2	12.7
2	.....	10.9	4.0	12	10.3	8.9	11.7	22	12.3	5.8	12.3
3	.....	12.2	7.5	13	11.4	9.3	11.4	23	12.3	2.7	12.1
4	.....	8.4	9.0	14	11.6	6.1	11.5	24	12.2	9.4	7.6
5	.....	5.5	12.2	15	7.5	11.2	12.0	25	12.1	12.5	8.6
6	.....	6.2	10.6	16	6.9	11.6	11.9	26	10.9	12.6	11.6
7	.....	7.3	11.6	17	8.5	12.2	10.0	27	11.6	13.0	10.5
8	.....	12.1	12.5	18	12.4	12.4	5.4	28	7.3	12.7	12.2
9	.....	9.0	12.4	19	11.2	12.8	9.0	29	9.3	8.5	12.1
10	.....	6.2	12.0	20	12.0	5.0	11.0	30	12.0	11.8	12.1
								31	11.8	12.5	.....

a For 13 hours.

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

Monthly discharge of Peachtree sewage plant at Atlanta, Ga., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
July 11–31	12.4	6.9	10.7
August	13.0	2.7	9.61
September	12.7	4.0	10.4

FLINT RIVER NEAR WOODBURY, GA.

Location.—At the Macon & Birmingham Railroad bridge, 3 miles east of Woodbury, about a third of a mile above the mouth of Cane Creek, and a quarter of a mile below Elkins Creek.

Drainage area.—1,090 square miles.

Records available.—March 29, 1900, to September 30, 1914.

Gage.—Vertical staff in four sections on the left bank about 300 feet above the railroad bridge; read twice daily by E. T. Riggins. Datum of gage 660 feet above sea level.

Discharge measurements.—Made from the downstream side of railroad bridge, which does not make a right angle with the current.

Channel and control.—Bottom is rough, consisting chiefly of rock, and currents are irregular. Above gage height 10 feet the banks are subject to overflow for a width of about 350 feet, but all water passes beneath the bridge and its approaches. Control formed by a shoal about 1 mile downstream. Shoal is somewhat shifting.

Extremes of discharge.—Maximum stage recorded during year: 5.3 feet at 6 a. m., April 15; discharge, 6,770 second-feet. Minimum stage recorded: −0.2 foot at 6 a. m., July 1 to 4; discharge, 140 second-feet.

Maximum stage recorded 1900–1914: 16.2 feet, March 15, 1913; discharge, 35,300 second-feet. Minimum stage recorded: −0.4 foot, October 8 to 10, 1911; discharge, 86 second-feet.

Regulation.—The operation of power plants on tributary streams above the station affects the daily flow at low stages.

Accuracy.—Diurnal fluctuation may slightly affect records, which are not very good, owing to shifting control, effect on discharge relation of the new bridge below gage, and to poor equipment for making discharge measurements.

Cooperation.—Since July 1, 1910, morning readings have been furnished by the United States Weather Bureau.

Discharge measurements of Flint River near Woodbury, Ga., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 13	B. M. Hall, jr.	2.00	1,810	June 23	Warren E. Hall	0.39	402
14	do	1.81	1,520				

Daily discharge, in second-feet, of Flint River near Woodbury, Ga., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	620	424	584	1,400	700	1,490	1,440	454	203	170	454	301
2	584	424	870	1,310	660	1,400	1,260	424	203	170	398	323
3	516	424	955	1,930	620	1,080	1,080	424	203	170	323	742
4	424	424	828	1,490	620	955	870	424	323	170	347	998
5	347	371	700	1,400	548	870	742	371	347	301	323	454
6	301	371	620	1,130	660	870	620	371	279	203	323	323
7	279	371	700	955	1,310	785	620	371	279	584	323	279
8	279	398	742	870	1,080	785	660	371	323	259	454	259
9	279	398	700	785	1,220	742	870	371	301	1,040	870	239
10	279	371	660	742	870	620	828	371	259	1,080	2,720	239
11	279	371	584	700	785	620	700	347	301	424	2,440	221
12	279	371	548	700	700	1,490	620	323	239	323	2,310	221
13	279	371	548	620	785	1,700	620	279	424	323	3,300	239
14	239	371	548	620	998	1,490	2,180	279	454	323	2,440	221
15	239	424	548	548	912	1,220	6,200	279	398	323	2,720	203
16	279	424	548	548	828	998	3,600	279	454	301	2,860	203
17	279	424	548	548	700	870	2,440	259	347	301	2,720	203
18	259	424	516	548	700	742	1,590	239	454	398	1,640	239
19	584	424	483	548	700	700	1,260	239	1,130	700	828	1,220
20	660	424	483	548	700	700	1,130	239	870	516	742	584
21	548	424	483	620	700	700	1,080	239	700	323	912	371
22	548	424	483	620	620	700	912	239	454	259	620	371
23	584	424	483	620	620	700	828	239	398	221	742	301
24	912	424	483	620	620	700	700	203	259	203	785	279
25	1,040	424	620	785	620	620	660	203	221	203	700	398
26	955	424	700	912	660	620	584	203	203	221	700	516
27	742	424	785	700	828	620	548	203	203	323	548	454
28	620	424	700	660	955	620	548	203	203	347	301	279
29	548	424	1,040	620	.....	620	516	170	186	2,180	347	259
30	483	424	1,490	620	.....	620	483	170	186	998	483	239
31	454	.....	1,440	620	.....	1,220	.....	170	.....	742	371	.....

NOTE.—Daily discharge determined from a rating curve fairly well defined below 24,000 second-feet. Because of uncertainties due to power regulation and lack of discharge measurements between discharges of 2,000 and 12,000 second-feet, discharge estimates for individual days should be used with caution.

Monthly discharge of Flint River near Woodbury, Ga., for the year ending Sept. 30, 1914.

[Drainage area, 1,090 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	1,040	239	475	0.436	0.50	C
November	424	371	408	.374	.42	C.
December	1,490	483	691	.634	.73	C.
January	1,930	548	817	.750	.86	C.
February	1,310	548	776	.712	.74	C.
March	1,700	620	899	.825	.95	C.
April	6,200	483	1,210	1.11	1.24	C.
May	454	170	289	.265	.31	C.
June	1,130	186	360	.330	.37	C.
July	2,180	170	455	.417	.48	C.
August	3,300	301	1,130	1.04	1.20	C.
September	1,220	203	373	.342	.38	C.
The year	6,200	170	656	.602	8.18	

FLINT RIVER NEAR CULLODEN, GA.

Location.—At Grays Ferry, 1½ miles above the mouth of Auchumpkee Creek, and about 3 miles above old gage near Musella, Ga., read for a short time in 1907; 14 miles southwest of Culloden.

Drainage area.—2,000 square miles.

Records availale.—July 1, 1911, to September 30, 1914.

Gage.—Staff in four sections on left bank at ferry landing; read twice daily by F. A. Adams.

Discharge measurements.—Made from the ferryboat. Measurements above gage height 5 feet can not be made because of danger in operating ferry.

Channel and control.—Bed sandy and likely to shift at station; control, rock ledge half a mile below; probably permanent.

Extremes of discharge.—Maximum stage recorded during year: 7.3 feet at 6 p. m. April 15; discharge, 8,800 second-feet. Minimum stage recorded: 1.2 feet at 6 a. m. and 6 p. m. July 3 and 4; discharge, 265 second-feet.

Maximum stage recorded 1911–1914: 30.5 feet, March 16, 1913. This stage, which is the crest of the March flood as shown by watermarks, was determined by levels by an engineer of the Survey; discharge not determined. Minimum mean daily stage recorded: 1 foot, October 8, 1911; discharge, 165 second-feet.

Accuracy.—Result good for low and medium stages.

The following discharge measurement was made from a boat by Warren E. Hall: January 10, 1914: Gage height, 4.56 feet; discharge, 3,670 second-feet.

Daily discharge, in second-feet, of Flint River near Culloden, Ga., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	915	875	800	1,960	1,170	3,590	2,080	875	473	415	1,260	630
2	998	800	1,040	2,200	1,220	2,990	2,200	800	360	307	1,080	534
3	1,040	765	1,510	4,400	1,120	2,320	1,840	800	360	257	630	566
4	875	800	1,460	3,590	1,120	1,840	1,560	765	360	257	765	1,560
5	765	765	1,260	2,850	1,040	1,720	1,310	730	630	307	765	1,040
6	663	730	1,080	2,200	1,260	1,840	1,170	730	800	388	696	630
7	663	730	1,310	1,840	2,320	1,620	1,120	765	696	534	696	504
8	598	800	1,410	1,560	2,450	1,510	1,120	730	566	765	1,510	444
9	598	875	1,310	1,410	1,840	1,360	1,310	730	534	444	1,170	415
10	598	800	1,170	1,360	1,560	1,310	1,410	663	566	1,720	2,710	415
11	598	800	1,040	1,260	1,460	1,220	1,260	663	473	998	5,860	415
12	566	730	955	1,220	1,360	2,580	1,170	630	630	630	2,710	360
13	504	730	955	1,120	1,410	3,430	1,120	598	730	696	2,850	360
14	504	730	875	1,120	1,840	2,990	1,840	598	765	534	3,590	360
15	504	730	915	1,040	1,720	2,450	7,800	534	663	696	2,320	307
16	504	800	955	1,040	1,560	1,960	6,430	534	630	598	2,850	307
17	473	800	955	1,040	1,360	1,620	4,230	534	730	1,840	3,430	307
18	504	800	955	1,040	1,260	1,510	2,850	534	630	1,410	2,580	307
19	534	800	955	1,040	1,220	1,410	2,080	473	1,220	1,080	1,620	1,510
20	1,260	800	955	1,040	1,510	1,310	1,840	473	1,510	1,360	1,080	1,360
21	1,170	800	875	1,040	1,410	1,310	1,840	473	1,080	598	1,120	915
22	1,040	800	875	1,120	1,310	1,360	1,560	473	875	504	955	800
23	955	800	955	1,120	1,220	1,410	1,360	473	696	415	1,080	630
24	1,720	800	955	1,170	1,120	1,360	1,260	444	566	504	1,170	534
25	2,080	800	1,220	1,410	1,120	1,310	1,170	415	444	307	1,080	566
26	1,620	800	1,410	1,410	1,260	1,260	1,120	415	415	307	1,040	696
27	1,460	800	1,410	1,360	1,510	1,220	1,040	388	388	504	838	663
28	1,170	800	1,410	1,220	1,840	1,220	998	360	360	2,580	598	534
29	1,080	800	1,460	1,120	.....	1,220	915	360	360	2,710	566	504
30	998	800	2,850	1,120	.....	1,220	875	360	307	1,720	915	473
31	915	.....	2,580	1,120	.....	1,460	.....	360	.....	1,120	730	.....

NOTE.—Daily discharge determined from a rating curve well defined below 4,400 second-feet. Above 4,400 second-feet the rating curve is simply an extension and estimates above 7,000 second-feet are only approximate. Estimates of daily and monthly discharge for October, November, and December, 1913, differ from those published in Water-Supply Paper 352 because of a revision of the rating curve.

Monthly discharge of Flint River near Culloden, Ga., for the year ending Sept. 30, 1914.

[Drainage area, 2,000 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	2,080	473	899	0.450	0.52	A.
November	875	730	789	.394	.44	A.
December	2,850	800	1,220	.610	.70	A.
January	4,400	1,040	1,530	.765	.88	A.
February	2,450	1,040	1,450	.725	.76	A.
March	3,590	1,220	1,770	.885	1.02	A.
April	7,800	875	1,930	.965	1.08	A.
May	875	360	570	.285	.33	A.
June	1,510	307	627	.314	.35	A.
July	2,710	257	855	.428	.49	B.
August	5,860	566	1,620	.810	.93	A.
September	1,560	307	622	.311	.35	A.
The year	7,800	257	1,160	.580	7.85	

FLINT RIVER AT ALBANY, GA.

Location.—At the Dougherty County highway bridge in the city of Albany, 700 feet below the Atlantic Coast Line Railroad bridge.

Drainage area.—5,000 square miles.

Records available.—April 10, 1893, to September 30, 1914 (United States Weather Bureau gage heights). Discharge measurements were begun by the Geological Survey in 1901 and estimates of daily discharge have been made from January 1, 1902, to September 30, 1914.

Gage.—Standard chain gage, installed at the bridge April 20, 1904, read once daily by D. W. Brosnan. The original staff gage was washed out in 1898. It was injured in 1902 and on June 18, 1902, a new gage was installed by the United States Weather Bureau at a datum 0.75 foot lower than that of the former gage. The gage heights for 1902 as published by the United States Weather Bureau and the United States Geological Survey refer to the new gage datum. Present standard chain gage has the same datum and reads in conformity with the United States Weather Bureau gage.

Discharge measurements.—Fairly accurate measurements can be made at the section at the Atlantic Coast Line bridge, although it is very rough, and train switching in the yard interferes with th work. The section at the Georgia Northern Railway bridge, 1 mile above, at which measurements are sometimes made is considered better, especially for medium and low stages.

Channel and control.—Channel at and below gage may shift slightly, but the control is such that conditions of flow are practically permanent. The river overflows both banks, but only under the approaches to the bridge.

Extremes of discharge.—Maximum stage recorded during year: 9.0 feet at 7 a. m. March 3 to 6; discharge, 11,900 second-feet. Minimum stage recorded: —0.6 foot at 7 a. m. May 30, June 3, July 4 and 5; discharge, 1,410 second-feet.

Maximum stage recorded 1902–1914: 30.3 feet at 7 a. m. March 21, 1913; discharge, 53,700 second-feet. Minimum stage recorded: —1.1 feet, October 9 to 12, 1911; discharge, 1,110 second-feet.

Regulation.—Power developments on Muckalee Creek, which joins Flint River about 2 miles above the station, cause considerable diurnal fluctuation, especially at low stages. It is probable that the flow is also affected by other power plants farther up the river.

Accuracy.—As the records are based on one gage reading a day, made at 7 a. m., it is probable that the estimates of daily discharge are somewhat in error, especially at low stages. The actual daily discharge is probably greater than that indicated by the 7 a. m. reading; accuracy of rating curve depends on permanence of discharge relation.

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

Daily discharge, in second-feet, of Flint River at Albany, Ga., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,670	3,200	2,580	4,190	3,770	9,420	4,520	3,020	1,550	1,930	2,580	2,420
2	2,840	3,020	2,500	4,750	3,770	10,700	4,410	2,840	1,550	1,700	2,420	2,500
3	3,110	2,840	2,670	5,320	3,570	11,900	4,410	2,670	1,410	1,620	2,500	2,420
4	3,110	2,930	2,670	5,780	3,290	11,900	4,640	2,580	1,620	1,410	3,020	2,420
5	2,930	2,930	2,760	6,130	3,670	11,900	4,980	2,330	1,850	1,410	2,840	2,250
6	2,840	2,760	3,110	6,590	3,770	11,900	4,860	2,250	1,930	1,550	2,670	2,500
7	2,670	2,580	3,480	6,940	5,210	11,200	4,640	2,420	1,850	3,480	2,670	2,420
8	2,580	2,500	3,290	6,480	7,670	10,400	4,300	2,420	1,850	1,850	2,580	2,500
9	2,420	2,500	3,570	5,560	9,920	9,920	4,300	2,580	1,700	2,170	3,110	2,170
10	2,250	2,500	3,770	5,100	10,000	8,920	4,190	2,500	1,850	2,420	3,980	2,010
11	2,170	2,580	3,770	4,640	10,000	8,040	4,190	2,420	1,780	2,670	4,080	1,850
12	2,090	3,380	3,770	4,080	9,040	7,420	4,520	2,250	1,700	3,110	4,750	1,930
13	2,090	3,290	3,570	3,980	7,920	7,420	4,520	2,170	1,550	4,410	5,210	1,780
14	2,250	3,020	3,570	3,870	8,040	8,040	4,410	2,170	1,780	3,290	5,670	1,780
15	2,250	3,020	3,770	3,770	8,420	8,920	4,410	2,010	2,010	2,500	6,130	1,700
16	2,500	3,020	3,380	3,380	8,800	9,670	4,300	2,010	1,850	2,250	6,240	1,780
17	2,090	3,020	3,290	3,110	8,800	9,420	4,300	1,930	2,010	2,500	6,480	1,620
18	2,090	2,840	3,380	3,020	7,420	8,920	4,190	1,850	2,090	3,570	5,900	1,850
19	2,010	2,840	3,110	2,930	6,700	7,800	4,860	1,850	2,330	4,410	5,780	1,930
20	1,930	2,670	3,200	3,110	6,360	6,820	6,820	1,700	2,010	5,100	6,240	2,090
21	2,250	2,580	3,380	3,380	6,820	6,360	8,040	1,620	2,330	6,240	6,020	2,090
22	2,500	2,500	3,380	3,380	6,700	6,360	7,800	1,550	2,840	6,480	6,130	2,670
23	3,380	2,580	3,110	3,570	6,360	6,700	6,590	1,480	3,290	4,860	5,760	2,930
24	3,570	2,580	3,020	3,980	6,130	6,360	4,860	1,480	2,840	3,980	4,750	2,840
25	3,870	2,760	3,020	4,410	6,360	5,670	4,080	1,480	2,500	2,930	4,520	3,020
26	4,520	2,760	3,380	4,520	6,590	5,560	3,870	1,550	2,170	2,580	4,190	3,480
27	4,980	2,670	3,670	4,980	7,180	5,210	3,870	1,550	2,250	2,250	4,080	3,980
28	4,860	2,580	3,980	4,980	7,920	4,980	3,770	1,480	2,090	2,330	3,770	4,640
29	4,520	2,580	3,980	4,640	.....	4,860	3,570	1,480	1,850	2,090	3,380	4,300
30	3,980	2,580	3,980	4,300	.....	4,520	3,290	1,410	1,930	1,930	3,020	3,980
31	3,980	.....	4,080	3,980	.....	4,520	.....	1,480	.....	1,930	2,930	.....

NOTE.—Daily discharge determined from a rating curve well defined between 2,500 and 48,000 second-feet.

Monthly discharge of Flint River at Albany, Ga., for the year ending Sept. 30, 1914.

