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

WATER-SUPPLY PAPER 262

SURFACE WATER SUPPLY OF THE UNITED STATES

1909

PART II. SOUTH ATLANTIC COAST AND EASTERN GULF OF MEXICO

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

M. R. HALL AND R. H. BOLSTER

WASHINGTON
GOVERNMENT PRINTING OFFICE
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By M. R. HALL and R. H. BOLSTER.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of flow measurements made on certain streams in the United States. The work was performed by the water-resources branch of the United States Geological Survey, either independently or in cooperation with organizations mentioned herein. These investigations are authorized by the organic law of the Geological Survey (Stat. L., vol. 20, p. 394), which provides, among other things, as follows:

> 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.

Inasmuch as water is the most abundant and most valuable mineral in nature the investigation of water resources is included under the above provision for investigating mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

> For gauging 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.

The various appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—

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

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor do they include all the river systems or parts thereof that might purposefully be studied. The scope of the work is limited by the appropriations available. The field covered is the widest and the character of the work is believed to be the best possible under the controlling conditions. The work would undoubtedly have greater scientific importance and ultimately be of more practical value if the money now expended for wide areas were concentrated on a few small drainage basins, but such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be kept during a period of years long enough to determine within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum. The length of such a period manifestly differs for different streams. Experience has shown that the records for some streams should cover from five to ten years, and for other streams twenty years or even more, the limit being determined by the relative importance of the stream and the interdependence of the results with other long-time records on adjacent streams.

In the performance of this work an effort is made to reach the highest degree of precision possible with a rational expenditure of time and a judicious expenditure of a small amount of money. In all engineering work there is a point beyond which refinement is needless and wasteful, and this statement applies with especial force to stream-flow measurements. It is confidently believed that the stream-flow data presented in the publications of the survey are in general sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of stations. All persons are cautioned to exercise the greatest care in using such incomplete records.

Records have been obtained at more than 1,550 different points in the United States, and in addition the surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, has been investigated. During 1909 regular gaging stations were maintained by the survey and cooperating organizations at about 850 points in the United States, and many miscellaneous measurements were made at other points. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular surface water-supply papers and in special papers from time to time.

PURPOSES OF THE WORK.

The results contained in this volume are requisite to meet the immediate demands of many public interests, including navigation, irrigation, domestic water supply, water power, swamp and overflow land drainage, and flood prevention.

Navigation.—The Federal Government has expended more than $250,000,000 for the improvement of inland navigation, and prospective expenditures will approximate several times this amount. It is obvious that the determination of stream flow is necessary to the intelligent solution of the many problems involved.

Irrigation.—The United States is now expending $51,000,000 on federal irrigation systems, and this amount is far exceeded by the private expenditures of this nature in the arid West. The integrity of any irrigation system depends absolutely on the amount of water available. Therefore investigations of stream flow in that portion of the country are not only of first importance in the redemption of the lands but constitute an insurance of federal and private investments.

Domestic water supply.—The highest use of water is for domestic supply, and although this branch of the subject is of less direct federal interest than the branches already named, it nevertheless has so broad a significance with respect to the general welfare that the Federal Government is ultimately and intimately concerned.

Water power.—The development of the water power of the country is an economic necessity. Our stock of coal is being rapidly depleted and the cost of steam power is increasing accordingly. Industrial growth and, as a consequence, the progress of the United States as a nation will cease if cheap power is not available. Water power affords the only avenue now open. When the electric transmission of power was accomplished the relation of our water powers to national economy changed entirely. Before the day of electric transmission water power was important only at the locality at which it was generated, but it has now become a public utility in which the individual citizen is vitally interested. Inasmuch as the amount of water power that may be made available depends on the flow of rivers, the investigation of flow becomes a prerequisite in the judicious management of this source of energy.

Drainage of swamp and overflowed lands.—More than 70,000,000 acres of the richest land in this country are now practically worthless or of precarious value by reason of overflow and swamp conditions. When this land is drained it becomes exceedingly productive and its value increases many fold. Such reclamation would add to the national assets at least $700,000,000. The study of run-off is the first consideration in connection with drainage projects. If by the drainage of a large area into any particular channel that channel

becomes so gorged with water which it had not hitherto been called upon to convey that overflow conditions are created in places where previously the land was not subject to inundation, then drainage results merely in an exchange of land values. This is not the purpose of drainage improvement.

Flood prevention.—The damage from floods in the United States probably exceeds on the average $100,000,000 annually, and in the year 1908, according to estimates based on reliable data, the aggregate damage approximated $250,000,000. Such an annual tax on the property of great regions should be reduced in the orderly progress of government. It goes without saying that any consideration of flood prevention must be based on a thorough knowledge of stream flow, both in the contributing areas which furnish the water and along the great lowland river

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey since its inception have appeared in the annual reports, bulletins, and water-supply papers. Owing to natural processes of evolution and to changes in governmental requirements, the character of the work and the territory covered by these different publications has varied greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into twelve parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface water supply for 1909. The dividing line between the North Atlantic and South Atlantic drainage areas lies between York and James rivers.

Papers on surface water supply of the United States, 1909.

Part.	No.	Title.	Part.	No.	Title.
I	261	North Atlantic coast.	VI	266	Missouri River Basin.
II	262	South Atlantic coast and eastern Gulf of Mexico.	VII	267	Lower Mississippi River Basin.
			VIII	268	Western Gulf of Mexico.
III	263	Ohio River Basin.	IX	269	Colorado River Basin.
IV	264	St. Lawrence River Basin.	X	270	Great Basin.
V	265	Upper Mississippi River and Hudson Bay basins.	XI	271	California.
			XII	272	North Pacific coast.

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey exclusive of all special papers. Numbers of reports are inclusive, and dates also are inclusive so far as the data are available.

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

[Ann.=Annual Report; B.=Bulletin; W. S.=Water-Supply Paper.]

Report.	Character of data.	Year.
10th Ann., pt. 2	Descriptive information only	
11th Ann., pt. 2	Monthly discharge	1884 to Sept., 1890.
12th Ann., pt. 2	do	1884 to June 30, 1891.
13th Ann., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th Ann., pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B. 131	Descriptions, measurements, gage heights, and ratings	1892 and 1894.
16th Ann., pt. 2	Descriptive information only	
B. 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W. S. 11	Gage heights (also gage heights for earlier years)	1896.
18th Ann., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W. S. 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W. S. 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th Ann., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W. S. 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W. S. 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1896.
20th Ann., pt. 4	Monthly discharge (also for many earlier years)	1898.
W. S. 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st Ann., pt. 4	Monthly discharge	1899.
W. S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d Ann., pt. 4	Monthly discharge	1900.
W. S. 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W. S. 75	Monthly discharge	1901.
W. S. 82 to 85	Complete data	1902.
W. S. 97 to 100	do	1903.
W. S. 124 to 135	do	1904.
W. S. 165 to 178	do	1905.
W. S. 201 to 214	Complete data, except descriptions	1906.
W. S. 241 to 252	Complete data	1907–8.
W. S. 261 to 272	do	1909.

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. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119. The first table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1909. Wherever the data for a drainage basin appear in two papers the number of one is placed in parentheses and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas rivers.

Numbers of water-supply papers containing results of stream measurements, 1899–1909.

	1899.[a]	1900.[b]	1901.	1902.	1903.	1904.	1905.	1906.	1907–8.	1909.
Atlantic coast and eastern Gulf of Mexico:										
New England rivers	35	47	65, 75	82	97	124	165	201	241	261
Hudson River to Delaware River, inclusive	35	47, (48)	65, 75	82	97	125	166	202	241	261
Susquehanna River to York River, inclusive	35	48	65. 75	82	97	126	167	203	241	261
James River to Yadkin River, inclusive	(35), 36	48	65, 75	(82), 83	(97), 98	126	167	203	242	262
Santee River to Pearl River, inclusive	36	48	65, 75	83	98	127	168	204	242	262
St. Lawrence River	36	49	65, 75	(82), 83	97	129	170	206	244	264
Hudson Bay	.....	.....	66, 75	85	100	130	171	207	245	265
Mississippi River:										
Ohio River	36	48, (49)	65, 75	83	98	128	169	205	243	263
Upper Mississippi River	36	49	65, 75	83	98, (99)	128, (130)	171	207	245	265
Missouri River	(36), 37	49, (50)	66, 75	84	99	130, (131)	172	208	246	266
Lower Mississippi River	37	50	(65), 66, 75	(83), 84	(98), 99	(128), 131	(169), 173	(205), 209	247	267
Western Gulf of Mexico	37	50	66, 75	84	99	132	174	210	248	268
Pacific coast and Great Basin:										
Colorado River	(37), 38	50	66, 75	85	100	133, (134)	175, (177)	211, (213)	249, (251)	269 (271)
Great Basin	38, (39)	51	66, 75	85	100	133, (134)	176, (177)	212, (213)	250, (251)	270, (271)
South Pacific coast to Klamath River, inclusive	(38), 39	51	66, 75	85	100	134	177	213	251	271
North Pacific coast	38	51	66, 75	85	100	135	(177), 178	214	252	272

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

Numbers of water-supply papers containing data covering portions of drainage basins.