[Drainage area, 5,000 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	4,980	1,930	2,950	0.590	0.68	A.
November	3,380	2,500	2,790	.558	.62	A.
December	4,080	2,500	3,360	.672	.77	A.
January	6,940	2,930	4,480	.896	1.03	B.
February	10,000	3,290	6,790	1.36	1.42	B.
March	11,900	4,520	8,120	1.62	1.87	B.
April	8,040	3,290	4,720	.944	1.05	A.
May	3,020	1,410	2,020	.404	.47	B.
June	3,290	1,410	2,010	.402	.45	B.
July	6,480	1,410	2,930	.586	.68	B.
August	6,480	2,420	4,300	.860	.99	A.
September	4,640	1,620	2,530	.506	.56	B.
The year	11,900	1,410	3,900	.780	10.59	

ESCAMBIA RIVER BASIN.

CONECUH RIVER AT BECK, ALA.

Location.—At Simmons Bridge at Beck, 8 miles west of Andalusia, Ala., a station on the Central of Georgia and Louisville & Nashville railroads, and about 12 miles below mouth of Patsaliga Creek.

Drainage area.—1,290 square miles.

Records available.—August 24, 1904, to September 30, 1914.

Gage.—Standard chain gage attached to the upstream side of wagon bridge; read by S. T. Dillard once daily to half-tenths.

Discharge measurements.—Made from the wagon bridge.

Channel and control.—In soft bedrock; practically permanent. Both banks subject to overflow at high stages.

Extremes of discharge.—Maximum stage recorded during year: 7.8 feet at 9 a. m. February 14. Minimum stage recorded: 1.0 foot at 8.30 a m. July 27.

Maximum mean daily discharge 1904–1914: 26,000 second-feet, March 18, 1913 (estimated by comparison with Pea River at Pera, Ala.). Minimum stage recorded: 0.7 foot, October 4, 1904; discharge, 187 second-feet.

Regulation.—The flow at times may be affected by logging operations.

Accuracy.—As this station has not been visited since October 18, 1911, the gage readings may be considerably in error, due to elongation of the gage chain. The gage-height record is therefore withheld from publication.

MOBILE RIVER BASIN.

OOSTANAULA RIVER AT RESACA, GA.

Location.—At the Western & Atlantic Railroad bridge in Resaca, 3 miles below the junction of Conasauga and Coosawattee rivers, and 1 mile above the mouth of Camp Creek.

Drainage area.—1,610 square miles.

Records available.—1891 to 1898 (gage heights by the United States Weather Bureau and discharge measurements and gage heights by the United States Geological Survey); 1899 to 1904, partial records of gage heights; continuous records, January 1, 1905, to September 30, 1914.

Gage.—Heavy vertical timber attached to the downstream side of the bridge pier in the middle of the river; read once daily. Gage is in poor condition.

Discharge measurements.—Usually made from the downstream side of the railroad bridge but at times from a boat at the ferry, about 200 feet above, where the section is somewhat better. A new steel highway bridge about 500 feet downstream now affords better equipment from which measurements can be made.

Channel and control.—Slightly shifting at and below the station. The left bank is low and overflows during high water for 480 feet.

Extremes of discharge.—Maximum stage recorded during year: 15.0 feet, April 15; discharge, 11,600 second-feet. Minimum stage recorded: 1.4 feet, October 11 to 18; discharge, 345 second-feet.

Maximum stage recorded 1896–1914:[1] 31.7 feet, March 15, 1909; discharge, 39,200 second-feet. Minimum stage recorded: 0.95 foot during discharge measurement on September 26, 1904; discharge, 273 second-feet.

[1] No gage-height records were collected during the following periods: May 1 to July 31, 1896; May 1 to October 31, 1899; July 1 to October 31, 1900; May 1 to November 12, 1901; and January 1, 1902, to December 31, 1904.

Regulation.—Except on the smaller tributaries there are very few mill dams and these have little or no effect on the flow at the station. The channel is sometimes obstructed by logs under the left span of the bridge.

Accuray.—There has been a slight change in rating curve on account of shift in the control. Discharge estimates for low stages should be used with caution, on account of difficulty of obtaining accurate gage readings owing to poor condition of lower end of gage.

Discharge measurements of Oostanaula River at Resaca, Ga., during the year ending Sept. 30, 1914.

Date	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 22	Warren E. Hall and B. M. Hall, jr	2.25	702
Feb. 27	B. M. Hall, jr	3.70	1,530

Daily discharge, in second-feet, of Oostanaula River at Resaca, Ga., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,270	500	990	2,340	3,940	1,350	5,420	2,490	780	500	500	590
2	680	500	1,750	2,040	3,270	1,350	4,110	1,960	680	680	500	500
3	590	500	1,470	1,890	2,040	1,230	3,430	1,750	680	590	500	590
4	500	500	990	1,820	2,040	1,110	2,960	1,750	680	590	680	780
5	420	500	880	1,750	1,470	1,110	2,490	2,340	635	590	990	680
6	420	500	880	1,750	1,750	1,110	2,420	2,490	635	990	880	590
7	380	500	935	1,410	6,780	1,110	1,610	2,190	590	635	1,110	590
8	380	500	1,350	1,350	5,510	1,110	1,750	1,890	990	590	1,110	500
9	380	500	1,110	1,350	3,270	990	4,110	1,890	730	590	880	500
10	380	500	990	1,350	2,260	990	3,430	1,540	680	590	1,110	500
11	380	500	880	1,350	2,040	990	2,490	1,410	635	590	1,110	500
12	345	500	780	1,230	2,040	1,540	1,890	1,230	635	590	1,540	500
13	345	500	730	1,110	2,040	3,270	2,880	1,110	635	590	1,230	420
14	345	500	730	1,110	2,340	3,270	2,490	1,110	590	680	1,350	420
15	345	500	730	990	2,490	2,040	11,600	1,050	590	680	3,270	420
16	345	500	680	880	2,190	1,750	10,600	1,050	680	2,490	1,890	420
17	345	500	680	730	1,750	1,540	7,160	990	680	2,880	1,350	420
18	345	500	635	590	1,610	1,470	4,110	990	780	6,780	990	420
19	590	500	635	590	1,540	1,350	2,640	935	830	5,420	780	500
20	420	500	590	590	2,420	1,350	2,190	935	830	3,270	500	500
21	420	500	590	590	1,610	1,470	5,870	880	780	2,650	500	460
22	420	500	590	590	1,610	1,750	4,540	880	780	2,190	500	460
23	500	500	680	590	1,350	1,540	2,960	780	730	1,110	500	420
24	420	500	830	590	1,470	1,290	2,720	780	680	880	500	420
25	380	500	990	780	1,610	1,230	2,490	680	590	780	830	420
26	380	500	1,110	1,110	3,110	1,350	2,190	635	590	680	990	420
27	380	460	1,230	990	1,610	1,290	2,040	635	590	590	590	380
28	1,110	460	1,230	880	1,540	1,290	1,890	635	500	590	590	380
29	880	460	1,610	780	.....	1,410	1,750	635	590	590	990	380
30	590	460	1,890	780	.....	1,410	2,880	590	500	590	1,110	380
31	500	.....	2,490	2,340	.....	5,960	.....	590	.....	500	880	.....

NOTE.—Daily discharge determined from a rating curve well defined below 7,000 second-feet. Daily discharge estimates Oct. 1 to Dec. 31, 1913, differ from those published in Water-Supply Paper 352 because of a revision of the rating curve.

Monthly discharge of Oostanaula River at Resaca, Ga., for the years ending Sept. 30, 1913–1914.

[Drainage area, 1,610 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1912–13.						
October	3,940	640	1,050	0.652	0.75	
November	1,440	640	891	.553	.62	
December	4,540	560	1,780	1.11	1.28	
January	11,100	2,500	4,690	2.91	3.36	A.
February	17,000	2,500	5,380	3.34	3.48	A.
March	22,200	2,800	9,940	6.17	7.11	B.
April	5,510	2,190	2,910	1.81	2.02	A.
May	8,690	1,540	2,610	1.62	1.87	A.
June	6,780	1,470	2,500	1.55	1.73	A.
July	4,110	730	1,370	.851	.98	A.
August	1,890	460	810	.503	.58	B.
September	4,110	380	662	.411	.46	B.
The year	22,200	380	2,880	1.79	24.24	
1913–14.						
October	3,270	345	554	.344	.40	B.
November	500	460	495	.307	.34	B.
December	2,490	590	1,020	.634	.73	B.
January	2,340	590	1,170	.727	.84	B.
February	6,780	1,350	2,380	1.48	1.54	A.
March	5,960	990	1,610	1.00	1.15	A.
April	11,600	1,610	3,620	2.25	2.51	A.
May	2,490	590	1,250	.776	.89	B.
June	990	500	676	.420	.47	B.
July	6,780	500	1,340	.832	.96	B.
August	3,270	500	976	.606	.70	B.
September	780	380	482	.299	.33	B.
The year	11,600	345	1,290	.801	10.86	

NOTE.—Monthly discharge estimates April to December, 1913, differ from those published in Water-Supply Paper 352 because of a revision of the rating curve below 2,880 second-feet. Monthly estimates October, 1912, to March, 1913, are republished in order to complete the year ending Sept. 30, 1913.

COOSA RIVER AT RIVERSIDE, ALA.

Location.—At the Southern Railway bridge at Riverside, 1 mile above mouth of Blue Eye Creek, and about 7 miles above Choccolocco Creek.

Drainage area.—7,060 square miles.

Records available.—September 25, 1896, to September 30, 1914.

Gage.—Standard chain gage attached to right-bank end of downstream side of railroad bridge; read twice daily by J. E. Whitehead. The original wire gage was located on the downstream side of bridge near middle of river.

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

Channel and control.—Bed of stream rocky and permanent. For a part of the width the current is broken by a ledge above. Both banks high and do not overflow. Control permanent.

Extremes of discharge.—Maximum stage recorded during year: 11.8 feet at 8 a. m. April 16 and 17; discharge, 41,700 second-feet. Minimum stage recorded: 0.7 foot at 6 a. m. and 6 p. m. September 19 and 20; discharge, 1,760 second-feet.

Maximum stage recorded 1896–1914: 19.8 feet, March 20, 1906; discharge, 75,800 second-feet. Minimum stage recorded: 0.35 foot, October 20 to November 1, 1904; discharge, 1,220 second-feet.

Regulation.—The flow is not noticeably affected by artificial regulation at the comparatively few dams above. Four navigation locks have been constructed, the nearest of which is lock 4, about 4 miles above the station. Lock 5, several miles downstream, will probably be completed soon, and the discharge relation will then be affected by backwater from the dam.

Accuracy.—The rating is good and probably permanent. Records should, however, be used with caution, as no discharge measurements have been made since 1911.

Daily discharge, in second-feet, of Coosa River at Riverside, Ala., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	14,900	2,260	9,660	11,000	10,300	6,250	19,800	7,140	2,620	1,840	3,660	3,660
2	18,300	2,170	13,100	11,000	14,500	6,250	23,900	5,420	2,440	1,840	3,660	3,430
3	14,200	2,260	13,800	9,660	13,800	5,970	21,400	6,250	2,620	2,170	3,890	3,430
4	8,060	2,170	9,660	9,340	12,400	5,970	19,800	6,250	2,440	2,170	3,660	3,010
5	7,140	2,260	7,750	9,020	9,020	5,160	12,700	5,970	2,620	2,620	3,430	2,810
6	4,130	2,170	5,970	8,380	7,140	4,900	11,000	4,640	2,440	2,440	3,220	2,620
7	3,890	2,260	4,900	7,750	8,380	4,900	12,000	5,420	3,430	2,620	3,010	2,260
8	3,010	2,000	4,380	6,540	13,800	4,900	16,000	6,540	3,660	2,440	2,810	2,260
9	2,620	2,080	4,380	5,970	17,500	4,380	18,300	7,440	3,890	2,620	3,010	1,920
10	2,620	2,620	4,900	5,420	17,500	4,380	18,300	7,140	3,430	2,080	2,810	1,920
11	2,440	2,810	4,900	5,160	14,500	4,380	19,000	6,540	3,220	2,260	3,220	1,920
12	2,260	2,440	4,380	4,900	11,000	5,700	16,000	6,540	2,810	2,810	4,130	1,920
13	2,260	2,620	4,380	4,380	9,660	5,970	12,000	5,700	2,810	4,380	7,750	1,920
14	2,170	2,260	4,380	3,890	11,000	7,140	15,600	5,700	2,620	4,130	10,600	1,920
15	2,260	2,260	4,380	3,890	10,300	6,840	28,300	5,420	3,010	3,890	9,660	1,920
16	2,170	2,170	3,890	3,890	9,660	7,750	41,700	4,130	2,810	3,220	8,700	1,920
17	2,260	2,170	3,890	3,660	9,020	7,140	41,700	3,890	3,430	3,010	7,140	1,920
18	2,260	2,260	3,660	3,430	8,700	6,540	40,900	3,890	3,660	9,340	6,250	1,920
19	2,260	2,260	3,430	3,430	8,380	5,970	34,900	3,660	3,430	15,300	4,380	1,760
20	2,260	2,260	3,010	3,660	7,750	5,700	25,200	3,890	3,010	15,600	3,660	1,760
21	2,260	2,260	3,010	3,430	7,140	5,420	14,500	3,660	3,010	13,800	3,430	2,620
22	3,010	2,260	3,010	3,220	7,140	5,700	15,300	3,430	2,810	9,340	2,620	4,900
23	3,220	2,260	3,220	3,220	6,840	5,970	16,000	3,010	3,220	5,970	2,810	3,660
24	3,010	2,260	3,430	3,010	6,540	6,250	13,800	3,220	2,810	4,130	2,620	3,010
25	2,620	2,260	3,890	3,220	7,140	5,700	12,700	3,220	2,810	3,430	3,010	2,810
26	2,440	2,260	5,420	3,430	7,750	5,970	10,300	3,010	2,620	3,220	3,010	2,620
27	2,260	2,080	5,700	3,660	7,140	5,700	10,300	3,010	2,620	3,220	3,220	2,620
28	2,260	2,080	6,540	3,890	6,540	5,420	9,660	3,010	2,170	2,810	3,220	2,260
29	2,170	2,080	6,540	3,890	.....	5,420	9,020	2,620	2,170	3,890	3,660	2,260
30	2,170	2,620	8,700	3,890	.....	5,970	7,440	2,620	1,920	4,640	3,890	2,260
31	2,260	.....	10,300	5,420	.....	7,140	.....	2,620	.....	4,900	3,890	.....

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

Monthly discharge of Coosa River at Riverside, Ala., for the year ending Sept. 30, 1914.

[Drainage area, 7,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	18,300	2,170	4,170	0.591	0.68	A.
November	2,810	2,000	2,270	.322	.36	A.
December	13,800	3,010	5,760	.816	.94	A.
January	11,000	3,010	5,310	.752	.87	A.
February	17,500	6,540	10,000	1.42	1.48	A.
March	7,750	4,380	5,830	.826	.95	A.
April	41,700	7,440	18,900	2.68	2.99	A.
May	7,440	2,620	4,680	.663	.76	A.
June	3,890	1,920	2,890	.409	.46	B.
July	15,600	1,840	4,710	.667	.77	B.
August	10,600	2,620	4,320	.612	.71	B.
September	4,900	1,760	2,510	.356	.40	B.
The year	41,700	1,760	5,910	.837	11.37	

COOSA RIVER AT CHILDERSBURG, ALA.

Location.—At the Central of Georgia Railroad bridge, half a mile west of Childersburg, 35 miles above site of lock 12, and 75.3 miles above Wetumpka, Ala.

Drainage area.—8,390 square miles (determined by Alabama Power Co.).

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

Gage.—Gurley printing water-stage recorder attached to downstream side 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 water-stage register is now attached. The sea-level elevation of the zero of both gages is 421.00 feet (United States Army Engineers' datum).

Discharge measurements.—Made from upstream side of bridge.

Channel and control.—No data available.

Extremes of discharge.—Maximum mean daily stage recorded: 11.6 feet, April 17; discharge, 38,200 second-feet. Minimum stage recorded: 1.3 feet, September 20; discharge, 2,370 second-feet.

Accuracy.—Estimates of flow published in the following tables have been computed by engineers of the United States Geological Survey from records of daily gage height and results of discharge measurements collected by the Alabama Power Co. It should be noted that the rating curve used in the determination of these estimates is based upon numerous discharge measurements made by the single-point method according to the methods of the Alabama Power Co. and has not been checked by discharge measurements made by engineers of the United States Geological Survey. The velocity in nearly all of these measurements was determined at the three-tenths depth and a coefficient applied to reduce it to the mean velocity in the vertical.

Cooperation.—The daily gage-height record, results of discharge measurements, and data for the description of this station have been furnished by the Alabama Power Co.

Discharge measurements of Coosa River at Childersburg, Ala., during the year ending Sept. 30, 1914.

[Made by engineers of Alabama Power Co.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Feb. 19	3.6	8,210	Apr. 21	6.4	17,500	May 16	2.4	4,790
20	3.5	7,730	21	6.1	17,200	16	2.35	4,670
21	3.5	7,780	21	6.1	17,200	17	2.3	4,560
21	3.45	7,580	22	5.7	15,500	18	2.3	4,530
21	3.4	7,130	22	5.6	15,600	18	2.25	4,520
23	3.3	6,970	22	5.75	16,300	18	2.2	4,570
23	3.3	7,210	23	6.2	18,100	20	2.1	4,080
24	3.5	7,910	23	6.2	18,400	26	1.95	3,710
26	3.3	6,770	23	6.2	17,900	26	1.95	3,730
26	3.3	6,700	24	6.0	16,500	June 27	1.54	2,770
27	3.2	6,860	24	6.0	16,500	29	1.48	2,770
27	3.1	6,740	25	5.15	13,700	30	1.43	2,660
27	3.1	6,820	26	4.6	11,600	30	1.43	2,630
28	3.2	7,020	26	4.5	11,500	30	1.43	2,620
Mar. 2	3.2	7,160	26	4.4	11,100	July 1	1.38	2,540
2	3.2	6,940	27	4.1	9,800	1	1.38	2,490
5	2.9	5,970	27	4.1	9,800	2	1.36	2,510
5	2.9	6,100	27	4.1	9,610	2	1.36	2,440
5	2.9	5,980	May 14	2.45	4,860	2	1.36	2,550
5	2.9	5,950	15	2.4	4,790	3	1.72	3,330
Apr. 20	8.25	25,300	16	2.4	4,730	3	1.73	3,380

Daily discharge, in second-feet, of Coosa River at Childersburg, Ala., for the year ending Sept. 30, 1914.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	7,150	23,500	9,140	3,400	2,570	4,530	4,530
2	.....	6,850	25,400	8,450	3,400	2,570	3,840	4,060
3	.....	6,560	23,500	7,780	3,400	3,190	5,010	4,060
4	.....	6,280	19,000	7,150	3,620	2,980	5,010	4,060
5	.....	6,010	15,300	6,850	3,620	2,980	5,500	3,840
6	.....	5,750	11,300	6,010	3,620	2,980	4,770	3,400
7	.....	5,250	10,200	6,280	4,290	3,190	4,060	2,980
8	.....	5,250	14,200	7,150	4,770	2,980	3,400	2,980
9	.....	5,010	18,300	7,460	4,530	3,190	3,620	2,980
10	.....	5,010	19,000	6,850	4,060	3,620	3,840	2,770
11	.....	5,010	19,000	6,010	3,840	2,980	4,290	2,570
12	.....	5,750	16,400	5,750	3,620	2,980	5,010	2,570
13	.....	7,150	13,100	5,250	3,620	3,400	8,110	2,770
14	.....	7,460	19,000	5,010	3,400	4,290	9,490	2,770
15	.....	7,460	31,100	4,770	3,190	3,400	9,850	2,570
16	.....	8,110	36,200	4,530	3,190	3,190	9,140	2,570
17	.....	7,460	38,200	4,530	2,980	3,190	7,780	2,570
18	.....	6,850	37,400	4,290	4,060	8,450	6,850	2,570
19	.....	6,010	33,900	4,290	4,290	13,800	5,500	2,570
20	.....	5,750	25,800	4,060	3,840	15,000	4,530	2,370
21	.....	5,750	17,900	4,060	3,400	13,800	3,840	2,570
22	7,150	6,010	15,700	4,060	3,400	10,200	3,620	4,530
23	7,460	6,280	17,500	3,840	3,620	6,850	3,730	4,530
24	7,780	6,280	16,100	3,840	3,620	5,010	3,850	3,840
25	7,460	6,280	13,500	3,840	3,190	3,840	3,960	3,620
26	6,850	5,750	10,900	3,840	2,980	3,400	4,080	3,400
27	6,850	5,750	9,490	3,400	2,770	3,190	4,190	3,620
28	6,850	5,750	8,790	3,400	2,980	3,400	4,300	3,400
29	.....	5,750	8,790	3,400	2,770	4,060	4,420	2,980
30	.....	5,750	9,850	3,400	2,570	4,770	4,530	2,770
31	.....	11,600	.....	3,400	.....	5,250	4,530	.....

NOTE.—Daily discharge determined from a rating curve well defined between 2,400 and 28,000 second-feet. See "Accuracy" in station description. Discharge interpolated June 1, 2, and Aug. 23–29.

Monthly discharge of Coosa River at Childersburg, Ala., for the year ending Sept. 30, 1914.

[Drainage area, 8,390 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
March	11,600	5,010	6,360	0.758	0.87
April	38,200	8,790	19,300	2.30	2.57
May	9,140	3,400	5,230	.623	.72
June	4,770	2,570	3,530	.421	.47
July	15,000	2,570	4,990	.595	.69
August	9,850	3,400	5,130	.611	.70
September	4,530	2,370	3,230	.385	.43

COOSA RIVER AT LOCK 12, NEAR CLANTON, ALA.

Location.—About 100 feet above mouth of lower Yellow Leaf Creek, half a mile below dam and lock 12 of Alabama Power Co., 1½ miles below mouth of Paint Creek, about 12 miles northeast of Clanton, and 39.8 miles above Wetumpka.

Drainage area.—9,170 square miles (determined by Alabama Power Co.).

Records available.—June 20, 1912, to September 30, 1914.

Gage.—Gurley printing water-stage register installed March 24, 1914, on right bank in a wooden shelter over a well formed by 24-inch corrugated galvanized culvert pipes. Prior to that date the following gages were used: June 20 to October 15, 1912, vertical staff at Adams Ferry, about 600 feet below present gage; October 16, 1912, to March 23, 1914, vertical staff in three sections on right bank about 100 feet above mouth of lower Yellow Leaf Creek and 40 feet above water-stage recorder; each section is set in concrete piers; sea-level elevation of zero of this gage, 341.50 feet. Sea-level elevation of zero of the water-stage recorder, 340.0 feet. All gage readings have been reduced to sea-level elevation.

Discharge measurements.—Made from a cable one-fourth mile below gage.

Channel and control.—Channel probably permanent; no data available concerning control.

Extremes of discharge.—Maximum mean daily stage recorded during year: 10.9 feet, April 17; discharge, 42,800 second-feet. Minimum mean daily stage recorded: 1.1 feet, December 29; discharge, 750 second-feet.

Maximum mean daily stage recorded 1912–1914: 13.8 feet, January 28, 1913; discharge, 59,400 second-feet. Minimum mean daily stage recorded: 1.1 feet, December 29, 1913; discharge, 750 second-feet.

Regulation.—Prior to December, 1913, there was probably but slight effect from operation of the few small mills on tributaries above station. Considerable diurnal fluctuation is caused by the hydroelectric plant at lock 12, which was put in operation in the last part of December, 1913.

Accuracy.—Estimates of flow published in the following tables have been computed by engineers of the United States Geological Survey from the gage-height record and results of discharge measurements furnished by the Alabama Power Co. It should be noted that the rating curve used in determining these estimates is based upon numerous discharge measurements made by the single-point method. The rating curve has not been checked by discharge measurements made by engineers of the Survey.

Cooperation.—Daily gage-height records, results of discharge measurements, and data for the description of this station have been furnished by the Alabama Power Co.

30631°—WSP 382—16——4

Discharge measurements of Coosa River at lock 12, near Clanton, Ala., during the years ending Sept. 30, 1913–1914.

[Made by engineers of the Alabama Power Co.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1912–13.	*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 16	4.1	7,570	June 19	3.7	6,270	Oct. 4	5.3	11,700
19	4.0	7,280	19	3.7	5,120	4	5.2	10,800
19	4.0	7,000	Sept. 26	3.1	4,850	4	5.2	10,700
19	4.0	6,790	27	3.2	4,810	5	4.4	8,820
20	4.0	8,150	29	2.8	3,530	5	4.3	8,600
20	4.0	8,160	29	2.8	3,650	5	4.2	8,100
20	4.0	6,630	29	2.8	3,410	6	3.8	6,890
21	4.0	7,800	29	2.8	3,260	6	3.7	6,960
21	4.0	7,900	30	2.9	4,050	6	3.6	6,360
21	4.0	8,050	30	2.9	3,600	6	3.6	5,520
22	4.8	11,900	30	2.9	3,850	8	3.2	4,370
24	5.4	12,200	30	2.9	3,600	8	3.2	4,400
24	5.6	12,600				13	2.7	3,330
26	5.8	14,300	1913–14.			14	2.7	2,890
26	5.8	13,500	Oct. 1	7.2	21,800	15	2.6	2,880
27	5.9	15,200	1	7.0	20,400	15	2.6	3,370
27	6.2	17,300	1	7.0	20,300	15	2.6	3,100
27	6.3	17,500	1	6.9	19,600	15	2.6	3,200
27	6.4	18,500	2	6.4	17,100	15	2.6	3,360
27	6.3	17,400	2	6.4	18,000	16	2.5	2,820
June 14	4.6	8,500	2	6.4	18,400	16	2.5	2,750
16	4.0	7,040	2	6.4	17,700	16	2.5	2,790
16	4.0	7,100	3	6.5	17,500	16	2.5	2,740
16	4.0	7,560	3	6.5	16,800	17	2.5	2,560
18	3.9	6,710	3	6.2	16,500	17	2.5	2,800
18	3.9	7,270	3	6.2	16,700	17	2.5	2,270
18	3.9	7,420	3	6.1	16,500			
19	3.7	6,370	4	5.4	13,000			

Daily discharge, in second-feet, of Coosa River at lock 12, near Clanton, Ala., for the years ending Sept. 30, 1912–1914.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1911–12.					1911–12.				
1		15,600	7,660	6,270	16		21,600	11,000	10,200
2		12,600	7,660	5,930	17		26,500	12,200	6,950
3		12,600	7,390	5,930	18		25,400	12,200	5,930
4		11,800	7,300	5,930	19		17,200	12,200	6.610
5		17,800	8,020	5,600	20	13,600	16,100	11,000	6,610
6		17,200	7,300	5,280	21	11,400	14,600	10,600	6,270
7		17,200	7,300	5,280	22	9,830	18,300	10,200	8,020
8		23,200	8,020	4,960	23	8,740	17,200	9,100	13,600
9		23,200	9,830	5,280	24	8,380	13,600	9,460	10,200
10		19,900	11,400	5,280	25	8,380	11,400	11,400	9,100
11		15,600	21,600	5,280	26	9,100	9,460	11,000	15,600
12		15,100	29,300	5,280	27	10,600	9,100	9,830	15,100
13		19,400	24,800	5,280	28	14,000	9,830	9,830	11,800
14		24,300	16,700	4,960	29	20,500	9,100	8,380	10,600
15		25,400	13,600	9,830	30	21,600	8,380	7,660	8,380
					31		8,020	6,950	

Daily discharge, in second-feet, of Coosa River at lock 12, near Clanton, Ala., for the years ending Sept. 30, 1912–1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	6,950	4,640	3,740	13,600	48,000	55,400	45,700	9,830	8,380	5,930	9,460	3,460
2	5,930	4,640	4,030	13,600	38,800	55,400	41,100	9,830	8,020	6,610	8,380	3,460
3	5,930	4,640	4,330	16,700	37,100	52,000	34,300	9,460	8,380	6,270	9,830	4,640
4	6,270	4,640	5,600	17,800	43,400	49,100	26,000	9,100	10,200	6,270	8,740	4,960
5	6,950	4,640	9,460	17,200	38,800	46,200	22,100	8,380	9,830	5,930	6,270	5,600
6	6,610	4,640	13,100	16,100	34,300	41,700	23,200	8,380	9,830	5,280	6,610	4,640
7	7,300	4,960	16,700	15,600	30,400	32,700	17,200	8,380	11,000	4,960	5,930	4,330
8	10,200	4,960	18,300	15,600	25,400	22,600	16,100	8,020	11,800	4,640	5,600	3,460
9	8,020	4,640	15,100	15,600	20,500	18,800	15,100	8,020	11,800	4,960	5,280	3,190
10	6,270	4,640	13,100	14,600	17,800	45,100	15,100	8,020	11,800	5,600	7,300	3,740
11	5,930	6,610	12,200	14,000	16,100	38,800	15,600	8,020	10,600	6,610	8,740	4,330
12	5,600	7,300	10,600	17,200	31,000	34,300	15,100	8,380	11,800	4,960	6,950	3,460
13	4,960	6,270	9,100	19,900	47,400	47,400	14,600	8,740	11,000	4,960	5,930	3,190
14	4,960	5,280	8,380	21,600	50,800	56,500	14,600	8,380	9,830	5,600	5,280	2,930
15	5,600	4,960	8,020	22,100	50,200	58,800	14,000	7,660	8,020	5,280	5,930	3,190
16	5,930	4,640	7,660	23,200	46,200	58,200	13,600	7,660	7,300	5,930	5,930	3,460
17	4,960	4,640	7,300	18,300	38,800	55,400	12,600	7,660	6,950	6,610	5,280	4,640
18	4,960	4,640	8,380	17,200	28,200	53,100	12,200	7,660	6,610	6,270	5,930	4,640
19	11,000	4,640	8,020	19,900	21,600	51,400	11,800	7,300	6,610	5,280	6,610	4,330
20	12,600	4,330	8,020	20,500	24,800	50,200	11,800	7,300	6,270	5,930	5,930	3,740
21	12,600	4,330	8,020	20,500	24,800	58,200	11,000	7,660	5,930	5,600	4,960	3,460
22	11,400	4,330	8,020	19,400	26,500	58,200	10,600	7,660	5,600	4,640	4,330	3,460
23	13,600	4,330	9,830	17,800	28,700	51,400	10,200	10,200	5,600	4,960	6,270	3,460
24	11,000	4,330	17,200	17,200	28,700	42,300	10,200	12,600	5,600	5,600	4,960	3,460
25	8,740	4,330	16,100	32,700	26,000	36,000	9,830	13,600	6,270	5,930	4,640	3,740
26	7,300	4,030	15,600	32,100	22,100	32,100	11,800	14,600	6,950	5,280	4,640	4,030
27	5,930	4,030	16,700	50,800	31,000	46,200	12,200	16,700	6,270	4,640	5,280	4,330
28	5,600	4,030	16,100	59,400	52,000	50,200	11,000	15,600	6,270	5,930	4,030	3,740
29	5,600	4,030	17,200	54,200	.....	50,200	10,200	12,600	5,600	8,740	3,740	3,460
30	5,280	3,740	12,600	50,800	.....	50,200	10,200	10,600	5,280	12,200	3,740	9,100
31	4,960	.....	13,100	50,200	.....	48,000	.....	8,740	.....	12,200	3,740	.....
1913–14.												
1	21,000	4,030	3,740	3,460	8,740	9,460	30,400	11,400	4,030	1,360	2,210	3,460
2	17,800	4,030	4,640	11,800	15,600	9,100	31,000	10,600	4,030	1,360	3,460	6,610
3	18,300	4,030	12,200	12,600	15,100	8,380	29,300	9,830	3,740	1,490	6,610	4,330
4	12,200	3,740	13,600	11,400	13,100	8,020	24,800	9,830	4,330	1,490	4,640	3,460
5	8,380	3,460	11,800	11,000	11,800	7,660	19,400	8,740	4,030	1,490	8,380	4,030
6	5,930	3,460	10,200	9,830	11,400	7,300	15,600	8,020	4,030	1,640	5,280	5,280
7	4,960	2,930	6,950	9,830	21,000	10,200	13,100	7,660	4,330	1,640	4,960	2,930
8	4,640	3,190	6,610	9,100	18,300	6,610	14,600	8,380	5,600	1,810	4,640	3,460
9	4,030	3,190	6,950	8,020	18,800	6,270	21,600	9,100	5,930	1,810	4,330	2,680
10	3,740	3,460	7,300	7,660	19,900	6,270	21,600	8,740	5,280	2,210	4,960	2,680
11	3,460	3,190	6,950	6,950	16,700	6,270	22,100	8,380	4,960	2,440	4,640	2,930
12	3,460	2,930	6,610	6,270	15,100	8,380	19,900	7,300	4,330	2,680	4,960	2,930
13	3,190	3,190	6,270	6,610	12,600	9,460	17,800	6,950	4,330	2,440	9,460	2,440
14	3,190	3,460	5,930	5,600	12,600	9,460	22,100	6,270	3,740	4,030	13,600	2,440
15	2,930	3,460	5,280	5,600	13,100	9,460	34,900	5,930	4,030	5,600	12,000	3,190
16	2,680	3,190	4,960	5,600	12,600	9,460	39,400	5,600	3,460	2,930	10,400	3,190
17	2,930	3,460	4,960	5,600	11,000	9,460	42,800	5,600	4,030	3,190	8,800	3,460
18	3,190	3,460	4,640	5,600	10,600	8,740	42,300	5,600	4,030	11,000	7,200	2,930
19	3,460	3,190	4,640	4,960	10,200	8,020	39,400	4,960	4,960	11,800	5,600	2,930
20	2,930	2,930	4,640	4,640	10,200	7,300	32,100	4,640	4,330	18,800	4,330	2,440
21	2,680	2,680	4,330	4,960	9,830	7,300	23,200	4,640	2,210	13,100	4,640	2,930
22	2,680	2,930	4,330	4,640	9,100	7,660	17,800	4,330	1,640	15,100	4,030	2,930
23	2,930	3,190	4,330	4,640	8,740	7,660	19,400	4,030	1,490	11,000	4,330	2,930
24	5,280	3,190	4,640	4,960	9,100	7,660	19,400	4,330	1,640	10,200	4,330	4,330
25	5,930	2,930	5,600	4,960	9,460	7,660	16,100	4,030	1,490	6,270	3,740	4,030
26	4,640	2,930	6,610	4,960	8,740	7,660	13,600	4,030	1,490	3,460	3,190	4,330
27	4,640	2,930	6,950	4,960	8,740	7,300	11,800	3,190	1,490	2,680	3,460	3,740
28	4,030	2,930	1,250	4,960	8,740	7,300	11,000	3,190	1,490	2,930	3,460	4,330
29	4,330	2,680	750	4,960	.....	7,300	11,000	4,030	1,640	3,190	4,960	4,330
30	4,330	3,190	2,210	5,280	.....	7,300	12,200	3,740	1,490	3,740	6,270	4,330
31	4,330	.....	2,930	5,600	.....	22,100	.....	3,740	.....	2,680	5,280	.....

NOTE.—Daily discharge determined from a rating curve fairly well defined between 2,600 and 23,800 second-feet. Above 23,800 second-feet rating curve is an extension based on a comparison with Coosa River at Childersburg. Estimates below 2,600 second-feet should be used with caution. See "Accuracy" in station description. Discharged Aug. 15–18, 1914, interpolated.

Monthly discharge of Coosa River at lock 12, near Clanton, Ala., for the years ending Sept. 30, 1912–1914.

[Drainage, area, 9,170 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1911–12.					
June 20–30	21,600	8,380	12,400	1.35	0.55
July	26,500	8,020	16,300	1.78	2.05
August	29,300	6,950	11,300	1.23	1.42
September	15,600	4,960	7,710	.841	.94
1912–13.					
October	13,600	4,960	7,390	.806	.93
November	7,300	3,740	4,730	.516	.58
December	18,300	3,740	11,000	1.20	1.38
January	59,400	13,600	24,400	2.66	3.07
February	52,000	16,100	33,200	3.62	3.77
March	58,800	18,800	46,600	5.08	5.86
April	45,700	9,830	16,600	1.81	2.02
May	16,700	7,300	9,570	1.04	1.20
June	11,800	5,280	8,180	.892	1.00
July	12,200	4,640	6,120	.667	.77
August	9,830	3,740	6,010	.655	.76
September	9,100	2,930	4,050	.442	.49
The year	59,400	2,930	14,700	1.60	21.83
1913–14.					
October	21,000	2,680	5,750	.627	.72
November	4,030	2,680	3,250	.354	.40
December	13,600	750	5,900	.643	.74
January	12,600	3,460	6,680	.728	.84
February	21,000	8,740	12,500	1.36	1.42
March	22,100	6,270	8,460	.923	1.06
April	42,800	11,000	23,000	2.51	2.80
May	11,400	3,190	6,350	.692	.80
June	5,930	1,490	3,450	.376	.42
July	18,800	1,360	5,020	.547	.63
August	13,600	2,210	5,750	.627	.72
September	6,610	2,440	3,530	.385	.43
The year	42,800	750	7,420	.809	10.98

COOSA RIVER AT LOCK 18, NEAR WETUMPKA, ALA.