No.	River basin.	Tributaries included.
35	James	
36	Missouri	Gallatin.
37	Colorado	Green, Gunnison, Grand above junction with Gunnison.
38	Sacramento	Except Kings and Kern.
39	Great Basin	Mohave.
48	Delaware	Wissahickon and Schuylkill.
49	Ohio	Scioto.
50	Missouri	Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte.
65	Lower Mississippi	Yazoo.
82	James	
	St. Lawrence	Lake Ontario, tributaries to St. Lawrence River proper.
83	Lower Mississippi	Yazoo.
97	James	
98	Lower Mississippi	Do.
99	Upper Mississippi	Tributaries from the west.
128	Lower Mississippi	Yazoo.
130	Upper Mississippi	Tributaries from the west.
131	Missouri	Platte, Kansas.
134	Colorado	Data near Yuma, Ariz., repeated.
	Great Basin	Susan, Owens, Mohave.
169	Lower Mississippi	Yazoo.
177	Colorado	Below junction with Gila.
	Great Basin	Susan repeated, Owens, Mohave.
	North Pacific coast	Rogue, Umpqua, Siletz.
205	Lower Mississippi	Yazoo, Homochitto.
213	Colorado	Data at Hardyville repeated; at Yuma, Salton Sea.
	Great Basin	Owens, Mohave.
251	Colorado	Yuma and Salton Sea stations repeated.
271	Great Basin	Owens River basin.

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined on the basis of drainage area, local changes in name and lake surface being disregarded. After all stations from the source to the mouth of the main stem of the river have been given, the tributaries are taken up in regular order from source to mouth. The tributaries are treated the same as the main stream, all stations in each tributary basin being given before taking up the next one below.

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

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. They may be defined as follows:

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

"Gallons per minute" is generally used in connection with pumping and city water supply.

The "miner's inch" is the rate of discharge of water that passes through an orifice 1 inch square under a head which varies locally. It is commonly used by miners and irrigators throughout the West and is defined by statute in each State in which it is used.

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

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

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

CONVENIENT EQUIVALENTS.

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

1 second-foot equals 40 California miner's inches (law of March 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,272 gallons for one day.
1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.
1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep..
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches equals 96.0 Colorado miner's inches.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches equals 104 California miner's inches.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.

1⅓ horsepower equals about 1 kilowatt.

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

EXPLANATION OF TABLES.

For each drainage basin there is given a brief description of general conditions covering such features as area, source, tributaries, topography, geology, conditions of forestation, rainfall, ice conditions, irrigation, storage, power possibilities, and other special features of importance or interest.

For each regular current-meter gaging station are given in general, and so far as available, the following data: Description of station, list of discharge measurements, table of daily gage heights, table of daily discharges, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting conditions of flow, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights gives the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights during ice conditions, backwater from obstructions, etc., are published as recorded, with suitable footnotes. The rating is not applicable for such periods unless the proper correction to the gage heights is known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

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

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the daily gage heights and daily discharges for the purpose of verifying the published results as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater conditions.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge consequently larger than given in the maximum column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 13, are based.

FIELD METHODS OF MEASURING STREAM FLOW.

There are three distinct methods of determining the flow of open-channel streams—(1) by measurements of slope and cross section and the use of Chezy's and Kutter's formulas; (2) by means of a weir or dam; (3) by measurements of the velocity of the current and of the area of the cross section. The method chosen depends on the local physical conditions, the degree of accuracy desired, the funds available, and the length of time that the record is to be continued.

Slope method.—Much information has been collected relative to the coefficients to be used in the Chezy formula, $v=c\sqrt{Rs}$. This has been utilized by Kutter, both in developing his formula for c and in determining the values of the coefficient n which appears therein.

The results obtained by the slope method are in general only roughly approximate, owing to the difficulty in obtaining accurate data and the uncertainty of the value for n to be used in Kutter's formula. The most common use of this method is in estimating the flood discharge of a stream when the only data available are the cross section, the slope as shown by marks along the bank, and a knowledge of the general conditions. It is seldom used by the United States Geological Survey. For full information regarding this method the reader is referred to the various text-books on hydraulics.

Weir method.—Relatively few stations are maintained at weirs or dams by the United States Geological Survey. Standard types of sharp-crested and broad-crested weirs, within the limits for which accurate coefficients have been experimentally obtained, give very accurate records of discharge if properly maintained. At practically all broad-crested weirs, however, there is a diversion of water either through or around the dam, usually for the purpose of development of water power. The flow is often complicated and the records are subject to errors from such sources as leakage through the dam, backwater at high stages, uncertainty regarding coefficient, irregularity of crest, obstructions from logs or ice, use of flashboards, old turbines with imperfect ratings, and many others depending on the type of development and the uses of the diverted water.

In general, records of discharge at dams are usually accurate enough for practical use if no others are available. It has been the general experience of the United States Geological Survey, however, that records at current-meter gaging stations under unobstructed-channel conditions are more accurate than those collected at dams, and where the conditions are reasonably favorable are practically as good as those obtained at sharp-crested weirs.[a]

Velocity method.—Streams in general present throughout their courses to a greater or less extent all conditions of permanent, semipermanent, and varying conditions of flow. In accordance with the location of the measuring section with respect to these physical conditions, current-meter gaging stations may in general be divided into four classes—(1) those with permanent conditions of flow; (2) those with beds which change only during extreme high water; (3) those with beds which change frequently but which do not cause a variation of more than about 5 per cent of the discharge curves from year to year; and (4) those with constantly shifting beds. In

[a] The determination of discharge over the different types of weirs and dams is treated fully in "Weir experiments, coefficients, and formulas" (Water-Supply Paper 200) and in the various text-books on hydraulics. "Turbine water-wheel tests and power tables" (Water-Supply Paper 180) treats of the discharge through turbines when used as meters. The edition of the latter water-supply paper is nearly exhausted. The paper can, however, be consulted at most of the larger libraries of the country or it can be obtained from the Superintendent of Documents, Washington, D. C., at a cost of 20 cents.

determining the daily flow different office methods are necessary for each class. The field data on which the determinations are based and the methods of collecting them are, however, in general the same.

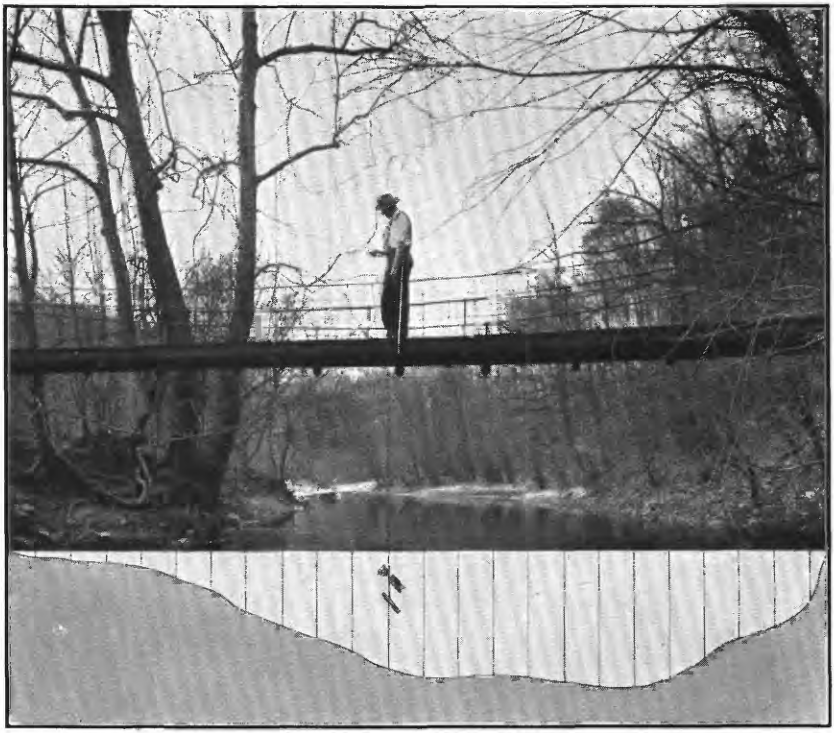
Great care is taken in the selection and equipment of gaging stations for determining discharge by velocity measurements in order that the data may have the required degree of accuracy. They are located, as far as possible, at such points that the relation between gage height and discharge will always remain constant for any given stage. The experience of engineers of the Geological Survey has been that permanency of conditions of flow is the prime requisite of any current-meter gaging station when maintained for several years, unless funds are available to cover all changes in conditions of flow. A straight, smooth section, without cross currents, backwater, boils, etc., at any stage is highly desirable, but on most streams is not attainable except at the expense of a cable equipment. Rough, permanent sections, if measurements are properly made by experienced engineers, taking measuring points at a distance apart of 2 to 5 per cent or less of the total width, will within reasonable limits yield better results for a given outlay of money than semipermanent or shifting sections with smooth, uniform current. So far as possible, stations are located where the banks are high and not subject to overflow at high stages and out of the influence of tributary streams, dams, or other artificial obstructions which might affect the relation between gage height and discharge.

A gaging station consists essentially of a gage for determining the daily fluctuations of stage of the river and some structure or apparatus from which discharge measurements are made, usually a bridge or cable.

The two factors required to determine the discharge of a stream past a section perpendicular to the mean direction of the current are the area of the cross section and the mean velocity of flow normal to that section.

In making a measurement with a current meter, a number of points, called measuring points, are measured off above and in the plane of the measuring section at which observations of depth and velocity are taken. (See Pl. I, *A*.) These points are spaced equally for those parts of the section where the flow is uniform and smooth, and are spaced unequally for other parts, according to the discretion and judgment of the engineer. In general, the points should not be spaced farther apart than 5 per cent of the distance between piers, nor farther apart than the approximate mean depth of the section at the time of measurement.

The measuring points divide the total cross section into elementary strips, at each end of which observations of depth and velocity



A. FOR BRIDGE MEASUREMENT.

B. FOR WADING MEASUREMENT.

TYPICAL GAGING STATIONS.

are made. The discharge of any elementary strip is the product of the average of the depths at the two ends times the width of the strip times the average of the mean velocities at the two ends of the strip. The sum of the discharges of the elementary strips is the total discharge of the stream.[a]

Depths for the determination of the area are usually obtained by sounding with the current meter and cable. In rough sections or swift current an ordinary weight and cable are used, particular care being taken that all observations shall be in the plane of the cross section.

Two methods of determining the velocity of flow of a stream are in general use—the float method and the current-meter method.

The float method, with its various modifications of surface, subsurface, and tube or rod floats, is now considered obsolete in the ordinary practice of the United States Geological Survey. The use of this method is limited to special conditions where it is impracticable to use the current meter, such as in places where large quantities of ice or débris which may damage the meter are flowing with the current, and for miscellaneous measurements or other work where a high degree of accuracy is not necessary. Tube floats are very satisfactory for use in canals with regular bottoms and even flow of current. Measurements by the float method are made as follows: The velocity of flow of the stream is obtained by observing the time which it takes floats set free at different points across the stream to pass between two range lines about 200 feet apart. The area used is the mean value obtained from several cross sections measured between the two range lines. The chief disadvantages of this method are difficulty in obtaining the correct value of mean area for the course used and uncertainty regarding the proper coefficient to apply to the observed velocity.[b]

The Price current meter is now used almost to the exclusion of other types of meters by the United States Geological Survey in the determination of the velocity of flow of water in open channels, a use for which it is adapted under practically all conditions.[c]

Plate II shows in the center the new type of penta-recording current meter equipped for measurements at bridge and cable stations; on the left the same type of meter is shown equipped for wading measurements, to record by the acoustic method; the meter is shown on the right equipped to record electrically. (See Pl. I, *B*.) Briefly, the

[a] For a discussion of methods of computing the discharge of a stream see Engineering News, June 25, 1908.

[b] Further information regarding this method is given in Water-Supply Paper 95 and in the various text-books covering the general subject of stream flow. The edition of this paper is nearly exhausted. It can, however, be consulted at most of the larger libraries of the country, or can be obtained from the Superintendent of Documents, Washington, D. C., at a cost of 15 cents.

[c] See Hoyt, J. C., and others, Use and care of the current meter as practiced by the United States Geological Survey: Trans. Am. Soc. C. E., vol. 66, 1910, p. 70.

meter consists of six cups attached to a vertical shaft which revolves on a conical hardened-steel point when immersed in moving water. The number of revolutions is indicated electrically. The rating or relation between the velocity of the moving water and the revolutions of the wheel is determined for each meter by drawing it through still water for a given distance at different speeds and noting the number of revolutions for each run. From these data a rating table is prepared which gives the velocity per second of moving water for any number of revolutions in a given time interval. The ratio of revolutions per second to velocity of flow in feet per second is very nearly a constant for all speeds, and is approximately 0.45.

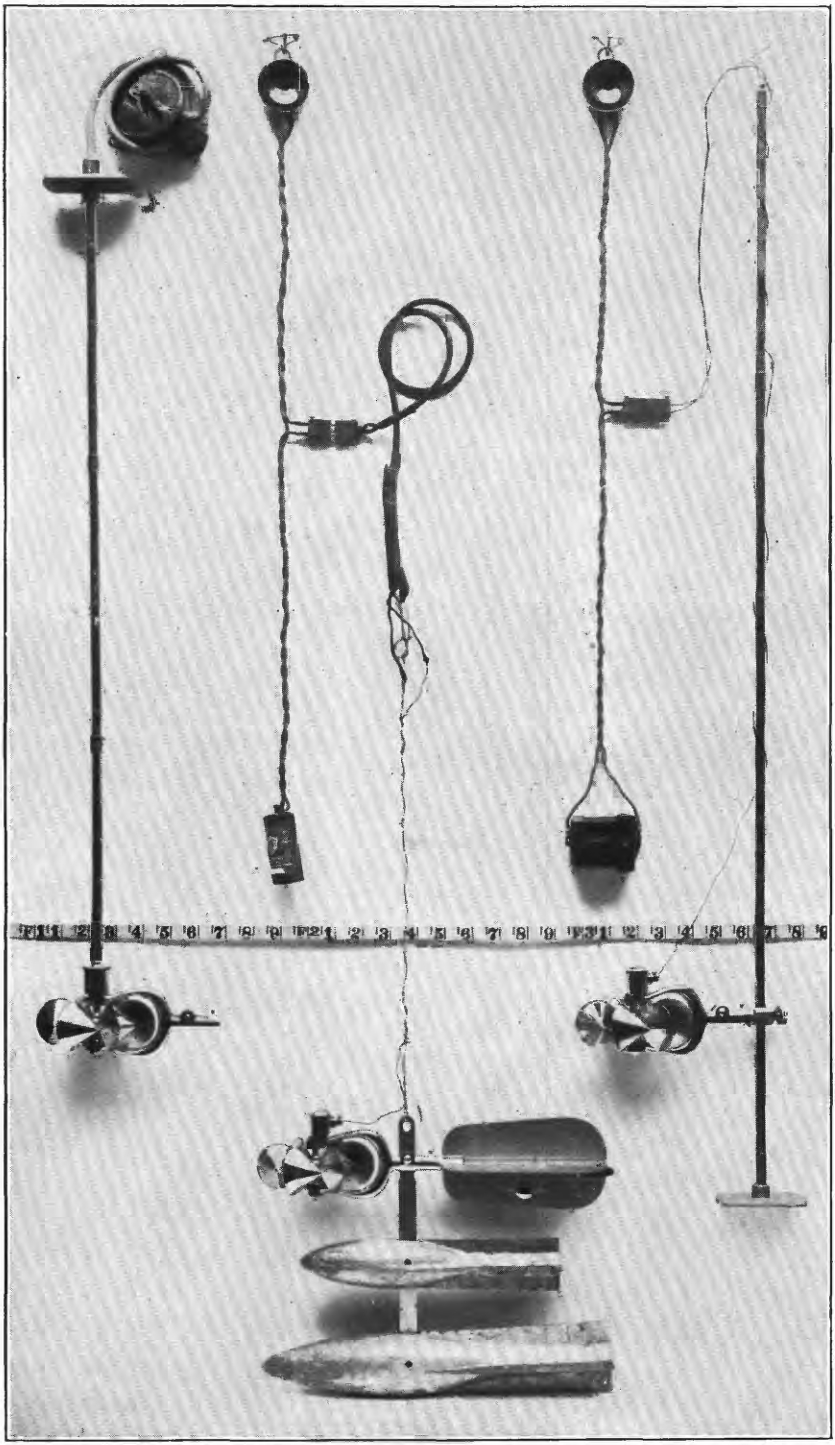
Three classes of methods of measuring velocity with current meters are in general use—multiple-point, single-point, and integration.