Location.—About 500 feet below the proposed lock 18 dam site, half a mile below mouth of Sofkohatchee Creek, and 8.3 miles above Wetumpka.

Drainage area.—10,200 square miles (determined by Alabama Power Co.).

Records available.—July 4, 1912, to September 30, 1914.

Gage.—Vertical staff in three sections on right bank, attached to 3-inch iron pipes set in concrete piers, installed July 25, 1913. Prior to this date a temporary gage was used. Comparative readings indicated that the elevation of the water surface at present gage was 0.6 foot lower than at temporary gage. All gage readings have been reduced to correspond with present gage; sea-level elevation of bottom of this gage, 186.50 feet.

Discharge measurements.—Made from cable 150 feet below gage.

Channel and control.—No data available.

Extremes of discharge.—Maximum mean daily stage recorded during year: 197.2 feet, April 18; discharge, 39,800 second-feet. Minimum mean daily stage recorded during year: 185.4 feet, July 6; discharge, 2,430 second-feet.

Regulation.—Little diurnal regulation until late in December, 1913, when dam at lock 12 was cut in.

Accuracy.—Estimates of flow published in following tables have been computed by engineers of the United States Geological Survey from gage-height records and results of discharge measurements collected by the Alabama Power Co. It should be noted that the rating curve which has been used in making these estimates is based on numerous discharge measurements made by the single-point method. This rating has not been checked by discharge measurements made by engineers of the Survey.

Cooperation.—The gage-height record, results of discharge measurements, and data for the description of this station have been furnished by the Alabama Power Co.

Discharge measurements of Coosa River at lock 18, near Wetumpka, Ala., during the years ending Sept. 30, 1913–1914.

[Made by engineers of the Alabama Power Co.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1912–13.	*Feet.*	*Sec.-ft.*	1912–13.	*Feet.*	*Sec.-ft.*	1193–14.	*Feet.*	*Sec.-ft.*
Apr. 17	190.3	12,800	July 18	188.1	7,200	Nov. 7	186.7	3,960
21	189.9	12,100	19	187.9	6,430	7	186.7	3,880
22	189.8	10,800	19	187.9	6,470	7	186.7	3,890
23	189.6	10,900	19	187.9	6,300	Dec. 22	187.3	5,260
24	189.6	10,900	21	188.1	6,760	23	187.3	5,270
24	189.6	10,500	21	187.9	6,560	24	187.3	5,480
25	189.5	10,800	21	187.9	6,620	24	187.4	5,680
25	189.5	10,600	22	188.0	6,410	25	187.8	6,100
25	189.5	10,800	22	187.9	6,390	25	187.9	6,100
28	190.1	12,500	22	187.8	6,080	26	188.3	7,490
29	189.7	11,700	Aug. 27	187.4	5,420	26	188.35	7,530
30	189.6	11,300	28	187.2	5,050	27	188.4	7,830
30	189.6	10,800	28	187.2	5,030	28	188.5	7,850
30	189.6	11,000	28	187.2	4,950	29	186.4	3,470
May 1	189.5	10,800	29	187.0	4,690	30	186.6	3,890
1	189.5	10,900	29	187.0	4,670	31	186.6	4,150
1	189.5	10,700	29	187.0	4,620	31	186.75	4,580
2	189.5	11,200	30	187.0	4,580	Jan. 5	190.1	12,000
2	189.5	10,800	30	187.0	4,540	6	189.9	11,400
July 14	188.2	6,850	30	187.0	4,660	6	189.8	11,200
15	187.9	6,280				6	189.8	11,200
15	187.9	6,510	1913–14.			7	189.6	10,600
15	187.8	6,240	Nov. 3	187.1	4,540	7	189.5	10,400
16	187.7	5,850	5	186.9	4,150	8	189.4	10,300
16	187.7	5,940	5	186.9	4,220	8	189.35	10,000
16	187.7	5,960	5	186.9	4,220	8	189.3	9,820
17	187.8	6,150	6	186.8	4,070	8	189.3	9,750
17	187.8	6,110	6	186.8	4,060			
17	187.8	6,330	6	186.7	3,960			

Daily discharge, in second-feet, of Coosa River at lock 18, near Wetumpka, Ala., for the years ending Sept. 30, 1912–1914.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1911–12.				1911–12.				1911–12.			
1	.....	8,000	7,480	11	15,800	12,700	6,210	21	15,500	14,200	7,740
2	.....	7,480	6,960	12	14,500	13,300	5,980	22	16,900	11,700	6,960
3	.....	7,220	6,700	13	17,600	13,800	5,760	23	19,900	11,500	12,300
4	14,500	10,900	6,450	14	21,800	14,300	8,780	24	14,800	10,100	12,000
5	17,300	10,100	6,210	15	23,400	14,800	6,960	25	12,300	11,500	10,400
6	17,300	8,260	6,210	16	21,400	11,500	12,300	26	11,500	11,500	13,200
7	16,900	10,600	6,210	17	21,000	12,300	13,500	27	10,600	9,840	15,500
8	19,500	11,200	5,760	18	28,300	13,800	7,220	28	10,100	10,400	13,500
9	23,000	11,700	5,760	19	20,300	12,600	7,220	29	9,840	10,100	10,400
10	19,900	12,200	5,760	20	16,900	12,000	8,260	30	9,300	9,040	11,700
								31	9,040	8,260	.....

Daily discharge, in second-feet, of Coosa River at lock 18, near Wetumpka, Ala., for the years ending Sept. 30, 1912–1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	8,520	6,210	5,340	13,800	46,400	53,900	42,600	10,600	9,040	5,980	11,500	4,540
2	7,480	5,980	5,340	14,200	38,100	51,400	39,000	10,400	8,780	6,960	12,600	4,340
3	7,220	5,980	5,550	15,500	35,700	48,900	34,000	10,400	8,520	6,700	10,100	4,340
4	7,220	5,760	6,700	17,300	43,900	45,900	25,000	10,100	10,100	6,450	10,400	5,550
5	7,740	5,550	14,500	16,900	37,300	43,500	21,800	9,840	10,600	6,210	7,740	5,760
6	7,740	5,760	13,500	16,500	34,000	36,100	19,100	9,300	10,600	5,980	6,960	5,140
7	7,480	7,220	16,500	15,500	29,100	28,700	17,600	9,040	10,900	5,340	6,700	5,340
8	10,100	6,700	19,100	15,800	24,600	24,200	16,500	9,300	13,200	5,140	7,740	4,940
9	10,100	6,210	16,900	16,500	21,400	21,800	15,800	9,040	12,900	5,140	7,480	3,600
10	9,040	6,210	14,800	15,200	17,600	38,500	15,200	9,300	12,900	5,340	10,100	4,140
11	7,220	7,220	13,200	14,500	18,400	41,400	17,300	8,780	11,700	5,980	9,570	5,550
12	6,210	8,260	12,000	16,500	29,900	33,600	15,800	9,300	11,700	6,210	8,260	4,940
13	5,980	8,000	10,600	19,900	43,000	49,700	15,500	9,300	11,700	6,450	6,960	3,320
14	5,980	7,220	9,570	20,600	43,900	57,700	15,200	9,040	10,900	6,960	6,450	3,600
15	6,960	6,700	9,040	19,100	45,500	58,100	14,800	8,520	9,300	6,210	5,340	3,770
16	7,480	6,210	8,780	20,300	41,400	66,100	14,200	8,260	8,260	5,980	6,700	4,940
17	6,450	5,980	8,260	18,700	32,400	64,800	13,800	8,780	7,740	6,210	7,480	3,770
18	6,210	6,210	9,570	17,300	27,900	59,400	13,200	9,040	7,480	6,960	5,980	5,980
19	12,900	5,980	9,570	18,700	21,000	51,400	12,900	8,000	7,220	6,450	6,700	5,550
20	14,200	5,980	9,040	19,900	21,400	47,600	11,700	8,000	6,960	7,480	7,220	4,940
21	13,800	5,760	8,780	19,500	23,800	56,000	11,500	8,260	6,700	6,700	5,980	4,540
22	13,800	5,550	9,040	18,400	27,500	59,400	11,200	8,260	6,450	6,450	5,140	3,600
23	13,800	5,550	11,200	17,600	28,700	49,700	10,900	10,400	8,520	5,760	5,140	4,340
24	13,200	5,760	20,600	20,300	27,500	41,800	10,900	13,500	8,000	6,700	6,450	3,770
25	10,600	5,550	20,600	37,700	26,600	34,800	10,600	13,800	7,740	8,520	5,340	3,600
26	9,300	5,340	19,100	31,600	23,400	30,800	10,900	13,200	8,000	5,980	5,140	4,340
27	8,000	5,340	17,600	61,900	27,900	45,100	10,900	14,200	8,000	5,340	5,140	3,450
28	7,220	5,550	16,900	61,100	46,800	51,000	10,900	15,200	7,480	6,450	4,940	4,740
29	6,700	5,340	14,800	53,500	.....	45,900	10,900	11,200	6,700	9,840	4,540	4,540
30	6,700	5,340	13,800	48,900	.....	46,400	10,600	10,900	6,450	12,000	4,540	5,140
31	6,210	.....	13,800	47,200	.....	44,300	.....	10,400	.....	13,200	4,340	.....
1913–14.												
1	16,200	4,740	4,340	4,540	7,740	10,600	30,800	8,520	4,340	3,100	4,540	4,340
2	18,000	4,740	4,940	10,100	13,200	10,400	30,800	9,040	4,540	3,000	3,320	5,140
3	17,600	4,740	9,570	13,800	15,200	9,840	33,600	9,300	4,340	2,900	3,770	6,700
4	12,900	4,540	14,800	12,900	14,200	9,300	25,400	9,040	4,140	2,800	7,480	4,140
5	10,100	4,340	14,800	12,000	12,600	9,040	16,500	8,000	6,700	2,610	5,980	4,540
6	8,000	3,940	10,900	11,500	12,000	11,500	14,200	7,480	5,550	2,430	8,260	5,140
7	5,340	3,940	9,570	10,600	17,600	10,600	14,200	6,960	5,340	2,610	4,540	5,140
8	5,340	3,770	8,780	10,100	19,100	10,400	17,300	12,900	5,340	2,610	4,340	3,770
9	4,740	3,770	7,480	9,300	18,400	10,100	18,700	11,500	6,450	2,800	5,140	3,770
10	4,540	3,770	7,740	8,780	19,500	9,570	21,000	10,600	6,450	2,800	6,210	3,200
11	4,540	3,770	8,000	8,000	18,700	10,100	21,400	10,100	5,760	3,450	5,980	3,450
12	4,140	3,770	7,480	7,740	16,900	10,100	21,000	9,570	5,340	3,940	5,340	4,140
13	3,940	3,770	6,960	7,220	14,200	11,500	18,000	11,200	5,340	4,140	6,210	4,140
14	3,940	3,770	6,450	6,700	13,200	10,900	27,100	9,840	6,210	3,770	12,000	3,100
15	3,770	3,940	6,450	6,210	13,500	10,600	33,600	6,450	4,540	4,940	13,800	3,200
16	4,740	4,140	5,980	6,210	13,500	10,400	37,300	5,980	4,740	5,140	9,300	4,140
17	3,770	4,140	5,760	5,980	12,600	10,600	39,000	5,980	4,140	4,340	8,000	3,770
18	3,600	3,940	5,550	5,980	11,700	10,100	39,800	6,210	5,340	4,940	9,840	3,940
19	4,740	3,940	5,340	5,760	11,200	9,300	38,100	5,140	4,940	10,600	7,220	3,770
20	4,340	3,940	5,340	5,760	11,500	9,300	33,200	5,340	5,340	15,200	4,740	3,000
21	3,940	3,770	5,140	5,760	11,200	8,780	24,600	5,140	4,140	15,200	4,940	2,800
22	3,940	3,770	5,140	5,550	9,840	8,780	18,700	4,940	3,200	15,200	4,940	3,600
23	3,770	3,770	5,140	5,340	9,840	9,040	17,600	4,740	3,000	12,000	4,940	3,200
24	5,340	3,770	5,140	5,550	9,570	8,780	18,700	4,940	3,100	12,000	4,740	3,770
25	8,260	5,760	5,980	5,760	10,400	8,780	17,300	5,550	3,000	6,210	4,940	4,940
26	6,210	3,770	7,220	5,980	10,100	8,000	16,200	3,770	3,200	4,540	4,140	4,940
27	5,140	3,600	7,740	5,760	9,840	8,520	12,600	4,740	3,450	3,770	3,940	7,220
28	4,940	3,600	8,000	5,760	9,840	8,260	11,500	4,540	3,200	3,940	4,140	7,740
29	4,940	3,600	4,140	5,760	.....	7,740	10,900	4,340	3,200	4,140	4,940	6,960
30	4,940	3,770	3,770	5,760	.....	8,780	14,500	4,540	3,100	3,770	6,210	7,480
31	4,940	.....	3,940	6,700	.....	27,900	.....	4,340	.....	3,940	9,300	.....

NOTE.—Daily discharge determined from a rating curve fairly well defined between 3,400 and 13,000 second-feet, and poorly defined beyond these limits. Discharge, Aug. 9–14, 1912, interpolated. See "Accuracy" in station description.

Monthly discharge of Coosa River at lock 18, near Wetumpka, Ala., for the years ending Sept. 30, 1912–1914.

[Drainage area, 10,200 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1911–12.					
July 4–31	28,300	9,040	16,800	1.65	1.72
August	14,800	7,220	11,200	1.10	1.27
September	15,500	5,760	8,650	.848	.95
1912–13.					
October	14,200	5,980	8,760	.859	.99
November	8,260	5,340	6,150	.603	.67
December	20,600	5,340	12,400	1.22	1.41
January	61,900	13,800	24,500	2.40	2.77
February	46,800	17,600	31,600	3.10	3.23
March	66,100	21,800	46,100	4.52	5.21
April	42,600	10,600	16,700	1.64	1.83
May	15,200	8,000	10,100	.990	1.14
June	13,200	6,450	9,150	.897	1.00
July	13,200	5,140	6,810	.668	.77
August	12,600	4,340	7,050	.691	.80
September	5,980	3,320	4,540	.445	.50
The year	66,100	3,320	15,300	1.50	20.32
1913–14.					
October	18,000	3,600	6,470	.634	.73
November	5,760	3,600	4,020	.394	.44
December	14,800	3,770	7,020	.688	.79
January	13,800	4,540	7,510	.736	.85
February	19,500	7,740	13,100	1.28	1.33
March	27,900	7,740	10,200	1.00	1.15
April	39,800	10,900	23,100	2.26	2.52
May	12,900	3,770	7,120	.698	.80
June	6,700	3,000	4,580	.449	.50
July	15,200	2,430	5,580	.547	.63
August	13,800	3,320	6,230	.611	.70
September	7,740	2,800	4,510	.442	.49
The year	39,800	2,430	8,250	.809	10.93

ETOWAH RIVER NEAR BALL GROUND, GA.

Location.—At the iron wagon bridge about 3 miles southeast of Ball Ground, and a quarter of a mile below mouth of Longswamp Creek.

Drainage area.—466 square miles.

Records available.—May 16, 1907, to September 30, 1914.

Gage.—Standard chain gage attached to upstream side of bridge, installed August 18, 1908, to replace vertical-staff gage located 75 feet below bridge. The chain gage was set to read with the vertical staff at low stage and will differ only very slightly at other stages. Gage read twice daily by Miss Ethel Long.

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

Channel and control.—The left bank does not overflow, but the right bank overflows about 500 feet beyond end of bridge approach at high stages. The current is somewhat broken and is disturbed by rough, rocky bed and curved channel above. Control somewhat shifting but not definitely located.

Extremes of discharge.—Maximum stage recorded during year: 11.8 feet at 5 p. m. April 11; discharge, 7,390 second-feet. Minimum stage recorded: 1.4 feet at 6 a. m. July 28; discharge, 165 second-feet.

Maximum stage recorded 1907–1914: 19.5 feet at 4 p. m. March 15, 1913; discharge, 15,500 second-feet. Minimum stage recorded: 1.4 feet at 6 a. m. July 28, 1914; discharge, 165 second-feet.

Regulation.—The operation of a number of mills above may cause slight variations in flow.

Accuracy.—The rating curve is affected by shifting of the stream bed some distance below the station, but is fairly good.

The following discharge measurement was made by Warren E. Hall:
December 16, 1913: Gage height, 2.47 feet; discharge, 389 second-feet.