The two principal multiple-point methods in general use are the vertical velocity curve and 0.2 and 0.8 depth.

In the vertical velocity curve method a series of velocity determinations are made in each vertical at regular intervals, usually about 10 to 20 per cent of the depth apart. By plotting these velocities as abscissas and their depths as ordinates and drawing a smooth curve among the resulting points, the vertical velocity curve is developed. This curve shows graphically the magnitude and changes in velocity from the surface to the bottom of the stream. The mean velocity in the vertical is then obtained by dividing the area bounded by this velocity curve and its axis by the depth. This method of obtaining the mean velocity in the vertical is probably the best known, but on account of the length of time required to make a complete measurement its use is largely limited to the determination of coefficients for purposes of comparison and to measurements under ice.

In the second multiple-point method the meter is held successively at 0.2 and 0.8 depth, and the mean of the velocities at these two points is taken as the mean velocity for that vertical. (See Pl. I, *A*.) On the assumption that the vertical velocity curve is a common parabola with horizontal axis, the mean of the velocities at 0.22 and 0.79 depth will give (closely) the mean velocity in the vertical. Actual observations under a wide range of conditions show that this multiple-point method gives the mean velocity very closely for open-water conditions and that a completed measurement seldom varies as much as 1 per cent from the value given by the vertical velocity curve method. Moreover, the indications are that it holds nearly as well for ice-covered rivers. It is very extensively used in the regular practice of the United States Geological Survey.

The single-point method consists in holding the meter either at the depth of the thread of mean velocity or at an arbitrary depth for which the coefficient for reducing to mean velocity has been determined or must be assumed.



SMALL PRICE CURRENT METERS.

Extensive experiments by means of vertical velocity curves show that the thread of mean velocity generally occurs between 0.5 and 0.7 total depth. In general practice the thread of mean velocity is considered to be at 0.6 depth, and at this point the meter is held in most of the measurements made by the single-point method. A large number of vertical velocity curve measurements, taken on many streams and under varying conditions, show that the average coefficient for reducing the velocity obtained at 0.6 depth to mean velocity is practically unity. The variation of the coefficient from unity in individual cases is, however, greater than in the 0.2 and 0.8 method and the general results are not as satisfactory.

In the other principal single-point method the meter is held near the surface, usually 1 foot below, or low enough to be out of the effect of the wind or other disturbing influences. This is known as the subsurface method. The coefficient for reducing the velocity taken at the subsurface to the mean has been found to be in general from about 0.85 to 0.95, depending on the stage, velocity, and channel conditions. The higher the stage the larger the coefficient. This method is especially adapted for flood measurements or when the velocity is so great that the meter can not be kept in the correct position for the other methods.

The vertical-integration method consists in moving the meter at a slow, uniform speed from the surface to the bottom and back again to the surface and noting the number of revolutions and the time taken in the operation. This method has the advantage that the velocity at each point of the vertical is measured twice. It is useful as a check on the point methods. In using the Price meter great care should be taken that the vertical movement of the meter is not rapid enough to vitiate the accuracy of the resulting velocity.

The determination of the flow of an ice-covered stream is difficult, owing to diversity and instability of conditions during the winter period and also to lack of definite information in regard to the laws of flow of water under ice. The method now employed is to make frequent discharge measurements during the frozen periods by the 0.2 and 0.8 and the vertical velocity curve methods, and to keep an accurate record of the conditions, such as the gage height to the surface of the water as it rises in a hole cut in the ice, and the thickness and character of the ice. From these data an approximate estimate of the daily flow can be made by constructing a rating curve (really a series of curves) similar to that used for open channels, but considering, in addition to gage heights and discharge, the varying thickness of ice.[a]

[a] For information in regard to flow under ice cover see Water-Supply Paper U. S. Geol. Survey No. 187.

OFFICE METHODS OF COMPUTING AND STUDYING DISCHARGE AND RUN-OFF.

At the end of each year the field or base data for current-meter gaging stations, consisting of daily gage heights, discharge measurements, and full notes, are assembled. The measurements are plotted on cross-section paper and rating curves are drawn wherever feasible. The rating tables prepared from these curves are then applied to the tables of daily gage heights to obtain the daily discharges, and from these applications the tables of monthly discharge and run-off are computed.

Rating curves are drawn and studied with special reference to the class of channel conditions which they represent. The discharge measurements for all classes of stations when plotted with gage heights in feet as ordinates and discharges in second-feet as abscissas define rating curves which are more or less generally parabolic in form. In many cases curves of area in square feet and mean velocity in feet per second are also constructed to the same scale of ordinates as the discharge curve. These are used mainly to extend the discharge curves beyond the limits of the plotted discharge measurements and for checking purposes to avoid errors in the form of the discharge curve and to determine and eliminate erroneous measurements.

For every published rating table the following assumptions are made for the period of application of the table: (*a*) That the discharge is a function of and increases gradually with the stage; (*b*) that the discharge is the same whenever the stream is at a given stage, and hence such changes in conditions of flow as may have occurred during the period of application are either compensating or negligible, except that the rating as stated in the footnote of each table is not applicable for known conditions of ice, log jams, or other similar obstructions; (*c*) that the increased and decreased discharge due to change of slope on rising and falling stages is either negligible or compensating.

As already stated, the gaging stations may be divided into several classes, as indicated in the following paragraphs:

The stations of class 1 represent the most favorable conditions for an accurate rating and are also the most economical to maintain. The bed of the stream is usually composed of rock and is not subject to the deposit of sediment and loose material. This class includes also many stations located in a pool below which is a permanent rocky riffle that controls the flow like a weir. Provided the control is sufficiently high and close to the gage to prevent cut and fill at the gaging point from materially affecting the slope of the water surface, the gage height will for all practical purposes be a true index of the

discharge. Discharge measurements made at such stations usually plot within 2 or 3 per cent of the mean discharge curve, and the rating developed from that curve represents a very high degree of accuracy. Stations of this type are found in the north Atlantic coast drainage basins.

Class 2 is confined mainly to stations on rough mountainous streams with steep slope. The beds of such streams are, as a rule, comparatively permanent during low and medium stages, and when the flow is sufficiently well defined by an adequate number of discharge measurements before and after each flood the stations of this class give nearly as good results as those of class 1. As it is seldom possible to make measurements covering the time of change at flood stage, the assumption is often made that the curves before and after the flood converged to a common point at the highest gage height recorded during the flood. Hence the only uncertain period occurs during the few days of highest gage heights covering the period of actual change in conditions of flow. Stations of this type are found in the upper Missouri River drainage basin.

Class 3 includes most of the current-meter gaging stations maintained by the United States Geological Survey. If sufficient measurements could be made at stations of this class results would be obtained nearly equaling those of class 1, but owing to the limited funds at the disposal of the Survey this is manifestly impossible, nor is it necessary for the uses to which discharge data are applied. The critical points are as a rule at relatively high or low stages. The percentage error, however, is greater at low stages. No absolute rule can be laid down for stations of this class. Each rating curve must be constructed mainly on the basis of the measurements of the current year, the engineer being guided largely by the past history of the station and the following general law. If all measurements ever made at a station of this class are plotted on cross-section paper, they will define a mean curve which may be called a "standard curve." It has been found in practice that if after a change caused by high stage a relatively constant condition of flow occurs at medium and low stages, all measurements made after the change will plot on a smooth curve which is practically parallel to the standard curve with respect to their ordinates, or gage heights. This law of the parallelism of ratings is the fundamental basis of all ratings and estimates at stations with semipermanent and shifting channels. It is not absolutely correct, but, with few exceptions, answers all the practical requirements of estimates made at low and medium stages after a change at a high stage. This law appears to hold equally true whether the change occurs at the measuring section or at some controlling point below. The change is, of course, fundamentally due to change in the channel caused by cut or fill, or both, at and near the

measuring section. For all except small streams the changes in section usually occur at the bottom. The following simple but typical examples illustrate this law:

(*a*) If 0.5 foot of planking were to be nailed on the bottom of a well-rated wooden flume of rectangular section, there would result, other conditions of flow being equal, new curves of discharge, area, and velocity, each plotting 0.5 foot above the original curves when referred to the original gage. In other words, this condition would be analogous to a uniform fill or cut in a river channel which either reduces or increases all three values of discharge, area, and velocity for any given gage height. In practice, however, such ideal conditions rarely exist.

(*b*) In the case of a cut or fill at the measuring section there is a marked tendency toward decrease or increase, respectively, of the velocity. In other words, the velocity has a compensating effect, and if the compensation is exact at all stages the discharge at a given stage will be the same under both the new and the old conditions.