Daily discharge, in second-feet, of Etowah River near Ball Ground, Ga., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	735	350	980	980	560	690	690	690	410	275	265	300
2	462	350	645	880	480	560	645	690	380	338	288	300
3	410	350	500	1,030	462	560	600	600	365	338	445	325
4	380	350	445	830	445	540	560	645	410	325	275	325
5	350	350	445	690	445	560	2,230	600	410	1,080	265	288
6	350	350	445	560	690	560	1,310	540	410	480	255	255
7	325	350	780	480	1,250	540	830	520	380	338	265	235
8	325	690	560	462	830	560	735	480	380	300	300	255
9	325	520	462	520	645	500	690	480	395	300	690	245
10	325	445	445	480	600	480	690	500	380	380	780	275
11	300	380	445	480	645	520	5,320	480	350	365	780	300
12	300	380	410	462	580	780	5,410	480	325	288	540	300
13	300	410	410	445	645	735	2,020	445	325	325	462	275
14	275	380	380	480	735	600	1,310	428	325	350	690	255
15	265	380	445	480	735	560	1,080	445	325	480	445	275
16	275	410	410	462	690	520	1,030	410	325	1,950	325	275
17	275	380	410	410	600	560	2,520	410	380	1,200	325	275
18	325	380	410	410	540	520	1,430	380	410	1,550	300	380
19	520	350	410	410	600	520	1,080	395	580	645	325	560
20	500	380	410	410	1,740	780	1,030	380	410	480	325	520
21	395	350	410	380	1,080	690	930	380	350	365	350	325
22	350	350	410	380	780	645	830	380	325	325	300	288
23	350	380	480	380	880	600	780	380	325	300	275	245
24	780	350	500	410	780	560	735	380	300	255	300	245
25	600	350	690	560	690	520	735	350	300	219	350	325
26	445	350	780	480	645	560	780	350	275	192	338	300
27	428	325	600	380	645	600	735	380	225	177	735	300
28	410	325	480	410	600	600	690	365	211	265	325	275
29	380	338	735	410	.....	645	645	380	288	480	380	300
30	380	380	1,080	445	.....	1,140	645	410	255	380	338	255
31	380	.....	930	560	.....	1,430	.....	380	.....	300	300	.....

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

Monthly discharge of Etowah River near Ball Ground, Ga., for the year ending Sept. 30, 1914.

[Drainage area, 466 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	780	265	394	0.845	0.97	B.
November	690	325	381	.818	.91	B.
December	1,080	380	547	1.17	1.35	B.
January	1,030	380	521	1.12	1.29	B.
February	1,740	445	715	1.53	1.59	A.
March	1,430	480	633	1.36	1.57	A.
April	5,410	560	1,290	2.77	3.09	B.
May	690	350	456	.979	1.13	A.
June	580	211	351	.753	.84	B.
July	1,950	177	485	1.04	1.20	B.
August	780	255	398	.854	.98	B.
September	560	235	303	.650	.73	B.
The year	5,410	177	538	1.15	15.65	

ETOWAH RIVER NEAR ROME, GA.

Location.—At Freemans Ferry, 5 miles above Rome, where Etowah and Oostanaula Rivers unite to form Coosa River; 1 mile below mouth of Dikes Creek.

Drainage area.—1,800 square miles.

Records available.—August 17, 1904, to September 30, 1914.

Gage.—Vertical gage in three sections on left bank, 250 feet below the ferry; read twice each day by R. M. Pattillo.

Discharge measurements.—Made from ferryboat or from a small boat held in place by ferry cable. No measurements can be made at high stages.

Channel and control.—Both banks subject to overflow during extremely high water. Control formed by shoal immediately below gage.

Extremes of discharge.—Maximum stage recorded during year: 14.5 feet at 7 a. m. April 15; discharge, 22,900 second-feet. Minimum stage recorded: 1.45 feet, September 13 to 16; discharge, 585 second-feet.

Maximum stage recorded 1905–1914: 23.1 feet at 6 p. m. March 20, 1906; discharge, approximately 60,800 second-feet. Minimum stage recorded: 1.2 feet, October 10 and 24, 1904; discharge, 360 second-feet.

Regulations.—Operation of the few mill dams above will seldom affect the flow.

Accuracy.—Records good. Although no discharge measurements were made at this station during the year ending September 30, 1914, a measurement made on November 2, 1915, checks the rating curve used during 1912 and 1913.

Daily discharge, in second-feet, of Etowah River near Rome, Ga., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,640	990	1,790	2,340	1,660	1,480	4,360	1,920	942	625	710	848
2	2,060	990	2,340	2,060	1,480	1,480	3,300	1,790	942	710	625	800
3	1,480	990	1,790	2,060	1,300	1,420	2,490	1,660	942	990	625	800
4	1,250	942	1,360	2,060	1,140	1,420	1,920	1,660	2,340	942	625	800
5	1,090	942	1,200	1,920	1,090	1,360	1,600	1,660	1,920	895	625	710
6	990	895	1,140	1,920	1,660	1,300	1,420	1,540	1,540	895	625	710
7	942	990	1,140	1,790	3,820	1,200	1,250	1,540	1,250	848	848	625
8	942	1,300	1,200	1,660	3,300	1,200	5,080	1,540	1,090	848	990	625
9	895	1,480	1,090	1,480	2,490	1,140	7,240	1,480	1,090	1,300	1,420	625
10	895	1,250	1,090	1,300	2,200	1,090	3,640	1,420	1,090	2,640	2,960	625
11	848	1,090	1,090	1,300	2,060	1,090	2,640	1,420	1,090	2,060	2,960	625
12	848	1,090	1,090	1,200	2,060	1,420	2,340	1,300	1,040	1,200	2,640	625
13	848	1,040	1,040	1,090	1,920	2,640	2,060	1,300	990	942	2,340	585
14	800	990	1,090	1,090	1,790	1,920	12,300	1,200	1,300	800	2,490	585
15	800	990	1,090	1,090	1,600	1,600	20,600	1,200	1,140	942	2,060	585
16	800	942	1,090	1,090	1,540	1,360	13,400	1,090	1,090	2,060	1,660	585
17	800	990	1,040	1,090	1,420	1,250	7,600	1,090	1,090	3,640	1,200	585
18	755	942	1,040	1,090	1,360	1,200	4,360	1,090	990	2,640	990	800
19	800	942	1,040	1,090	1,540	1,090	3,300	1,090	990	1,920	848	3,820
20	990	942	1,040	1,040	1,920	1,360	6,160	1,090	942	1,420	800	2,060
21	1,090	895	1,090	990	2,340	1,920	7,240	1,090	895	1,040	1,300	1,040
22	990	895	1,090	990	2,060	1,790	5,080	1,090	895	990	1,140	895
23	990	895	1,090	990	1,790	1,660	2,640	1,090	848	895	1,090	800
24	1,200	895	1,090	1,200	1,660	1,540	2,340	1,040	800	848	990	800
25	1,360	895	1,420	1,300	1,540	1,420	2,200	1,040	800	800	990	800
26	1,250	895	2,200	1,250	1,540	1,360	2,200	1,040	710	800	1,090	800
27	1,090	895	1,660	1,200	1,540	1,300	2,060	1,040	710	800	990	800
28	1,040	848	1,300	1,090	1,480	1,300	1,920	990	668	800	1,250	800
29	990	848	1,480	1,040	.....	1,200	1,790	990	668	800	1,200	755
30	990	990	2,640	1,090	.....	1,420	2,060	942	625	800	1,040	710
31	990	.....	2,640	1,420	.....	5,080	.....	942	.....	710	895	.....

NOTE.—Daily discharge determined from a rating curve well defined below 4,000 second-feet.

Monthly discharge of Etowah River near Rome, Ga., for the year ending Sept. 30, 1914.

[Drainage area, 1,800 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	3,640	755	1,110	0.617	0.71	A.
November	1,480	848	989	.549	.61	A.
December	2,640	1,040	1,370	.761	.88	A.
January	2,340	990	1,370	.761	.88	A.
February	3,820	1,090	1,830	1.02	1.06	A.
March	5,080	1,090	1,550	.861	.99	A.
April	20,600	1,250	4,550	2.53	2.82	B.
May	1,920	942	1,270	.706	.81	A.
June	2,340	625	1,050	.583	.65	A.
July	3,640	625	1,210	.672	.77	A.
August	2,960	625	1,290	.717	.83	A.
September	3,820	585	874	.486	.54	B.
The year	20,600	585	1,530	.850	11.55	

TALLAPOOSA RIVER AT STURDEVANT, ALA.

Location.—At the Central of Georgia Railway bridge, a quarter of a mile west of Sturdevant and 5 miles below mouth of Hillabee Creek.

Drainage area.—2,460 square miles.

Records available.—July 19, 1900, to September 30, 1914.

Gage.—A vertical staff gage on right bank of river about 2,000 feet above bridge; read twice daily by C. J. Stowe. The original gage was a staff in two sections attached to pier of railroad bridge. A standard chain gage installed July 10, 1905, was read until summer of 1906, when present gage was installed. Readings of new staff gage corrected to agree with readings of standard chain gage referred to its original datum at railroad bridge.

Discharge measurements.—Made from a plank walk resting on the lower members of the deck railroad bridge. Some low-water measurements made from boat.

Channel and control.—Rocky and permanent; one side deep and sluggish at low stage. Both banks overflow for about 200 feet at extremely high stages. Control, a rocky ledge across river just below bridge.

Extremes of discharge.—Maximum stage recorded during year: 9.0 feet at 6 p. m. April 15. Minimum stage recorded: 0.4 foot at 8 a. m. July 17.

Maximum stage recorded 1900–1914: 21.6 feet, March 20, 1906; discharge, 59,100 second-feet. Minimum stage recorded: —0.2 foot, October 25 to 29, 1904; discharge, 250 second-feet.

Regulation.—Pactically no effect from any of the small dams upstream.

Accuracy.—As this station has not been visited since 1911, estimates of discharge have not been prepared.

Daily gage height, in feet, of Tallapoosa River at Sturdevant, Ala., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.9	1.6	1.8	3.2	3.6	3.1	6.5	2.7	1.35	0.65	2.3	1.4
2	3.6	1.5	3.0	2.9	3.3	3.0	5.6	2.7	1.35	.5	1.9	1.3
3	2.5	1.45	3.0	3.2	2.8	2.9	4.3	2.5	1.25	2.1	1.7	1.5
4	2.0	1.45	3.0	3.0	2.3	2.7	3.6	2.3	1.4	1.25	2.0	1.7
5	1.6	1.4	2.3	2.9	2.2	2.5	3.1	2.3	2.0	.8	1.7	1.6
6	1.35	1.35	2.2	2.7	2.9	2.4	2.9	2.2	2.9	1.6	2.0	1.15
7	1.15	1.45	2.5	2.5	4.7	2.3	2.7	2.2	2.6	1.05	1.45	.95
8	1.15	1.35	2.3	2.3	6.0	2.3	3.6	2.5	2.2	.85	1.2	.75
9	1.05	1.45	2.2	2.2	4.7	2.2	4.2	2.2	2.2	.7	1.5	.6
10	1.05	1.45	2.0	2.2	3.8	2.2	3.8	2.3	1.8	1.2	4.7	.55
11	1.0	1.4	1.9	2.1	3.2	2.2	3.6	2.2	1.4	.9	3.8	.45
12	.9	1.35	1.8	2.0	2.8	3.6	3.2	2.0	2.5	1.5	2.9	.65
13	.85	1.35	1.7	1.9	2.7	3.6	2.9	1.9	1.6	1.25	5.2	1.15
14	.8	1.35	1.7	1.9	3.0	3.2	6.7	1.8	2.0	.95	4.9	2.0
15	.75	1.35	1.9	1.8	2.9	2.9	8.9	1.7	1.9	.6	3.7	1.15
16	.7	1.35	1.9	1.8	2.7	2.7	6.8	1.7	1.8	.45	2.7	.75
17	.7	1.35	1.8	1.8	2.5	2.5	5.4	1.6	1.8	1.35	2.2	.6
18	1.2	1.45	1.8	1.8	2.3	2.3	4.2	1.7	2.0	4.7	1.9	.65
19	3.1	1.45	1.7	1.8	2.4	2.2	4.0	1.7	3.4	3.4	1.5	.95
20	3.4	1.45	1.7	1.8	2.7	2.4	5.0	1.7	2.3	2.9	1.3	.75
21	2.8	1.45	1.7	1.8	3.0	2.7	5.0	1.6	2.4	2.5	1.45	.85
22	2.4	1.35	1.7	1.9	2.9	2.7	4.2	1.6	2.0	2.0	1.3	2.0
23	2.5	1.35	1.7	1.8	2.7	2.7	3.6	1.5	1.6	1.25	1.45	1.6
24	3.9	1.35	1.7	1.9	2.5	2.5	3.2	1.45	1.3	.95	2.2	1.35
25	3.4	1.25	2.0	1.8	2.3	2.3	3.0	1.35	1.05	.8	1.7	1.1
26	2.9	1.25	2.2	2.2	2.5	2.4	2.9	1.35	.8	.8	1.4	1.0
27	2.4	1.25	2.2	2.2	2.7	2.4	2.7	1.25	.6	.8	2.6	1.0
28	2.2	1.35	2.0	2.1	3.0	2.4	2.5	1.25	.6	.75	2.0	.85
29	1.8	1.45	3.6	2.1	.....	2.5	2.5	1.15	.8	2.4	1.4	.75
30	1.7	1.4	3.8	2.5	.....	2.5	2.7	1.15	.85	2.9	1.3	.75
31	1.7	.....	3.8	3.8	.....	4.9	.....	1.25	.....	3.0	1.8	.....

TALLAPOOSA RIVER AT CHEROKEE BLUFFS, NEAR TALLASSEE, ALA.

Location.—One-fourth mile below mouth of Wind Creek; 600 feet above Double Bridge ferry; three-fourths mile below the site of the Alabama Power Co.'s proposed dam at Cherokee Bluffs; about 10 miles upstream from Tallassee, and about 23 miles downstream from the United States Geological Survey gaging station at Sturdevant, Ala.

Drainage area.—2,970 square miles (determined by the Alabama Power Co.).

Records available.—July 1, 1912, to September 14, 1914.

Gage.—Vertical staff on right bank fastened to a 3-inch iron pipe embedded at its lower end in a concrete pier which is carried down to solid rock. Prior to August 10, 1913, a temporary vertical staff gage located about 35 feet below Double Bridge ferry. All gage readings have been reduced to the datum of the present gage (sea-level elevation of zero, 339.73 feet).

Discharge measurements.—Made from a cable about 550 feet downstream from gage.

Channel and control.—Channel bed at cable section composed partly of sand and partly of rock; somewhat shifting. A rocky island opposite the gage divides the channel into two parts. Control is formed by a rock shoal about 1,500 feet below gage.

Extremes of discharge.—Maximum mean daily stage recorded during year: 2.8 feet, April 15; discharge, 17,800 second-feet. Minimum mean daily stage recorded: —0.8 foot, October 17; discharge, 340 second-feet.

Maximum mean daily stage recorded 1912–1914: 5.0 feet, January 28 and March 14, 1913; discharge, 33,200 second-feet. Minimum stage recorded: —0.8 foot, October 17, 1913; discharge, 340 second-feet.

Regulation.—Small mills above may cause some slight diurnal fluctuation.

Accuracy.—Estimates of flow published in the following tables have been computed by engineers of the United States Geological Survey from records of daily gage height and results of discharge measurements collected by the Alabama Power Co. It should be noted that the rating curve used in making these estimates is based on numerous discharge measurements made by the single-point method according to the methods of the Alabama Power Co., and has not been checked by discharge measurements made by engineers of the United States Geological Survey. Accuracy of estimates considered only fair because of the wide variations in the results of discharge measurements made at the same stage. Estimates for low stages should be used with caution.

Cooperation.—The daily gage-height record, results of discharge measurements, and data for the description of this station have been furnished by the Alabama Power Co.

Discharge measurements of Tallapoosa River at Cherokee Bluffs, near Tallassee, Ala., during the years ending Sept. 30, 1913–14.

[Made by engineers of the Alabama Power Co.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1912–13.	*Feet.*	*Sec.-ft.*	1913–14.	*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 9	0.1	2,670	Nov. 10	−0.5	1,180	Apr. 17	1.62	9,790
10	.1	2,390	12	− .5	1,190	17	1.60	9,550
10	.1	2,350	12	− .5	1,110	17	1.52	9,590
10	.1	2,900	12	− .5	1,090	17	1.42	8,490
10	.1	2,540	13	− .5	1,200	17	1.37	8,500
11	.1	2,630	13	− .5	1,220	17	.90	5,870
12	.1	2,780	13	− .5	1,110	18	.87	5,480
12	.1	2,740	14	− .5	1,210	18	.80	5,990
12	.1	2,860	14	− .5	1,050	May 22	−.40	807
12	.1	2,930	14	− .5	1,240	23	−.45	639
July 30	.1	1,770	Apr. 10	.95	6,270	23	−.45	807
Aug. 1	−.1	2,050	11	.8	4,830	23	−.45	809
1	−.1	2,270	11	.8	4,280	23	−.45	808
2	.2	2,470	11	.8	4,490	23	−.50	335
2	.3	2,920	13	.2	2,930	25	−.50	623
2	.3	2,850	13	.2	2,850	25	−.50	706
4	.7	3,930	14	1.4	7,950	25	−.50	695
4	.7	3,720	14	1.85	10,800	June 10	−.22	1,310
4	.4	3,670	14	2.4	14,900	11	−.38	1,140
4	.4	3,120	15	2.85	17,900	12	−.50	715
5	−.07	1,830	15	2.9	18,500	13	−.27	1,314
7	−.4	1,380	15	2.95	19,100	15	−.39	1,230
8	.0	2,050	15	3.0	19,300	16	−.47	740
8	.05	2,270	15	3.0	20,000	16	−.40	1,070
8	−.05	2,010	16	2.45	15,100	16	−.34	1,360
8	−.05	1,840	16	2.35	14,300	17	−.15	1,650
9	−.45	956	16	2.32	14,400			
9	−.5	1,380	16	2.20	13,900			
9	−.4	1,140	16	2.20	14,000			
9	−.4	1,000	17	1.70	10,300			

NOTE.—The results of the above discharge measurements were furnished by the Alabama Power Co. Three significant figures have been used in publishing the discharge.

Daily discharge, in second-feet, of Tallapoosa River at Cherokee Bluffs, near Tallassee, Ala., for the years ending Sept. 30, 1912–1914.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1912.				1912.				1912.			
1	7,760	1,600	1,340	11	6,600	6,080	1,110	21	3,140	2,180	900
2	7,340	1,600	1,340	12	4,700	5,140	1,110	22	2,480	2,180	900
3	6,920	2,180	1,340	13	4,700	4,280	1,110	23	2,180	2,180	9,000
4	6,500	2,800	1,600	14	7,760	2,800	1,340	24	2,180	2,180	10,900
5	6,080	2,480	1,600	15	5,140	2,800	1,880	25	2,180	2,800	6,080
6	4,280	5,140	1,600	16	4,280	2,800	1,880	26	2,180	1,880	3,880
7	5,140	12,200	1,600	17	17,800	2,800	2,180	27	2,180	2,480	2,180
8	3,140	6,080	1,110	18	7,760	6,600	1,600	28	1,880	1,880	4,280
9	9,640	10,300	1,110	19	5,140	6,600	1,340	29	1,880	1,880	3,480
10	5,140	7,760	1,110	20	4,280	4,280	1,110	30	1,880	2,180	2,680
								31	1,600	1,600	.....

Daily discharge, in second-feet, of Tallapoosa River at Cherokee Bluffs, near Tallassee, Ala., for the years ending Sep. 30, 1912–1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	1,880	1,340	1,810	3,500	11,600	15,000	9,000	6,080	1,600	2,480	1,600	1,340
2	1,340	1,600	2,020	3,500	6,080	9,000	9,640	3,500	1,880	2,800	2,800	2,180
3	1,600	1,600	2,230	3,500	13,600	6,080	5,600	2,800	2,480	1,880	3,880	1,600
4	1,600	1,340	2,440	3,500	19,200	5,140	5,600	2,800	3,880	1,340	3,880	1,110
5	2,180	1,340	2,660	3,500	12,200	5,140	5,600	2,480	3,140	1,340	1,880	1,110
6	7,760	1,340	2,870	3,500	7,760	4,280	5,140	2,480	2,480	1,340	1,340	2,180
7	4,700	2,480	3,080	6,080	5,600	4,280	4,700	2,480	3,500	1,340	1,110	2,800
8	2,480	2,280	3,290	2,800	5,140	3,880	4,700	2,480	9,640	1,110	1,880	1,600
9	1,880	2,080	3,500	3,140	4,700	3,880	4,700	2,480	6,080	900	1,110	1,340
10	1,600	1,880	3,140	3,140	4,280	17,100	4,700	2,480	4,700	900	1,340	900
11	1,600	1,600	2,800	3,140	3,140	21,300	5,600	2,480	3,880	1,110	1,340	1,600
12	1,340	1,340	2,800	3,140	4,700	14,300	5,600	2,480	2,800	2,800	1,600	1,880
13	1,110	1,340	2,480	8,360	4,280	30,400	4,700	2,180	2,480	6,600	1,340	1,340
14	900	1,340	2,480	10,300	4,280	33,200	4,280	2,180	2,480	4,700	900	1,110
15	1,110	1,600	2,180	10,900	4,700	29,700	4,280	2,180	1,880	2,800	1,110	1,110
16	1,600	1,600	2,180	6,600	4,280	21,300	4,280	2,180	1,880	2,480	2,180	1,340
17	1,600	1,340	2,180	3,880	3,880	14,300	3,880	3,880	1,600	2,180	1,340	1,110
18	1,340	1,600	2,480	2,800	3,500	9,640	3,880	3,880	1,600	1,880	1,880	900
19	4,280	1,340	2,480	2,800	3,500	9,000	3,880	2,800	1,600	1,110	1,340	900
20	5,600	1,340	3,140	3,500	4,700	7,160	3,500	2,480	1,340	1,110	900	900
21	4,700	1,340	3,500	3,140	6,080	15,000	3,500	2,180	1,340	2,180	700	1,600
22	2,800	1,340	2,800	5,600	8,360	19,200	3,500	2,180	1,340	1,880	700	1,600
23	2,800	1,110	3,500	2,800	6,600	12,200	3,140	3,880	1,600	2,480	900	1,600
24	1,880	1,340	11,600	3,140	5,600	8,360	3,140	6,600	1,600	3,140	1,600	1,110
25	2,180	1,600	10,900	11,600	4,280	6,600	3,140	5,600	1,340	3,500	1,340	900
26	1,600	1,340	5,140	8,360	3,880	6,600	3,140	3,880	1,340	2,800	900	900
27	1,600	1,600	4,700	32,500	8,360	27,600	3,500	2,800	1,110	2,480	700	700
28	1,600	1,340	4,280	33,200	13,600	20,600	3,140	2,180	1,110	2,180	700	700
29	1,340	1,340	3,880	19,200	.....	14,300	3,140	2,180	1,340	2,180	510	510
30	1,110	1,600	3,500	13,600	.....	11,600	3,140	1,880	1,110	2,800	787	2,180
31	1,340	.....	3,880	10,900	.....	9,640	.....	1,880	.....	1,880	1,060	.....
1913–14.												
1	3,500	1,110	1,340	3,140	3,880	3,140	9,640	2,180	962	5,140	2,800	3,500
2	3,500	1,110	2,800	2,800	3,140	3,140	9,640	2,480	1,220	5,600	2,800	2,800
3	2,180	1,110	3,500	3,880	2,800	2,800	4,280	2,180	1,490	4,280	3,500	3,500
4	1,600	1,110	2,480	3,140	2,180	2,480	3,140	1,880	1,750	3,500	3,500	3,500
5	1,340	1,110	1,880	3,140	1,880	2,180	3,140	1,880	2,010	3,500	3,500	3,880
6	1,110	1,110	1,600	2,800	1,880	2,180	2,800	1,880	2,280	3,500	3,500	4,280
7	900	1,110	1,880	2,180	3,500	2,180	2,480	2,180	2,540	4,280	3,500	4,280
8	700	900	1,880	1,880	9,000	1,880	4,280	1,880	2,800	5,140	3,880	5,140
9	700	900	1,880	1,880	6,080	1,880	5,140	1,880	2,480	5,140	3,500	5,140
10	700	900	1,880	1,880	4,280	1,880	5,140	2,180	2,800	5,140	6,080	6,080
11	700	900	1,880	1,600	3,140	1,880	3,880	1,600	3,500	5,140	4,280	6,080
12	700	900	1,880	1,600	2,800	4,280	2,800	1,600	3,880	4,700	2,800	4,280
13	510	900	1,880	1,600	2,480	4,280	2,800	1,600	3,500	3,880	5,140	4,700
14	510	900	1,340	1,600	2,800	3,140	10,900	1,340	2,800	4,700	6,080	3,500
15	510	900	1,600	1,340	2,800	2,800	17,800	1,110	3,500	5,140	5,140	.....
16	510	900	1,600	1,340	2,480	2,480	14,300	1,110	4,280	5,600	2,800	.....
17	340	900	1,340	1,340	2,180	2,180	8,360	1,110	3,500	5,600	2,480	.....
18	510	900	1,340	1,340	2,180	2,180	5,140	1,110	3,140	4,700	3,140	.....
19	1,600	900	1,340	1,340	2,180	2,180	5,140	1,110	2,800	4,700	3,500	.....
20	3,880	900	1,340	1,340	2,180	2,180	6,600	1,110	2,480	3,140	3,500	.....
21	3,880	900	1,340	1,340	2,800	2,480	6,600	1,110	2,180	2,180	2,800	.....
22	1,880	900	1,340	1,600	2,800	2,480	5,140	900	2,800	2,800	2,800	.....
23	1,600	900	1,340	1,600	2,480	2,480	3,880	900	3,500	4,280	3,500	.....
24	5,600	900	1,340	1,600	2,180	2,180	3,140	900	3,880	4,280	3,140	.....
25	5,140	900	1,880	1,880	2,180	2,180	2,800	900	4,280	5,140	3,500	.....
26	3,140	900	1,880	1,880	2,180	2,180	2,800	900	3,880	5,140	3,500	.....
27	2,800	900	1,880	1,880	2,480	2,180	2,480	700	5,140	5,600	2,800	.....
28	1,600	900	1,600	1,600	2,480	2,180	2,180	700	5,140	5,600	2,480	.....
29	1,480	1,110	4,700	1,600	.....	2,180	2,180	700	5,140	5,140	2,800	.....
30	1,360	1,110	4,280	1,880	.....	2,180	2,180	700	4,700	2,480	3,500	.....
31	1,230	.....	4,280	3,880	.....	10,900	.....	700	.....	2,800	3,880	.....

NOTE.—Daily discharge determined from a rating curve fairly well defined between 1,100 and 19,000 second-feet. Beyond these limits the rating curve has been extended. Estimates below 1,100 second-feet should be used with caution. Discharge, July 2–4, Sept. 29, 30, Nov. 8, 9, and Dec. 1–8, 1912, Aug. 30, 31, and Oct. 29–31, 1913, and June 1–7, 1914, interpolated. See "Accuracy" in station description.

Monthly discharge of Tallapoosa River at Cherokee Bluffs, near Tallassee, Ala., for the years ending Sept. 30, 1912–1914.

[Drainage area, 2,970 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1912.					
July	17,800	1,600	4,960	1.67	1.92
August	12,200	1,600	3,860	1.30	1.50
September	10,900	900	2,420	.815	.91
1912–13.					
October	7,760	900	2,270	.764	.88
November	2,480	1,110	1,520	.512	.57
December	11,600	1,810	3,550	1.20	1.38
January	33,200	2,800	7,600	2.56	2.05
February	19,200	3,140	6,710	2.26	2.35
March	33,200	3,880	13,400	4.51	5.20
April	9,640	3,140	4,520	1.52	1.70
May	6,600	1,880	2,970	1.00	1.15
June	9,640	1,110	2,470	.832	.93
July	6,600	900	2,250	.758	.87
August	3,880	510	1,440	.485	.56
September	2,800	510	1,340	.451	.50
The year	33,200	510	4,170	1.40	19.04
1913–14.					
October	5,600	340	1,800	.606	.70
November	1,110	900	963	.324	.36
December	4,700	1,340	2,020	.680	.78
January	3,880	1,340	2,000	.673	.78
February	9,000	1,880	2,980	1.00	1.04
March	10,900	1,880	2,740	.923	1.06
April	17,800	2,180	5,360	1.80	2.01
May	2,480	700	1,370	.461	.53
June	5,140	962	3,150	1.06	1.18
July	5,600	2,180	4,450	1.50	1.73
August	6,080	2,480	3,550	1.20	1.38
September 1–14	6,080	2,800	4,330	1.46	.76

LITTLE TALLAPOOSA RIVER NEAR WEDOWEE, ALA.

Location.—Just above highway bridge 6 miles northwest of Wedowee and about 4 miles above junction with Tallapoosa River. Wedowee Creek enters from the left 2 miles above gage.

Drainage area.—Not measured.

Records available.—August 29, 1913, to July 8, 1914, when station was discontinued. Three discharge measurements were made in 1904.

Gage.—Vertical staff on right bank near upper side of bridge; read twice daily by Elbert Cummings.

Discharge measurements.—From a single-span highway bridge about 20 feet below gage.

Channel and control.—Section under bridge is somewhat shifting, but discharge relation is kept constant by a rock ledge extending across river about 100 feet below gage and forming the control. During low and medium stages water pours sharply over the ledge. The point of zero flow, as determined by lowest point on control, is approximately at gage height −0.5 foot.

Extremes of discharge.—Maximum stage recorded August 29, 1913, to July 8, 1914: 8.7 feet at 5 p. m. April 14, 1914. Minimum stage recorded: 0.6 foot at 4 p. m. October 16 and 5 p. m. October 17, 1913.

Regulation.—Mills above cause considerable diurnal fluctuation.

Accuracy.—Daily gage-height records poor, owing to class of observers available.

Data insufficient for estimates of discharge.

Discharge measurements of Little Tallapoosa River near Wedowee, Ala., during the years ending Sept. 30, 1905–1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1904–5.		*Feet.*	*Sec.-ft.*	1912–13.		*Feet.*	*Sec.-ft.*
Nov. 4	J. M. Giles	[a] 0.48	124	Aug. 29	Warren E. Hall	0.60	165
Dec. 14	do	[a] .80	211				
15	do	[a] .80	214	1913–14.			
				Oct. 16	B. M. Hall, jr	.58	159

[a] Gage height published in Water-Supply Paper 127, page 157, has been decreased 0.22 foot in order to reduce it to datum of gage used during 1913 and 1914.

Daily gage height, in feet, of Little Tallapoosa River near Wedowee, Ala., for the year ending Sept. 30, 1914.

[Elbert Cummings, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	2.05	1.0	2.0	1.65	2.25	1.85	4.8	3.9	1.0
2	1.65	.9	2.6	1.65	1.9	1.85	4.25	5.7	1.0
3	1.05	.95	1.8	1.85	1.5	1.45	2.9	4.4	1.0
4	1.05	.95	2.7	1.95	1.2	1.7	2.25	3.95	2.3
5	1.55	.9	1.95	1.75	1.2	1.45	1.85	1.0	1.65
6	1.7	.85	1.65	1.5	2.6	1.55	1.75	3.6	1.8
7	2.05	.9	2.4	1.5	4.9	1.45	1.55	1.0	1.3
8	1.05	1.0	1.25	1.45	4.3	1.4	1.85	3.65	1.3
9	1.05	1.05	1.0	1.0	3.3	1.35	3.35	2.0	1.3
0	1.0	1.05	1.4	1.0	2.5	1.45	2.45	4.5	1.15
11	1.0	.95	1.2	1.25	2.0	1.85	2.2	2.0	1.0
12	1.0	.9	1.0	1.25	1.95	2.35	1.9	2.0	.9
13	1.05	.85	1.0	1.45	1.85	2.3	1.45	5.5	.85
14	1.1	.85	1.7	1.4	2.05	2.0	6.5	1.15	.8
15	1.0	.9	1.4	1.35	1.6	1.75	6.5	1.2	1.0
16	.8	.85	1.4	1.15	1.8	1.55	5.2	1.2	1.15
17	.65	.95	1.35	1.0	1.55	1.5	4.35	1.0	.85
18	1.0	.85	1.35	1.1	1.45	1.35	3.3	1.1	1.25
19	2.75	.9	1.0	.95	1.4	1.4	2.9	2.1	1.75
20	2.1	.85	1.0	1.05	2.15	1.75	5.7	1.1	1.05
21	1.2	.8	1.15	1.2	2.05	1.85	4.3	1.2	1.1
22	1.35	.85	1.0	1.1	1.7	1.4	3.3	1.2	1.25
23	1.25	.9	.95	1.0	1.75	1.25	2.6	1.05	1.15
24	2.85	.8	.9	1.7	1.95	1.3	2.05	1.0	.85
25	2.25	.85	1.05	2.55	1.45	1.4	2.0	1.0	.7
26	1.65	.9	.9	2.7	1.75	1.55	2.05	1.0	.8
27	1.3	.8	.85	2.05	1.45	1.65	1.9	1.0	.9
28	1.15	.9	1.15	1.6	1.65	1.7	1.7	1.0	.95
29	1.2	.9	2.0	1.15	.....	1.55	4.25	1.0	.95
30	1.15	1.0	2.45	1.7	.....	1.45	4.6	1.0	.85
31	1.05	.....	2.5	1.75	.....	3.15	.....	1.0	.....

MISCELLANEOUS MEASUREMENTS.

Miscellaneous measurements in south Atlantic and eastern Gulf of Mexico basins in the year ending Sept. 30, 1914.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Apr. 19	Beaver Island Creek...	Dan River.....	Highway bridge at McMichael's mill, near Madison, N. C.	.....	27
30	Tallulah River.....	Savannah River.....	Three-fourths of a mile upstream from gaging station at Mathis, Ga.	7.18	388
30	Tiger Creek.....	Tallulah River.....	400 feet above mouth.....	.....	[a] 64
30	.....do.....	.....do.....	Half a mile above mouth....	.....	[b] 34.2
July 13	Intrenchment sewage plant.	Intrenchment Creek...	At inlet channel to Imhoff tanks, Atlanta, Ga.	.....	7.4
May 25	Oconee River.....	Altamaha River.....	At cemetery steel highway bridge, Athens, Ga.	1.02	24.7
25	.....do.....	.....do.....	.....do.....	1.93	126
25	.....do.....	.....do.....	.....do.....	1.99	135
Sept. 15	.....do.....	.....do.....	.....do.....	1.72	96.5
Oct. 31	Peachtree sewage plant.	Peachtree Creek.....	At inlet to Imhoff tanks, Atlanta, Ga.	.....	20.7
31	Proctor sewage plant...	Proctor Creek.....	.....do.....	1.55	5
Dec. 16	Sharp Mountain Creek.	Etowah River.....	1 mile above mouth.....	.....	45
Feb. 27	Coosawattee River.....	Oostanaula River.....	At old gaging station, near Carters, Ga.	1.72	581

[a] Corn mill, 200 feet upstream, running at full capacity; flow not natural.
[b] This represents natural flow of creek.

INDEX.

STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

PART II. SOUTH ATLANTIC AND EASTERN GULF OF MEXICO BASINS

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, 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 basins.
II. South Atlantic and eastern Gulf of Mexico basins.
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.
IX. Colorado River basin.
X. Great basin.
XI. Pacific basins in California.
XII. North Pacific basins.

HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED.

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

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

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

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

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

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

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

STREAM-FLOW REPORTS.

Stream-flow records have been obtained at more than 3,400 points in the United States, and the data obtained have been published in the reports tabulated below:

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

[A=Annual Report; B=Bulletin; 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.

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

Report.	Character of data.	Year.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	1905.
W 201 to 214	do	1906.
W 241 to 252	do	1907–8.
W 261 to 272	do	1909.
W 281 to 292	do	1910.
W 301 to 312	do	1911.
W 321 to 332	do	1912.
W 351 to 362	do	1913.
W 381 to 394	do	1914.

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

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

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

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

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

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Estimates for 1899 in Twenty-first Annual Report, Part IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohave River only.
[f] Kings and Kern rivers and south Pacific coast basins.
[g] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Estimates for 1900 in Twenty-second Annual Report, Part IV.
[h] Wissahickon and Schuylkill rivers to James River.
[i] Scioto River.
[j] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries to St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers.
[r] Great Basin in California except Truckee and Carson river basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz rivers only.

In these papers and in the following lists the stations are arranged in downstream order. The main stem of any river is determined by measuring or estimating its drainage area—that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. All stations from the source to the mouth of the main stem of the river are presented first, and the tributaries in regular order from source to mouth follow, the streams in each tributary basin being listed before those of the next basin below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated on page III, and in the records for large lakes, where it is simpler to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

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

PRINCIPAL STREAMS.

The south Atlantic coast 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 a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects, and also brief references to reports published by State and other organizations. (See p. XVII.)

GAGING STATIONS.[1]

NOTE.—Dash after a date indicates that station was being maintained September 30, 1914. Period after a date indicates discontinuance.

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–
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 Randolph, Va., 1900–1906.
Roanoke River above Dan River, at Clarksville, Va., 1895–1898.
Roanoke River at Old Gaston, N. C., 1912–
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 at Madison, N. C., 1903–1908.
Dan River at South Boston, Va., 1900–1907.
Dan River at Clarksville, Va., 1895–1898.
Banister River at Houston, Va., 1904–5.