(*c*) In the case of uniform change along the crest of a weir or rocky controlling point, the area curve will remain the same as before the change, and it can be shown that here again the change in velocity curve is such that it will produce a new discharge curve essentially parallel to the original discharge curve with respect to their ordinates.

Of course, in actual practice such simple changes of section do not occur. The changes are complicated and lack uniformity, a cut at one place being largely offset by a fill at another, and vice versa. If these changes are very radical and involve large percentages of the total area—as, for example, on small streams—there may result a wide departure from the law of parallelism of ratings. In complicated changes of section the corresponding changes in velocity which tend to produce a new parallel discharge curve may interfere with each other materially, causing eddies, boils, backwater, and radical changes in slope. In such extreme conditions, however, the measuring section would more properly fall under class 4 and would require very frequent measurements of discharge. Special stress is laid on the fact that, in the lack of other data to the contrary, the utilization of this law will yield the most probable results.

Slight changes at low or medium stages of an oscillating character are usually averaged by a mean curve drawn among them parallel to the standard curve, and if the individual measurements do not vary more than 5 per cent from the rating curve the results are considered good for stations of this class. Stations of this type are found in the south Atlantic coast and eastern Gulf of Mexico drainage basins.

Class 4 comprises stations that have soft, muddy, or sandy beds. Good results can be obtained from such sections only by frequent discharge measurements, the frequency varying from a measurement every two or three weeks to a measurement every day, according to the rate of diurnal change in conditions of flow. These measurements are plotted and a mean or standard curve drawn among them. It is assumed that there is a different rating curve for every day of the year and that this rating is parallel to the standard curve with respect to their ordinates. On the day of a measurement the rating curve for that day passes through that measurement. For days between successive measurements it is assumed that the rate of change is uniform, and hence the ratings for the intervening days are equally spaced between the ratings passing through the two measurements. This method must be modified or abandoned altogether under special conditions. Personal judgment and a knowledge of the conditions involved can alone dictate the course to pursue in such cases. Stations of this type are found in the Platte, Arkansas, Rio Grande, and lower Colorado drainage basins.

The computations have, as a rule, been carried to three significant figures. Computation machines, Crelle's tables, and the 20-inch slide rule have been generally used. All computations are carefully checked.

After the computations have been completed they are entered in tables and carefully studied and intercompared to eliminate or account for all gross errors so far as possible. Missing periods are filled in, so far as is feasible, by means of comparison with adjacent streams. The attempt is made to complete years or periods of discharge, thus eliminating fragmentary and disjointed records. Full notes accompanying such estimates follow the daily and monthly discharge tables.

For most of the northern stations estimates have been made of the monthly discharge during frozen periods. These are based on measurements under ice conditions wherever available, daily records of temperature and precipitation obtained from the United States Weather Bureau, climate and crop reports, observers' notes of conditions, and a careful and thorough intercomparison of results with adjacent streams. Although every care possible is used in making these estimates, they are often very rough, the data for some of them being so poor that the estimates are liable to as much as 25 to 50 per cent error. It is believed, however, that estimates of this character are better than none at all, and serve the purpose of indicating in a relative way the proportionate amount of flow during the frozen period. These estimates are, as a rule, included in the annual discharge. The large error of the individual months has a

relatively small effect on the annual total, and it is for many purposes desirable to have the yearly discharge computed, even though some error is involved in doing so.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are largely compensating, the mean rating curve, when well defined, is much more accurate than the individual measurements. Numerous tests and experiments have been made to test the accuracy of current-meter work. These show that it compares very favorably with the results from standard weirs and, owing to simplicity of methods, usually gives results that are much more reliable than those from stations at dams, where uncertainty regarding the coefficient and complicated conditions of flow prevail.

The work is, of course, dependent on the reliability of the observers. With relatively few exceptions, the observers perform their work honestly. Care is taken, however, to watch them closely and to inquire into any discrepancies. It is, of course, obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in a period of one month, although a single day's reading may, when taken by itself, be considerably in error.

The effort is made to visit every station at least once each year for the purpose of making a measurement to determine the constancy of conditions of flow since the last measurement made during the preceding year, and also to check the elevation of the gage. On account of lack of funds or for other causes some stations were not visited during the current year. If conditions of flow have been reasonably permanent up to the time of the last preceding measurement it is considered best to publish values of discharge on the basis of the latest verified rating curve rather than to omit them altogether, although it should be distinctly understood that such records are at times subject to considerable error. This is also true, although to a less degree, of the period of records since the date of the last measurement of the current year. As a rule, the accuracy notes are based on the assumption that the rating curve used is strictly applicable to the current year.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly dis-

charge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

USE OF THE DATA.

In general, the policy is followed of making available for the public the base data which are collected in the field each year by the Survey engineers. This is done to comply with the law, and also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to year nearly always throw new light on data already collected and published, and hence allow more or less improvement in the computed results of earlier years. It is therefore expected that the engineer who makes serious use of the data given in these papers will verify all ratings and make such adjustments in earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for five or ten year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The values in the table of monthly discharge are so arranged as to give only a general idea of the conditions of flow at the station, and it is not expected that they will be used for other than preliminary estimates. This is particularly true of the maximum and minimum figures, which, in the very nature of the method of collecting these data, are liable to large errors. The maximum value should be increased considerably for many stations in considering designs for spillways, and the minimum value should be considered for a group of, say, seven days and not for one day.

The daily discharges are published to allow a more detailed study of the variation in flow and to determine the periods of deficient flow.

COOPERATIVE DATA.

Cooperative data of various kinds and data regarding the run-off at many stations maintained wholly by private funds are incorporated in the surface water-supply reports of the United States Geological Survey.

Many stations throughout the country are maintained for specific purposes by private parties who supply the records gratuitously to the United States Geological Survey for publication. When such records are supplied by responsible parties and appear to be reasonably accurate they are verified, so far as possible, and estimated values of accuracy are given. Records clearly known to be worthless or misleading are not published. As it is, however, impossible to completely verify all such records furnished—because of lack of funds or for other causes—they are published for what they are worth, as they are of value as a matter of record and afford at least approximate information regarding stream flow at the particular localities. The Survey does not, however, assume any responsibility for inaccuracies found in such records, although most of them are believed to be reasonably good.

COOPERATION AND ACKNOWLEDGMENTS.

Special acknowledgments are due for assistance rendered or records furnished by the United States Engineer Corps, United States Weather Bureau, North Carolina Geological Survey, Geological Survey of Alabama, Wilson Aluminum Company, Roanoke Railway and Electric Company, Rockingham Power Company, and Tennessee Coal, Iron and Railroad Company.

DIVISION OF WORK.

The field data in the James and Roanoke drainage basins were collected under the direction of R. H. Bolster, assistant engineer, assisted by G. C. Stevens.

The field data for all drainage basins south of the Roanoke River were collected by M. R. Hall, district engineer, assisted by W. A. Lamb and E. H. Swett.

The ratings, special estimates and studies of the completed data were made by M. R. Hall and R. H. Bolster. The computations and the preparation of the completed data for publication were made under the direction of R. H. Bolster, by R. C. Rice, G. C. Stevens, H. D. Padgett, J. G. Mathers, E. H. Swett, and M. I. Walters. The computations for Camp Branch and Venison Branch were made by engineers of the Tennessee Coal, Iron and Railroad Company.

The entire report has been edited by Mrs. B. D. Wood.

SOUTH ATLANTIC STATES DRAINAGE.

JAMES RIVER DRAINAGE BASIN.

DESCRIPTION.

The basin of James River, the most important stream in Virginia, extends entirely across the southern part of the State from east to west. It is bounded on the north by the Potomac and York River basins and on the south by the basin of the Roanoke. Its entire area comprises approximately 9,700 square miles.

James River proper is formed by the junction of Jackson and Cowpasture rivers in the northern part of Botetourt County. Jackson River drains a long, narrow basin bounded on the west by the main range of the Allegheny Mountains and on the east by a secondary range of the same system. Still other ranges divide its basin into parallel valleys having steep sides and heavy slopes.

The basin of Cowpasture River, like that of the Jackson, is long and narrow. It lies parallel to and east of the Jackson basin and extends as far east as the Blue Ridge Mountains.

From the junction of Jackson and Cowpasture rivers the James flows in a general easterly course leading into the lower part of Chesapeake Bay. Its length is about 335 miles. The important tributaries in descending order are: Craig Creek and North, Pedlar, Buffalo, Rockfish, Hardware, Slate, Rivanna, Willis, Appomattox, and Chickahominy rivers.

Near Clifton Forge and again near Balcony Falls the James flows through ridges of the Alleghenies with sharp falls over beds of solid rock. At other points similar though less pronounced falls and rapids occur as the river cuts through the lesser foothills. The fall line is crossed at Richmond.