[1] York River, Va., to Pearl River, Miss.

TAR RIVER BASIN.

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

NEUSE RIVER BASIN.

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

CAPE FEAR BASIN.

Haw River (head of Cape Fear River) near Moncure, N. C., 1898–9.
Cape Fear River near Fayetteville, N. C., 1889–1903.
Deep River near Cumnock, N. C., 1900–1902.
Deep River near Moncure, N. C., 1898–9.
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.
Yadkin River at Siloam, N. C., 1900–1901.
Yadkin River near Donnaha, N. C., 1913–
Yadkin River near Salisbury, N. C., 1895–1909; 1911–
Yadkin River near Norwood, N. C., 1896–1899.
Yadkin River near Peedee, N. C., 1906–1912.
Peedee River at Cheraw, S. C., 1909–1912.

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 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.
Mill Creek at Old Fort, N. C., 1907.
Linville River at Fonta Flora, N. C., 1907–8.
Linville River near Bridgewater, N. C., 1900.
John River at Collettsville, N. C., 1907.
John River near Morganton, N. C., 1900–1901.
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.

SAVANNAH RIVER BASIN.

Chattooga River (head of Savannah) near Clayton, Ga., 1907–8.
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., 1899–1906.
Stekoa Creek near Clayton, Ga., 1907–8.
Tallulah River at Mathis, Ga., 1912–

Savannah River tributaries—Continued.
Tallulah River at Tallulah Falls, Ga., 1900–1901; 1904–1912.
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.
Canoochee River near Groveland, Ga., 1903–1907.

ALTAMAHA RIVER BASIN.

South River (head of Ocmulgee River, which is head of Altamaha) near Lithonia, Ga., 1903–4.
Ocmulgee River near Jackson, Ga., 1906–
Ocmulgee River near Flovilla, Ga., 1901–1905.
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.
Oconee River at Fraleys Ferry, near Milledgeville, Ga., 1905–1908; 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.
Ohoopee River near Reidsville, Ga., 1903–1907.

ST. JOHNS RIVER BASIN.

Silver Spring 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 near White Springs, Fla., 1906–1908.

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.
Chattahoochee River near Buford, Ga., 1901.
Chattahoochee River near Norcross, Ga., 1903–
Chattahoochee River at Oakdale, Ga., 1895–1904.
Chattahoochee River at West Point, Ga., 1896–1910; 1912–
Chattahoochee River at Columbus, Ga., 1912.

Chattahoochee River at Alaga, Ala., 1908–1912.
Soque River near Demorest, Ga., 1904–1909.
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., 1902–
Flint River at Bainbridge, Ga., 1908–
Kinchafoonee Creek near Leesburg, Ga., 1905–1909.
Kinchafoonee Creek near Albany, Ga., 1903.
Muckalee Creek near Albany, Ga., 1903.
Ichawaynochaway Creek at Milford, Ga., 1905–1907.
Chipola River at Altha, Fla., 1912–13.

CHOCTAWHATCHEE RIVER BASIN.

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

ESCAMBIA RIVER BASIN.

Conecuh River at Beck, Ala., 1904–

MOBILE RIVER BASIN.

Cartecay River (head of Mobile River) near Cartecay, Ga., 1904–5; 1907.
Coosawattee River (continuation of Cartecay River) at Carters, Ga., 1892–1908.
Oostanaula River (continuation of Coosawattee River) at Resaca, Ga., 1896–1901; 1905–
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–
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., 1914.
Coosa River at Lock No. 18, near Wetumpka, Ala., 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.
Conasauga River at Beaverdale, Ga., 1907–8.
Etowah River near Ball Ground, Ga., 1907–
Etowah River at Canton, Ga., 1892–1905.
Etowah River near Rome, Ga., 1904–
Etowah River at Rome, Ga., 1903.
Amicalola River near Potts Mountain, Ga., 1907–8; 1910–1913.
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.

Alabama River tributaries—Continued.
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.
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 are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased (at price noted) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Omission of the price indicates that the report is not obtainable from Government sources. Water-supply papers are of octavo size.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11 pls. 15c.

Gives elevations and distances along rivers of the United States, and brief descriptions of many of the streams, including Roanoke, Cape Fear, Pedee, 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. (See No. 149.) 5c.

61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.

Nos. 57 and 61 contain information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" give information concerning temperature, quality of water, purposes of boring, etc. The lists are arranged by States, and the States are arranged alphabetically. A second edition was published as Water-Suppy Paper 149 (q. v.).

62. Hydrography of the southern Appalachian Mountain region, Part I, by H. A. Pressey. 1902. 95 pp., 25 pls. 15c.

63. Hydrography of the southern Appalachian Mountain region, Part II, by H. A. Pressey. 1902. pp. 96–190, pls. 26–44. 15c.

Nos. 62 and 63 describe in a general way the mountains, rivers, climate, forests, soil, vegetation, and mineral resources of the southern Appalachian Mountains, and then discuss in detail the drainage basins, giving for each an account of the physical features, rainfall, forests, minerals, transportation, discharge measurements, and water powers. Most of the streams described are tributary through Tennessee River to the Ohio, but Part II (No. 63) includes also descriptions of several streams in the south Atlantic and eastern Gulf of Mexico drainage basins.

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.

102. Contributions to the hydrology of eastern United States, 1903; M. L. Fuller, geologist in charge. 1904. 522 pp. 30c.

Contains brief reports on municipal water supplies, wells, and springs of Georgia, 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.

*107. Water powers of Alabama, with an appendix on stream measurements in Mississippi, by B. M. Hall. 1904. 253 pp., 9 pls. 20c.

Contains gage heights, rating tables, estimates of monthly discharge at stations on Tallapoosa, Coosa, Alabama, Cahaba, Black Warrior, 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. 10c.

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. 25c.

Contains brief reports relating to south Atlantic and eastern Gulf of Mexico drainage areas, as follows:

North Carolina, by M. L. Fuller.
South Carolina, by L. C. Glenn.
Georgia, by S. W. McCallie.
Florida, by M. L. Fuller.
Alabama, by E. A. Smith.

Each of these reports describes the geology of the area in its relation to water supplies; notes the principal mineral springs, and gives list of pertinent publications.

115. River surveys and profiles made during 1903, by W. C. Hall and J. C. Hoyt. 1905. 115 pp., 4 pls. 10c.

Contains results of surveys made to determine location of undeveloped power sites. Gives elevations and distances along 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. 10c.

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.

159. Summary of the underground-water resources of Mississippi, by A. F. Crider and L. C. Johnson. 1906. 88 pp., 6 pls. 20c.

Describes geography, topography, and general geology of the State; discusses the source, depth of penetration, rate of percolation, and recovery of underground waters; artesian requisites, and special conditions in the Coastal Plain formations; gives notes on wells by counties, deep well records, and selected records in detail; treats of sanitary aspect 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; also index to literature on floods on American streams.

*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 waters east of the one hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.

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

319. Geology and underground waters of Florida, by George Charlton Matson and Samuel Sanford. 1913. 444 pp., 17 pls. 60c.

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 underground 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. 539 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.

ANNUAL REPORTS.

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

Annual reports are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*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. 255–339. Pls. VI–XIX. 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 the eastern United States, by W J McGee, pp. 1–47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

PROFESSIONAL PAPERS.

Professional papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked with an asterisk may, however, be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Professional papers are of quarto size.

37. The southern Appalachian forests, by H. B. Ayres and W. W. Ashe. 1905. 291 pp., 37 pls. 80c.

Describes the relief, drainage, climate, natural resources, scenery, and water supply of the southern Appalachian forests, the trees, shrubs, and rate of growth; gives details concerning forests by drainage basins, including New, Holston (southern tributaries of South Fork only), Watauga, Nolichucky, French Broad, Pigeon, Little Tennessee, Hiwassee, Tallulah-Chattooga Toxaway, Saluda and First and Second Broad rivers, Catawba and Yadkin rivers, describing, many of the tributaries of each of the master streams.

72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate and population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee river basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chattahoochee, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

BULLETINS.

An asterisk (*) indicates that the Geological Survey's stock of the paper is exhausted. Many of the papers so marked may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Bulletins are of octavo size.

*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. 10c.

Discusses the importance of accurate well records, to the driller, to owners of oil, gas, and water wells, and to the geologist; describes the general methods of work; gives tabulated records of wells in Alabama, Florida, Georgia, 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. 25c.

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; Aiken, Barnwell, Charleston, Hampton, Lee, and Orangeburg counties, South Carolina; and Hancock, Harrison, Jackson, Marshall, Newton, and Panola counties, Mississippi. 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.[1] The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute a Geologic Atlas of the United States.

A folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. Each folio includes maps showing the topography, geology, underground structure, and mineral deposits of the area mapped and several pages of descriptive text. The text explains the maps and describes the topographic and geologic features of the country and its mineral products. The topographic map shows roads, railroads, waterways, and, by contour lines, the shapes of the hills and valleys and the height above sea level of all points in the quadrangle. The areal-geology map shows the distribution of the various rocks at the surface. The structural-geology map shows the relations of the rocks to one another underground. The economic-geology map indicates the location of mineral deposits that are commercially valuable. The artesian-water map shows the depth to underground-water horizons. Economic-geology and artesian-water maps are included in folios if the conditions in the areas mapped warrant their publication. The folios are of special interest to students of geography and geology and are valuable as guides in the development and utilization of mineral resources.

The folios numbered from 1 to 163, inclusive, are published in only one form (18 by 22 inches), called the library edition. Some of the folios that bear numbers higher than 163 are published also in an octavo edition (6 by 9 inches). Owing to a fire in the Geological Survey building May 18, 1913, the stock of geologic folios was more or less damaged by fire and water, but 80 or 90 per cent of the folios are usable. They will be sold at the uniform price of 5 cents each, with no reduction for wholesale orders. This rate applies to folios in stock from 1 to 184, inclusive (except reprints), also to the library edition of folio 186. The library edition of folios 185, 187, and higher numbers sells for 25 cents a copy, except that some folios which contain an unusually large amount of matter sell at higher prices. The octavo edition of folio 185 and higher numbers sells for 50 cents a copy, except folio 193, which sells for 75 cents a copy. A discount of 40 per cent is allowed on an order for folios or for folios together with topographic maps amounting to $5 or more at the retail rate.

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

80. Norfolk, Virginia-North Carolina. 5c.

Describes the plains, Dismal Swamp, and the tidal marshes; discusses the reclamation of swamp lands and gives an account of the underground 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. 5c.

Under "Mineral resources" discusses water power.

124. Mount Mitchell, North Carolina. 5c.

Under "Economic geology" describes water powers and the various sources of water used for industrial and domestic supplies.

147. Pisgah, North Carolina-South Carolina. 5c.

Under "Economic geology" discusses streams, water powers, and underground waters.

[1] 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. Geological Survey, Washington, D. C.

175. Birmingham, Alabama.[1] 5c.

Describes the topography and geology of an area mainly in Jefferson and Blount counties, but including small parts of Walker and Cullman counties and St. Clair and Shelby counties, Under "Economic geology" discusses underground water, surface water, and water power.

187. Ellijay, Georgia-North Carolina-Tennessee.[2] 25c.

"The drainage of the Ellijay quadrangle reaches the Gulf of Mexico by three widely divergent routes. More than half of the area is drained northeastward into the Tennessee and nearly all of the remainder southwestward into the Coosa-Alabama system, but a small part of the southeast corner is drained directly to the Gulf by the Chattahoochee system." The folio contains brief mention of the mineral springs and the water powers of the area.

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 reports 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.

Water powers of Georgia, by B. M. Hall: Georgia Geol. Survey Bull. 3-A, 1896.

Artesian-well system of Georgia, by S. W. McCallie: Georgia Geol. Survey Bull. 7, 1898.

Underground waters of Georgia, by S. W. McCallie: Georgia Geol. Survey Bull. 15, 1908.

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. 30, 1913.

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 Congress, 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.

[1] Octavo edition only.

[2] Octavo edition, 50c.

GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTEREST.

The following list comprises reports not readily classifiable by drainage basins and covering a wide range of hydrologic investigations:

WATER-SUPPLY PAPERS.

*1. Pumping water for irrigation, by H. M. Wilson. 1896. 57 pp., 9 pls.

Describes pumps and motive powers, windmills, water wheels, and various kinds of engines; also storage reservoirs to retain pumped water until needed for irrigation.

*3. Sewage irrigation, by G. W. Rafter. 1897. 100 pp., 4 pls. (See Water-Supply Paper 22.) 10c.

Discusses methods of sewage disposal by intermittent filtration and by irrigation; describes utilization of sewage in Germany, England, and France, and sewage purification in the United States.

*8. Windmills for irrigation, by E. C. Murphy. 1897. 49 pp., 8 pls. 10c.

Gives results of experimental tests of windmills during the summer of 1896 in the vicinity of Garden, Kansas; describes instruments and methods and draws conclusions.

*14. New tests of certain pumps and water lifts used in irrigation, by O. P. Hood. 1898. 91 pp., 1 pl. 10c.

Discusses efficiency of pumps and water lifts of various types.

*20. Experiments with windmills, by T. O. Perry. 1899. 97 pp., 12 pls. 15c.

Includes tables and descriptions of wind wheels, makes comparisons of wheels of several types, and discusses results.

*22. Sewage irrigation, Part II, by G. W. Rafter. 1899. 100 pp., 7 pls. 15c.

Gives résumé of Water-Supply Paper No. 3; discusses pollution of certain streams, experiments on purification of factory wastes in Massachusetts, value of commercial fertilizers, and describes American sewage-disposal plants by States; contains bibliography of publications relating to sewage utilization and disposal.

32. Water resources of Puerto Rico, by H. M. Wilson. 1899. 48 pp., 17 pls. 15c.

Describes briefly topography, climate, rivers, irrigation methods, soils, forestation, water power, and transportation facilities.

*41. The windmill; its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls.

*42. The windmill; its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp., 2 pls. 10c.

Nos. 41 and 42 give details of results of experimental tests with windmills of various types.

*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls. 15c.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11 pls. 15c.

Gives elevation and distance along rivers of the United States; also brief descriptions of many of the streams. Arrangement geographic. Many river profiles are scattered through other reports on surface waters in various parts of the United States.

*56. Methods of stream measurement. 1901. 51 pp., 12 pls. 15c.

Describes the methods used by the Survey in 1901–2. (See also Nos. 64, 94, and 95.)

57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. (See No. 149.) 5c.

61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.

Nos. 57 and 61 contain information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" gives information concerning temperature, quality of water, purposes of boring, etc. The lists are arranged by States, and the States are arranged alphabetically. A second revised edition was published in 1905 as Water-Supply Paper 149 (q. v.). 5c.

64. Accuracy of stream measurements, by E. C. Murphy. 1902. 99 pp., 4 pls. (See No. 95.) 10c.

Describes methods of measuring velocity of water and of measuring and computing stream flow, and compares results obtained with the different instruments and methods; describes also experiments and results at the Cornell University hydraulic laboratory. A second, enlarged edition published as Water-Supply Paper 95.

*67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls. 15c.

Discusses origin, depth, and amount of underground waters; permeability of rocks and porosity of soils; causes, rates, and laws of motions of underground water; surface and deep zones of flow, and recovery of waters by open wells and artesian and deep wells; treats of the shape and position of the water table; gives simple methods of measuring yield of flowing wells; describes artesian wells at Savannah, Ga.

72. Sewage pollution in the metropolitan area near New York City and its effect on inland water resources, by M. O. Leighton. 1902. 75 pp., 8 pls. 10c.

Defines "normal" and "polluted" waters and discusses the damage resulting from pollution.

77. The water resources of Molokai, Hawaiian Islands, by Waldemar Lindgren. 1903. 62 pp., 4 pls. 10c.

Describes briefly the topography, geology, coral reefs, climate, soils, vegetation, forests, fauna of the island, the springs, running streams and wells, and discusses the utilization of the surface and underground waters.

*80. The relation of rainfall to run-off, by G. W. Rafter. 1903. 104 pp. 10c.

Treats of measurements of rainfall and laws of measurements of stream flow; gives rainfall, run-off, and evaporation formulas; discusses effect of forests on rainfall and run-off.

87. Irrigation in India (second edition), by H. M. Wilson. 1903. 238 pp., 27 pls. 25c.

First edition was published in Part II of the Twelfth Annual Report.

*94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls. 10c.

Gives instruction for field and office work relating to measurements of stream flow by current meters. (See also No. 95.)

*95. Accuracy of stream measurements (second, enlarged edition), by E. C. Murphy. 1904. 169 pp., 6 pls.

Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. (See also No. 94.)

103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.)

Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classifies according to scope the statutes enacted in the different States.

110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c.

Contains the following reports of general interest. The scope of each paper is indicated by its title.

Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.

The California or "stovepipe" method of well construction, by Charles S. Slichter.

Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.

Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.

Experiment relating to problems of well contamination at Quitman, Ga., by S. W. McCallie.

Notes on the hydrology of Cuba, by M. L. Fuller.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.

The first paper discusses the pollution of streams by sewage and by trade wastes, describes the manufacture of strawboard and gives results of various experiments in disposing of the waste. The second paper describes briefly the topography, drainage, and geology of the region about Marion, Ind., the contamination of rock wells and of streams by waste oil and brine.

114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.

Contains report on "Occurrence of underground waters," by M. L. Fuller, discussing sources, amount, and temperature of waters, permeability and storage capacity of rocks, water-bearing formations, recovery of water by springs, wells, and pumps, essential conditions of artesian flows, and general conditions affecting underground waters in eastern United States.

119. Index to the hydrographic progress reports of the United States Geological Survey, 1888 to 1903, by J. C. Hoyt and B. D. Wood. 1905. 253 pp. 15c.

Scope indicated by title.

120. Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879–1904, by M. L. Fuller, 1905. 128 pp. 10c.

Scope indicated by title.

122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Defines and classifies underground waters, gives common-law rules relating to their use, and cites State legislative acts affecting them.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.

Discusses the capacity of sand to transmit water, describes measurements of underflow in Rio Hondo, San Gabriel, and Mohave River valleys, Cal., and on Long Island, N. Y., gives results of tests of wells and pumping plants, and describes stovepipe method of well construction.