The James traverses three distinct geologic provinces—the Allegheny Mountain region, extending from the western edge of the basin to the Blue Ridge Mountains; the Piedmont Plateau, which extends from the Blue Ridge to the fall line, and the Coastal Plain east of Richmond. Within the first region the surface is much broken, slopes are steep, and here are found deposits of limestone, marble, lead ores, and anthracite and bituminous coal. Within the Piedmont Plateau region the topography is rolling and the uplands are rounded, with a resulting small range in altitude; this section contains the bituminous coal fields of Goochland, Chesterfield, Powhatan, and Prince Edward counties. The characteristic strata of the Coastal Plain are horizontal beds of clay and sand abounding in fossil shells; the region is generally low and in some parts swampy. The range of altitude for the entire basin is from sea level to 4,000 feet on the crest of the mountains.

Except on the mountain sides in the upper part of the basin, which are forested, the drainage area is largely cleared and under cultivation.

The mean annual rainfall, as shown by the records of the United States Weather Bureau, ranges from 40 to 50 inches, being heaviest at the mouth of the river and decreasing to 45 inches at Richmond. Between this latter point and the upper part of the basin the range is between 40 and 45 inches.

The river lies so far south that its flow is not seriously affected by ice; frozen periods usually last only from a few days to two or three weeks.

A study of the topographic sheets which cover nearly the entire drainage basin shows that the upper valleys are so narrow and the headwaters have so much fall that few sites could be utilized for reservoirs of any considerable capacity without building dams of great height and length.

A reconnaissance made in 1897 showed 18 dams across James River between Clifton Forge and Richmond. Many of these dams were built to divert water into the old James and Kanawha Canal, which followed the river from Richmond to Buchanan and at one time was utilized throughout that entire distance. The canal has now been abandoned and its right of way is owned by the Chesapeake and Ohio Railway. The use of the dams was abandoned with the canal, and although many of them are in good repair they have not been improved for power development.

The following publications contain information in regard to the surface waters of the James River basin:

Nineteenth Annual Report, U. S. Geol. Survey, part 4, pages 162–173; full report of the 1897 reconnaissance, including brief descriptions of the various dams and the profile of James River.

Hydrography of Virginia, Bulletin Geological Survey of Virginia, No. 3, 1906, pages 94–162; full report of 1897 reconnaissance, description of dams and profile of river; and all records and discharge data collected in the James River basin prior to 1906, revised by engineers of the United States Geological Survey, published by the Virginia Board of Agriculture and Immigration, Richmond, Va.

United States Forest Service Circulars Nos. 143 and 144, Relation of Southern Appalachian Mountains to the development of inland water navigation and water power.

The following gaging stations have been maintained in James River basin:

Jackson River at Covington, Va., 1907–8.
James River at Buchanan, Va., 1895–1909.
James River at Holcomb Rock, Va., 1900–1909.
James River at Cartersville, Va., 1899–1909.
Cowpasture River near Clifton Forge, Va., 1907–8.
North of James River near Glasgow, Va., 1895–1905.
Appomattox River at Mattoax, Va., 1900–1905.

JAMES RIVER AT BUCHANAN, VA.

The station, which is located at the highway bridge near the Chesapeake and Ohio Railway depot at Buchanan, was established August 18, 1895, to determine the availability of the upper James River for water power and other purposes. Previous to July 15, 1906, the observations of daily gage height were made by employees of the Geological Survey, but since that time the records have been obtained from the Weather Bureau.

Purgatory Creek, the nearest tributary, enters one-half mile below the bridge. The nearest important tributary is North Branch of James River, which enters 20 miles below Buchanan.

The ice conditions at this station are slight and usually last only for short periods.

The datum of the original wire gage, attached to the highway bridge, was lowered 2 feet April 3, 1897, to avoid negative readings; subsequently the datum of the gage has remained constant. The wire gage was replaced by a chain gage November 21, 1903.

The bed of the river under the bridge is composed of rock overlain with a heavy deposit of mud. There is a rock control several hundred feet below the station, but the plotting of the discharge measurements indicates changing conditions of flow at the bridge: The ratings developed are fairly accurate, however, for the periods which they cover.

Discharge measurements of James River at Buchanan, Va., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 22	G. C. Stevens	306	933	2.26	690
September 10	Stevens and Thomas	299	896	2.10	595

Mean daily gage height, in feet, of James River at Buchanan Va., for 1909.

[D. D. Booze, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.8	3.5	4.7	4.3	4.4	4.2	3.8	2.3	2.0	2.0	2.1	2.1
2	5.6	3.5	4.3	4.0	6.1	5.0	3.9	2.4	2.0	2.0	2.1	2.1
3	4.9	3.5	4.0	3.8	5.5	4.7	3.7	2.4	2.0	2.0	2.1	2.1
4	4.4	3.4	4.5	3.7	5.0	4.4	3.2	2.4	2.0	2.0	2.1	2.0
5	4.6	3.3	4.8	3.5	4.6	4.4	2.9	2.3	2.0	2.0	2.1	2.0
6	8.6	3.2	4.4	3.5	4.2	4.8	2.8	2.2	2.0	2.0	2.1	2.0
7	6.6	3.2	4.4	3.4	3.9	4.4	3.3	2.8	2.0	2.0	2.1	2.0
8	6.5	3.2	4.6	3.4	3.9	4.0	3.9	2.6	2.0	2.0	2.1	2.1
9	5.0	3.2	5.2	3.3	3.9	4.5	3.3	2.3	2.0	2.0	2.1	2.1
10	4.6	4.9	5.2	3.2	3.9	4.5	3.0	2.2	2.1	1.9	2.1	2.2
11	4.2	9.1	5.2	3.1	6.7	4.3	2.9	2.2	2.1	1.9	2.1	2.2
12	4.0	6.3	4.8	3.1	5.5	4.2	2.8	2.2	2.1	3.8	2.1	2.2
13	3.8	5.5	4.8	3.0	4.7	3.8	2.7	2.1	2.1	3.8	2.2	2.3
14	3.6	5.0	4.5	10.8	4.4	3.6	2.6	2.1	2.1	2.8	2.2	4.6
15	3.6	4.8	4.3	13.0	4.1	3.4	2.6	2.3	2.1	2.6	2.2	5.0

Mean daily gage height, in feet, of James River at Buchanan, Va., for 1909—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	4.3	4.8	4.1	7.0	3.9	3.3	2.6	2.7	2.0	2.4	2.1	4.0
17	6.6	5.3	3.9	6.0	3.7	3.2	2.5	2.6	2.0	2.3	2.1	3.5
18	6.0	5.1	3.8	5.3	3.5	3.5	2.4	2.6	4.8	2.3	2.1	3.1
19	5.5	4.6	3.7	4.8	3.3	3.2	2.4	2.4	4.0	2.3	2.1	2.8
20	5.1	4.8	3.6	4.4	3.7	3.1	2.3	2.3	2.7	2.2	2.1	2.6
21	5.4	4.8	3.6	4.0	3.8	3.0	2.3	2.2	2.3	2.2	2.1	2.4
22	5.2	4.8	3.6	3.8	10.0	2.9	2.2	2.2	2.3	2.1	2.1	2.3
23	5.8	4.9	3.5	4.2	7.5	2.8	2.3	2.2	2.2	2.1	2.1	2.8
24	6.2	5.3	4.0	4.8	6.0	2.8	2.2	2.1	2.2	2.1	2.1	2.8
25	6.1	6.5	4.4	5.3	5.0	2.7	2.2	2.1	2.2	2.2	2.1	2.6
26	5.6	6.0	7.5	4.8	6.7	2.9	2.2	2.0	2.2	2.2	2.1	2.2
27	4.9	5.4	6.0	4.4	8.2	3.0	2.2	2.0	2.1	2.2	2.1	2.3
28	4.5	5.0	5.0	4.0	6.7	2.9	2.2	2.0	2.1	2.2	2.1	2.3
29	4.0	.....	5.0	4.0	5.8	2.8	2.2	2.0	2.1	2.2	2.1	2.3
30	3.8	.....	4.8	3.9	5.0	2.7	2.3	2.0	2.0	2.2	2.1	2.2
31	3.6	.....	4.5	.....	4.4	.....	2.3	2.0	.....	2.2	.....	2.2

NOTE.—Probably ice conditions December 23 to 31.