143. Experiments on steel-concrete pipes on a working scale, by J. H. Quinton. 1905, 61 pp., 4 pls.

Scope indicated by title.

145. Contributions to the hydrology of eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls.

Contains brief reports of general interest as follows:

Drainage of ponds into drilled wells, by Robert E. Horton. Discusses efficiency, cost, and capacity of drainage wells, and gives statistics of such wells in southern Michigan.

Construction of so-called fountain and geyser springs, by Myron L. Fuller.

A convenient gage for determining low artesian heads, by Myron L. Fuller.

147. Destructive floods in United States in 1904, by E. C. Murphy. 15c.

Contains a brief account of "A method of computing cross-section area of waterways," including formulas for maximum discharge and areas of cross section.

149. Preliminary list of deep borings in the United States, second edition with additions, by N. H. Darton. 1905. 175 pp. 10c.

Gives by States (and within the States by counties), location, depth, diameter, yield, height of water, and other available information, concerning wells 400 feet or more in depth; includes all wells listed in Water-Supply Papers 57 and 61; mentions also principal publications relating to deep borings.

150. Weir experiments, coefficients, and formulas, by R. E. Horton. 1906. 189 pp., 38 pls. (See Water-Supply Paper 200.) 15c.

Scope indicated by title.

151. Field assay of water, by M. O. Leighton. 1905. 77 pp., 4 pls. 10c.

Discusses methods, instruments, and reagents used in determining turbidity, color, iron, chlorides, and hardness in connection with the studies of the quality of water in various parts of the United States.

152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

Scope indicated by title.

*155. Fluctuations of the water level in wells, with special reference to Long Island, N. Y., by A. C. Veatch. 1906. 83 pp., 9 pls. 25c.

Includes general discussion of fluctuation due to rainfall and evaporation, barometric changes, temperature changes in rivers, changes in lake level, tidal changes, effects of settlement, irrigation, dams, underground water developments, and to indeterminate causes.

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

Gives account of work in 1905; lists of publications relating to underground waters, and contains the following brief reports of general interest:
Significance of the term "artesian," by Myron L. Fuller.
Representation of wells and springs on maps, by Myron L. Fuller.
Total amount of free water in the earth's crust, by Myron L. Fuller.
Use of fluorescein in the study of underground waters, by R. B. Dole.
Problems of water contamination, by Isaiah Bowman.
Instances of improvement of water in wells, by Myron L. Fuller.

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

163. Bibliographic review and index of underground-water literature published in the United States in 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson. 1906. 130 pp. 15c.

Scope indicated by title.

*179. Prevention of stream pollution by distillery refuse, based on investigations at Lynchburg, Ohio, by Herman Stabler. 1906. 34 pp., 1 pl. 10c.

Describes grain distillation, treatment of slop, sources, character, and effects of effluents on streams; discusses filtration, precipitation, fermentation, and evaporation methods of disposal of wastes without pollution.

*180. Turbine water-wheel tests and power tables, by R. E. Horton. 1906. 134 pp., 2 pls. 20c.

Scope indicated by title.

*185. Investigations on the purification of Boston sewage, by C.-E. A. Winslow and E. B. Phelps. 1906. 163 pp. 25c.

Discusses composition, disposal, purification, and treatment of sewages and recent tendencies in sewage-disposal practice in England, Germany, and the United States; describes character of crude sewage at Boston, removal of suspended matter, treatment in septic tanks, and purification in intermittent sand filtration and coarse material; gives bibliography.

*186. Stream pollution by acid-iron wastes, a report based on investigations made at Shelby, Ohio, by Herman Stabler. 1906. 36 pp., 1 pl. 10c.

Gives history of pollution by acid-iron wastes at Shelby, Ohio, and resulting litigation; discusses effect of acid-iron liquors on sewage purification processes, recovery of copperas from acid-iron wastes, and other processes for removal of pickling liquor.

*187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl. 15c.

Scope indicated by title.

*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls. 5c.

Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amounts and character of water used, raw material and finished product, and mechanical filtration.

*194. Pollution of Illinois and Mississippi rivers by Chicago sewage (a digest of the testimony taken in the case of the State of Missouri *v.* The State of Illinois and the Sanitary District of Chicago), by M. O. Leighton. 1907. 369 pp., 2 pls. 40c.

Scope indicated by amplification of title.

*196. Water supply of Nome region, Seward Peninsula, Alaska, 1906, by J. C. Hoyt and F. F. Henshaw. 1907. 52 pp., 6 pls. 15c.

Gives results of measurements of flow of Alaskan streams, discusses available water supply for ditch and pipe lines and power development; presents notes for investors.

*200. Weir experiments, coefficients, and formulas, revision of paper No. 150, by R. E. Horton. 1907. 195 pp., 38 pls. 35c.

Scope indicated by title.

*218. Water-supply investigations in Alaska, 1906–7 (Nome and Kougarok regions, Seward Peninsula; Fairbanks district, Yukon-Tanana region), by F. F. Henshaw and C. C. Covert. 1908. 156 pp., 12 pls. 25c.

Describes the drainage basins, gives results of observations at the gaging stations, and discusses the water supply of the ditches and pipe lines, and possibilities of development; gives also meteorological records.

*226. The pollution of streams by sulphite-pulp waste, a study of possible remedies, by E. B. Phelps. 1908. 37 pp., 1 pl., 10c.

Describes manufacture of sulphite pulp, the waste liquors, and the experimental work leading to suggestions as to methods of preventing stream pollution.

228. Water-supply investigations of the Yukon-Tanana region, Alaska, 1907 and 1908 (Fairbanks, Circle, and Rampart districts), by C. C. Covert and C. E. Ellsworth. 1909. 108 pp., 7 pls. 20c.

Describes the drainage basins; gives results of observations at gaging stations; discusses the water supplies of the ditches and pipe lines and possibilities of hydraulic development.

*229. The disinfection of sewage and sewage filter effluents, with a chapter on the putrescibility and stability of sewage effluents, by E. B. Phelps. 1909. 91 pp., 1 pl. 15c.

Scope indicated by title.

*234. Papers on the conservation of water resources. 1909. 96 pp., 2 pls. 15c.

Contains the following papers, whose scope is indicated by their titles: Distribution of rainfall by Henry Gannett; Floods, by M. O. Leighton; Developed water powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped water powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground waters, by W. C. Mendenhall; Denudation, by R. B. Dole and Herman Stabler; Control of catchment areas, by H. N. Parker.

*235. The purification of some textile and other factory wastes, by Herman Stabler and G. H. Pratt. 1909. 76 pp. 10c.

Discusses waste waters from wool-scouring, bleaching, and dyeing cotton yarn, bleaching cotton piece goods, and manufacture of oleomargarine, fertilizer, and glue.

236. The quality of surface waters in the United States: Part I, Analyses of waters east of the one-hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.

Describes collection of samples, method of examination, preparation of solutions, accuracy of estimates, and expression of analytical results.

238. The public utility of water powers and their governmental regulation, by René Tavernier and M. O. Leighton. 1910. 161 pp. 15c.

Discusses hydraulic power and irrigation, French, Italian, and Swiss legislation relative to the development of water powers, and laws proposed in the French Parliament; reviews work of bureau of hydraulics and agricultural improvement of the French department of agriculture and gives résumé of Federal and State water-power legislation in the United States.

255. Underground waters for farm use, by M. L. Fuller. 1910. 58 pp., 17 pls. 15c.

Discusses rocks as sources of water supply and the relative safety of supplies from different materials; springs, and their protection; open or dug and deep wells, their location, yield, relative cost, protection, and safety; advantages and disadvantages of cisterns and combination wells and cisterns.

257. Well-drilling methods, by Isaiah Bowman. 1911. 139 pp., 4 pls. 15c.

Discusses amount, distribution, and disposal of rainfall, water-bearing rocks, amount of underground water, artesian conditions, and oil and gas bearing formations; gives history of well drilling in Asia, Europe, and the United States; describes in detail the various methods and the machinery used; discusses loss of tools and geologic difficulties; contamination of well waters and methods of prevention; tests of capacity and measurement of depth; and costs of sinking wells.

*258. Underground water papers, 1910, by M. L. Fuller, F. G. Clapp, G. G. Matson, Samuel Sanford, and H. C. Wolff. 1911. 125 pp., 2 pls. 15c.

Contains the following papers (scope indicated by titles) of general interest:
Drainage by wells, by M. L. Fuller.
Freezing of wells and related phenomena, by M. L. Fuller.
Pollution of underground waters in limestone, by G. C. Matson.
Protection of shallow wells in sandy deposits, by M. L. Fuller.
Magnetic wells, by M. L. Fuller.

259. The underground waters of southwestern Ohio, by M. L. Fuller and F. G. Clapp, with a discussion of the chemical character of the waters, by R. B. Dole. 1912. 228 pp., 9 pls. 35c.

Describes the topography, climate, and geology of the region, the water-bearing formations, the source, mode of occurrence, and head of the waters, and municipal supplies; gives details by counties; discusses in supplement, under chemical character, method of analysis and expression of results, mineral constituents, effect of the constituents on waters for domestic, industrial, or medicinal uses, methods of purification, chemical composition; many analyses and field assays. The matter in the supplement was also published in Water-Supply Paper 254 (The underground waters of north-central Indiana.)

274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describes collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of the Rio Grande and of Pecos, Gallinas, and Hondo rivers.

280. Gaging stations maintained by the United States Geological Survey, 1888–1910, and Survey publications relating to water resources, compiled by B. D. Wood. 1912. 102 pp. 10c.

314. Surface water supply of Seward Peninsula, Alaska, by F. F. Henshaw and G. L. Parker, with a sketch of the geography and geology by P. S. Smith, and a description of methods of placer mining by A. H. Brooks. 1913. 317 pp., 17 pls. 45c.

Contains results of work at gaging stations.

315. The purification of public water supplies, by G. A. Johnson. 1913. 84 pp., 8 pls. 10c.

Discusses ground, lake, and river waters as public supplies, development of waterworks systems in the United States, water consumption, and typhoid fever; describes methods of filtration and sterilization of water, and municipal water softening.

318. Water resources of Hawaii, 1909–1911, by W. F. Martin and C. H. Pierce. 1913. 552 pp., 15 pls. 50c.

Describes the general features of the islands and gives results of measurements of streams and of observations of rainfall and evaporation; contains a gazetteer.

334. The Ohio Valley flood of March–April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 32 pls. 20c.

Although relating specifically to floods in the Ohio Valley, this report discusses also the causes of floods and the prevention of damage by floods.

336. Water resources of Hawaii, 1912, by C. H. Pierce and G. K. Larrison. 50c.

Contains results of stream measurements on the islands in 1912.

337. The effects of ice on stream flow, by William Glenn Hoyt. 1913. 76 pp., 7 pls. 15c.

Discusses methods of measuring the winter flow of streams.

342. Surface water supply of the Yukon-Tanana region, Alaska, by C. E. Ellsworth and R. W. Davenport. 1915. 343 pp., 13 pls. 45c.

Presents results of 6 years' observations of the water supply of the Yukon-Tanana region, discusses climate and precipitation, and gives station records.

*345. Contributions to the hydrology of the United States, 1914. N. C. Grover, chief hydraulic engineer. 30c.

*(e) A method of determining the daily discharge of rivers of variable slope, by M. R. Hall, W. E. Hall, and C. H. Pierce, pp. 53–65.

Scope indicated by title.

(f) The discharge of Yukon River at Eagle, Alaska, by E. A. Porter and R. W. Davenport, pp. 67–77, Pls. IV–V. 5c.

Describes briefly the location and size of the Yukon basin, the climatic conditions in the basin, and methods of collecting hydrometric data; compares run-off with precipitation, and gives table showing the discharge of some of the large rivers in the United States as compared with the discharge of the Yukon and the Nile.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of waters from rivers, lakes, wells, and springs in various parts of the United States, including analyses of the geyser water of Yellowstone National Park, hot springs in Montana, brines from Death Valley, water from the Gulf of Mexico, and mine waters from Tennessee, Michigan, Missouri, and Oklahoma, Montana, Colorado and Utah, Nevada and Arizona, and California.

371. Equipment for current-meter gaging stations, by G. J. Lyon. 1915. 64 pp., 37 pls. 20c.

Describes methods of installing automatic and other gages and of constructing gage wells, shelters, and structures for making discharge measurements and artificial controls.

373. Water resources of Hawaii, 1913, by G. K. Larrison. 1915. 190 pp. 20c.

Contains results of stream measurements on the islands in 1913.

375. Contributions to the hydrology of the United States, 1915. N. C. Grover, chief hydraulic engineer.

(c) Relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77–84.

(e) A method for correcting river discharge for changing stage, by B. E. Jones, pp. 117–130.

(f) Conditions requiring the use of automatic gages in obtaining stream-flow records, by C. H. Pierce, pp. 131–139.

Papers presented at the conference of engineers of the water-resources branch in December, 1914.

400. Contributions to the hydrology of the United States, 1916. N. C. Grover, chief hydraulic engineer.

(a) The people's interest in water-power resources, by G. O. Smith, pp. 1–8.

ANNUAL REPORTS.

*Fifth Annual Report of the United States Geological Survey, 1883–84, J. W. Powell, Director. 1885. xxxvi, 469 pp., 58 pls. $2.25. Contains:

The requisite and qualifying conditions of artesian wells, by T. C. Chamberlin, pp. 125–173, Pl. XXI. Scope indicated by title.

*Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Irrigation in India, by H. M. Wilson, pp. 368–561, Pls. CVII to CXLVI. (See Water-Supply Paper 87.)

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. Pt. III, Irrigation, pp. xi, 486, 77 plates. $1.85. Contains:

*American irrigation engineering, by H. M. Wilson, pp. 101–349, Pls. CXI to CXLV. Discusses the economical aspects of irrigation, alkaline drainage, silt, and sedimentation; gives brief history of legislation; describes perennial canals in Idaho-California, Wyoming, and Arizona; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply, pumping and subirrigation.

Fourteenth Annual Report of the United States Geological Survey, 1892–93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II, Accompanying papers, pp. xx, 597, 73 pls. $2.10. Contains:

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

*Natural mineral waters of the United States, by A. C. Peale, pp. 49–88, Pls. III and IV. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analysis of spring waters, geographic distribution, and the utilization mineral waters; gives a list of American mineral spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Parts II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. II, papers chiefly of a theoretical nature, pp. v, 958, 172 plates. $2.65. Contains:

*Principles and conditions of the movements of ground water, by F. H. King, pp. 59–294, Pls. VI to XVI. Discusses the amount of water stored in sandstone, in soil, and in other rocks, the depth to which ground water penetrates; gravitational, thermal, and capillary movements of ground waters, and the configuration of the ground-water surface; gives the results of experimental investigations on the flow of air and water through a rigid, porous medium, and through sands, sandstones, and silts; discusses results obtained by other investigators, and summarizes results of observations; discusses also rate of flow of water through sand and rock, the growth of rivers, rate of filtration through soil, interference of wells, etc.

*Theoretical investigation of the motion of ground waters, by C. S. Slichter, pp. 295–384, Pl. XVII. Scope indicated by title.

Twentieth Annual Report of the United States Geological Survey, 1898–99, Charles D. Walcott, Director. 1899. (Parts II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. IV, Hydrography, vii, 660 pp., 75 pls. $1.40. Contains:

*Hydrography of Nicaragua, by A. P. Davis, pp. 563–637, Pls. LXIV to LXXV. Describes the topographic features of the boundary, the lake basin, and Rio San Juan; gives a brief résumé of the boundary dispute; discusses rainfall, temperature, and relative humidity, evaporation, resources, and productions, the ship-railway and canal projects; gives the history of the investigations by the Canal Commission, and results of measurements on the Rio Grande, on streams tributary to Lake Nicaragua, and on Rio San Juan and its tributaries.

Twenty-second Annual Report of the United States Geological Survey, 1900–1901. Charles D. Walcott, Director. 1901. (Parts III and IV, 1902.) 4 parts, Pt. IV, Hydrography, 690 pp., 65 pls. $2.20. Contains:

*Hydrography of the American Isthmus, by A. P. Davis, pp. 507–630, Pls. XXXVII to L. Describes the physiography, temperature, rainfall, and winds of Central America; discusses the hydrography of the Nicaragua Canal route and the Panama Canal route; gives estimated monthly discharges of many of the streams, rainfall, and evaporation tables at various points.

PROFESSIONAL PAPERS.

86. The transportation of débris by running water, by G. K. Gilbert, based on experiments made with the assistance of E. C. Murphy. 1914. 265 pp., 3 pls. 70c.

The results of an investigation which was carried on in a specially equipped laboratory at Berkeley, Cal., and was undertaken for the purpose of learning "the laws which control the movement of bed load and especially to determine how the quantity of load is related to the stream slope and discharge and to the degree of comminution of the débris."

A highly technical report.

BULLETINS.

*32. Lists and analyses of the mineral springs of the United States (a preliminary study), by A. C. Peale. 1886. 235 pp.

Defines mineral waters, lists the springs by States, and gives tables of analyses so far as available.

264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Bulletins 264 and 298 discuss the importance of accurate wel records to the driller, to owners of oil, gas, and water wells, and to the geologist; describes the general methods of work; gives tabulated records of wells by States, and detailed records selected as affording valuable stratigraphic information.

*319. Summary of the controlling conditions of artesian flows, by Myron L. Fuller. 1908. 10c.

Describes underground reservoirs, the sources of underground waters, the confining agents, the primary and modifying factors of artesian circulation, the essential and modifying factors of artesian flow, and typical artesian systems.

*479. The geochemical interpretation of water analyses, by Chase Palmer. 1911. 31 pp. 5c.

Discusses the expression of chemical analyses, the chemical character of water and the properties of natural water; gives a classification of waters based on property values and reacting values, and discusses the character of the waters of certain rivers as interpreted directly from the results of analyses, discusses also the relation of water properties to geologic formations, silica in river water, and the character of the water of the Mississippi and the Great Lakes and St. Lawrence River as indicated by chemical analyses.

INDEX BY AREAS AND SUBJECTS.

[A=Annual Reports; M=Monograph; B=Bulletin; P=Professional Paper; W=Water-Supply Paper; G F=Geologic folio.]

[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications, as noted in abstracts.

INDEX OF STREAMS.