Daily discharge, in second-feet, of James River at Buchanan, Va., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,580	2,180	4,450	3,620	3,820	3,430	2,680	745	515	515	585	585
2	6,480	2,180	3,620	3,040	7,720	5,100	2,860	835	515	515	585	585
3	4,880	2,180	3,040	2,680	6,250	4,450	2,500	835	515	515	585	585
4	3,820	2,030	4,030	2,500	5,100	3,820	1,740	835	515	515	585	515
5	4,240	1,880	4,660	2,180	4,240	3,820	1,360	745	515	515	585	515
6	15,100	1,740	3,820	2,180	3,430	4,660	1,240	660	515	515	585	515
7	9,030	1,740	3,820	2,030	2,860	3,820	1,880	1,240	515	515	585	515
8	8,760	1,740	4,240	2,030	2,860	3,040	2,860	1,030	515	515	585	585
9	5,100	1,740	5,560	1,880	2,860	4,030	1,880	745	515	515	585	585
10	4,240	4,880	5,560	1,740	2,860	4,030	1,480	660	585	450	585	660
11	3,430	16,800	5,560	1,610	9,300	3,620	1,360	660	585	450	585	660
12	3,040	8,230	4,660	1,610	6,250	3,430	1,240	660	585	2,680	585	660
13	2,680	6,250	4,660	1,480	4,450	2,680	1,140	585	585	2,680	660	745
14	2,340	5,100	4,030	23,600	3,820	2,340	1,030	585	585	1,240	660	4,240
15	2,340	4,660	3,620	33,600	3,240	2,030	1,030	745	585	1,030	660	5,100
16	3,620	4,660	3,240	10,100	2,860	1,880	1,030	1,140	515	835	585	3,040
17	9,030	5,780	2,860	7,460	2,500	1,740	930	1,030	515	745	585	2,180
18	7,460	5,330	2,680	5,780	2,180	2,180	835	1,030	4,660	745	585	1,610
19	6,250	4,240	2,500	4,660	1,880	1,740	835	835	3,040	745	585	1,240
20	5,330	4,660	2,340	3,820	2,500	1,610	745	745	1,140	660	585	1,030
21	6,020	4,660	2,340	3,040	2,680	1,480	745	660	745	660	585	835
22	5,560	4,660	2,340	2,680	20,300	1,360	660	660	745	585	585	745
23	6,960	4,880	2,180	3,430	11,600	1,240	745	660	660	585	585	860
24	7,970	5,780	3,040	4,660	7,460	1,240	660	585	660	585	585	710
25	7,720	8,760	3,820	5,780	5,100	1,140	660	585	660	660	585	550
26	6,480	7,460	11,600	4,660	9,300	1,360	660	515	660	660	585	550
27	4,880	6,020	7,460	3,820	13,800	1,480	660	515	585	660	585	630
28	4,030	5,100	5,100	3,040	9,300	1,360	660	515	585	660	585	640
29	3,040	.....	5,100	3,040	6,960	1,240	660	515	585	660	585	520
30	2,680	.....	4,660	2,860	5,100	1,140	745	515	515	660	585	530
31	2,340	.....	4,030	.....	3,820	.....	745	515	.....	660	.....	490

NOTE.—The above daily discharges are based on a rating well defined below 20,300 second-feet. Discharges for December 23 to 31, because of probable ice conditions, estimated at about 28 per cent of the daily discharge at Cartersville.

Monthly discharge of James River at Buchanan, Va., for 1909.

[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.		
January	15,100	2,340	5,630	2.73	3.15	A.
February	16,800	1,740	4,830	2.34	2.44	A.
March	11,600	2,180	4,210	2.04	2.35	A.
April	33,600	1,480	5,150	2.50	2.79	B.
May	20,300	1,880	5,690	2.76	3.18	B.
June	5,100	1,140	2,550	1.24	1.38	A.
July	2,860	660	1,230	.597	.69	A.
August	1,240	515	729	.354	.41	A.
September	4,660	515	814	.395	.44	A.
October	2,680	450	772	.375	.43	B.
November	660	585	592	.287	.32	A.
December	5,100	.....	1,070	.519	.60	B.
The year	33,600	.....	2,770	1.34	18.18	

JAMES RIVER AT HOLCOMB ROCK, VA.

The station, which is located at the works of the Wilson Aluminum Company, at Holcomb Rock, was established in 1899, and from January, 1900, to date two readings daily have been furnished to the United States Geological Survey through the courtesy of George O. Seward, general manager of the company.

The gage consists of a copper float inclosed in a stilling box, and a vertical rod extending up through the power-house floor. No rating curve has been developed for this station.

Daily gage height, in feet, of James River at Holcomb Rock, Va., for 1909.

[G. L. Price and J. H. Webb, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.0	2.85	3.9	3.3	3.25	4.25	2.55	1.2	1.0	1.0	1.0	1.0
2	5.6	2.5	3.4	3.1	5.1	4.55	3.2	1.65	1.05	.85	1.05	1.0
3	4.2	2.5	3.4	2.9	4.7	3.9	2.55	1.6	.8	.7	1.0	1.0
4	3.7	2.45	3.6	2.7	3.9	4.95	2.2	1.6	.9	.95	1.0	1.0
5	4.65	2.4	4.1	2.8	3.5	4.85	2.0	1.4	.75	.9	.9	.75
6	8.65	2.35	3.5	2.6	3.15	4.3	2.0	1.6	.85	.85	1.0	1.05
7	7.05	2.2	3.35	2.45	2.85	3.65	2.5	1.55	.95	.8	.8	1.0
8	5.35	2.3	3.75	2.35	2.65	3.5	2.75	1.6	1.05	.8	1.1	1.0
9	4.3	2.3	4.2	2.3	2.6	3.5	2.3	1.55	1.35	.75	1.0	1.0
10	3.65	5.45	4.2	2.2	3.0	3.65	2.05	1.45	1.1	.85	1.0	1.0
11	3.25	9.65	4.2	2.05	5.9	3.4	1.8	1.4	1.1	1.05	1.05	1.25
12	3.1	7.0	3.75	2.05	4.7	3.25	1.95	1.25	.95	3.15	1.0	.85
13	2.85	5.0	3.55	2.1	3.75	2.95	1.8	1.1	1.0	2.35	1.0	1.45
14	2.7	4.35	3.4	10.75	3.5	3.1	1.5	1.05	1.0	1.75	.9	5.15
15	2.7	4.05	3.25	12.75	2.95	2.75	1.5	1.3	.95	1.55	1.1	4.75
16	3.25	3.8	3.05	7.5	2.7	2.55	1.5	1.55	1.0	1.35	1.1	3.15
17	5.7	4.0	2.9	5.6	2.7	2.6	1.6	1.65	1.0	1.1	1.0	2.4
18	5.55	4.45	2.75	4.5	2.4	3.1	1.25	1.75	2.8	1.2	1.0	2.2
19	5.0	3.8	2.65	4.05	2.25	2.45	1.65	1.6	1.65	1.15	1.0	1.85
20	4.55	3.9	2.55	3.55	2.15	2.25	1.45	1.5	1.75	1.2	1.0	1.85

Daily gage height, in feet, of James River at Holcomb Rock, Va., for 1909—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	4.7	4.0	2.35	3.35	4.55	2.25	1.4	1.3	1.45	1.15	.85	1.6
22	5.25	4.1	2.6	3.25	10.4	2.15	1.35	.9	1.25	.9	1.0	1.45
23	5.5	4.2	2.65	3.25	7.7	2.0	1.35	1.1	1.2	.9	1.0	1.5
24	6.1	5.0	3.1	4.15	5.6	2.05	1.4	1.15	1.15	.8	1.0	1.25
25	6.05	6.05	4.55	4.5	4.4	2.0	1.1	1.05	1.0	.95	1.0	1.3
26	5.15	6.1	7.5	3.95	5.95	2.0	1.4	1.25	.85	1.1	.95	1.35
27	4.3	5.15	5.8	3.5	7.95	2.0	1.5	.9	1.2	1.15	.95	1.35
28	3.7	4.35	4.7	3.15	6.45	2.15	1.4	1.0	1.0	1.2	.85	1.4
29	3.3	.....	4.25	2.95	5.0	2.3	1.3	.75	1.05	1.15	1.0	1.4
30	3.2	.....	4.1	2.9	3.9	2.5	1.3	1.05	1.0	.95	1.0	1.15
31	3.0	.....	3.7	.....	3.55	.....	1.45	1.05	.....	.9	.....	1.0

JAMES RIVER AT CARTERSVILLE, VA.

The gaging station at Cartersville, which is located at the highway bridge crossing the James between Pemberton and Cartersville, about 50 miles above Richmond, was established January 1, 1899, to determine the flow of James River above Richmond for navigation and power.

Willis River enters James River from the south about 1 mile above the station, and Rivanna River comes in from the north about 7 miles above. No important tributaries enter between Cartersville and Richmond.

During severe winters the discharge at this station is affected for short periods by ice conditions.

The datum of the chain gage, which is attached to the bridge, has remained the same since the establishment of the station.

Discharge measurements are made from the bridge. Conditions of flow change somewhat from year to year, necessitating three or four measurements annually to adequately define the discharge curve. This is due to the great range of stage and débris and sediment carried in the James. The left bank overflows for several hundred feet at a stage of about 20 feet. Above the overflow point the discharge is uncertain. The right bank does not overflow.

Discharge measurements of James River at Cartersville, Va., in 1907–1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907.					
July 27	R. G. Knight	675	1,790	1.76	3,220
1908.					
April 28	Follansbee and Barrows	700	3,150	3.63	6,420
1909.					
July 21	G. C. Stevens	650	1,660	1.91	2,700
September 9	Stevens and Thomas	633	1,170	1.09	1,470

Daily gage height, in feet, of James River at Cartersville, Va., for 1909.

[B. W. Palmore, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.15	4.52	6.12	5.16	4.75	4.98	3.32	1.42	1.18	1.24	1.32	1.24
2	8.38	3.86	5.70	4.85	6.00	6.28	3.45	3.02	1.14	1.18	1.26	1.22
3	7.45	3.75	5.20	4.50	5.80	5.85	3.50	2.68	1.10	1.08	1.24	1.18
4	6.18	3.70	5.58	4.26	6.82	6.96	3.30	2.08	1.04	1.06	1.26	1.16
5	8.20	3.66	5.55	4.12	5.18	9.32	3.05	1.89	1.01	1.04	1.29	1.18
6	12.22	3.55	5.50	3.98	4.68	8.02	2.86	1.88	1.06	1.06	1.32	1.26
7	10.68	3.45	6.18	3.85	4.34	6.35	3.10	1.95	1.02	1.08	1.26	1.28
8	8.98	3.42	5.98	3.52	4.04	5.48	3.18	1.92	1.06	1.06	1.26	1.34
9	7.40	4.22	5.72	3.36	3.81	5.05	2.98	1.68	1.10	1.06	1.19	1.38
10	6.20	7.02	5.75	3.15	3.63	7.12	3.15	1.70	1.46	1.06	1.22	1.42
11	5.32	9.24	5.79	3.12	3.98	6.56	2.92	1.68	1.96	1.04	1.32	1.36
12	4.88	11.25	5.55	3.15	6.12	6.64	2.42	1.42	1.66	1.28	1.31	1.32
13	4.41	9.02	5.26	3.20	5.55	6.00	2.22	1.44	1.36	2.68	1.28	1.40
14	4.17	7.58	5.05	6.15	4.78	5.05	2.26	1.42	1.20	3.10	1.27	4.78
15	4.14	6.08	4.76	11.95	4.22	4.70	2.12	1.38	1.31	2.58	1.26	5.84
16	4.25	5.68	4.59	15.68	3.88	4.85	2.08	1.52	1.32	2.27	1.25	6.18
17	5.55	5.38	4.47	9.02	3.52	4.50	2.02	1.98	1.38	2.18	1.32	4.26
18	6.86	5.10	4.10	7.98	3.38	5.35	1.94	2.20	1.55	1.64	1.32	3.44
19	7.45	5.95	3.92	6.22	3.06	5.58	1.82	2.04	1.88	1.51	1.34	2.98
20	6.64	7.78	3.84	5.62	2.88	5.05	1.72	1.82	2.84	1.50	1.34	2.54
21	6.68	7.68	3.72	5.28	3.55	3.48	1.84	1.68	2.42	1.36	1.30	2.26
22	6.84	6.05	3.92	4.88	8.10	3.32	1.72	1.52	2.06	1.38	1.32	2.29
23	7.74	6.86	4.16	4.68	11.60	3.14	1.58	1.40	1.88	1.38	1.31	2.02
24	8.12	7.48	4.18	5.00	8.82	3.01	1.54	1.36	1.68	1.34	1.34	1.88
25	7.75	8.98	5.20	5.48	7.15	2.98	1.52	1.34	1.48	1.36	1.36	1.54
26	7.38	8.32	8.00	5.68	6.46	3.00	1.50	1.28	1.42	1.35	1.34	1.54
27	6.68	8.11	8.86	5.22	7.48	2.98	1.40	1.30	1.24	1.34	1.24	1.72
28	5.82	7.52	8.26	4.74	9.08	3.08	1.60	1.28	1.18	1.28	1.26	1.75
29	5.32	.....	7.02	4.35	7.80	3.35	1.91	1.28	1.26	1.28	1.26	1.58
30	5.15	.....	6.15	4.12	6.88	3.70	1.66	1.22	1.24	1.29	1.25	1.48
31	4.86	.....	5.58	.....	5.28	.....	1.58	1.16	.....	1.28	.....	1.40

NOTE.—Ice in river December 22 to 31, but river was not closed over.

Daily discharge, in second-feet, of James River at Cartersville, Va., for 1907–1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	12,400	5,880	8,430	7,240	7,830	11,800	6,530	2,750	2,530	4,780	2,210	7,080
2	14,500	6,720	10,000	6,720	7,850	71,300	5,860	2,790	2,210	4,320	2,310	6,320
3	16,900	6,560	11,400	10,400	8,310	45,100	5,770	2,510	2,080	4,240	5,020	5,860
4	14,000	6,490	15,000	9,030	7,640	30,100	4,910	2,860	6,170	3,640	5,750	5,290
5	11,400	6,620	15,200	7,640	7,540	19,300	4,660	2,490	8,500	3,320	4,990	4,700
6	10,700	6,900	11,600	7,080	6,950	17,100	4,410	2,190	4,490	3,130	5,770	4,660
7	9,480	6,620	10,600	12,300	14,500	13,500	4,320	2,490	2,640	2,900	4,660	4,450
8	8,740	6,320	9,400	19,600	12,000	12,400	4,780	2,620	2,670	2,750	4,180	4,240
9	8,120	6,030	8,670	34,400	25,400	11,800	4,000	2,570	2,820	2,940	3,640	4,800
10	7,360	7,240	9,200	40,900	17,800	11,700	4,080	3,070	2,690	2,820	3,840	10,300
11	6,720	8,070	9,660	34,000	14,000	16,200	3,600	4,080	2,750	2,670	4,490	29,300
12	7,020	8,360	10,000	22,300	11,100	13,500	3,640	4,200	3,130	2,860	4,620	26,400
13	6,900	8,670	13,000	17,400	10,800	12,900	3,760	4,600	3,480	2,980	6,300	21,300
14	7,020	8,360	12,700	17,400	9,400	25,800	3,840	4,620	4,240	2,670	6,490	21,300
15	6,780	8,020	17,200	18,200	8,550	52,400	3,760	3,580	3,240	2,880	5,220	22,300
16	8,070	7,780	17,500	11,000	7,950	44,900	3,200	2,920	3,130	2,670	4,660	17,700
17	9,400	7,240	14,600	9,530	10,100	22,300	3,440	2,800	2,750	2,350	4,530	13,800
18	13,600	6,950	12,500	8,840	8,840	16,800	3,440	3,700	2,640	2,570	4,280	13,000
19	17,900	6,850	11,000	8,430	7,830	12,800	3,280	2,860	2,690	2,150	7,180	10,700
20	18,000	6,390	10,700	8,310	7,130	11,100	5,950	2,490	2,570	2,170	7,080	9,680
21	17,100	6,440	10,000	7,830	6,560	9,900	5,660	2,600	2,670	2,280	6,950	8,310
22	14,900	6,390	12,400	7,360	5,770	8,310	4,040	2,670	2,920	2,080	8,310	7,780
23	11,100	5,880	11,900	7,240	5,590	9,030	3,720	2,310	8,310	2,210	10,000	12,600
24	8,980	5,660	10,300	11,600	5,220	9,830	3,280	2,980	61,700	2,170	23,500	39,000
25	7,590	5,290	8,910	10,400	5,220	9,900	3,110	2,880	31,400	2,020	28,200	34,800
26	7,480	7,080	8,070	11,400	5,330	8,670	2,940	2,790	14,900	2,070	22,300	25,800
27	6,780	7,310	7,130	11,600	5,510	7,590	2,920	3,320	9,530	2,210	17,400	18,400
28	6,210	7,880	6,950	10,500	5,440	9,780	2,980	3,860	7,270	2,030	12,300	17,500
29	5,550	.....	6,490	9,230	4,740	8,070	2,690	3,280	6,390	2,670	10,200	16,200
30	5,590	.....	5,880	8,670	4,530	7,480	2,530	2,750	5,900	2,710	7,830	12,300
31	5,880	.....	5,880	.....	4,800	.....	2,860	2,490	.....	2,280	.....	14,300

NOTE.—The daily discharges for 1907–1909 were obtained from two rating curves well defined below 25,800 second-feet. Above this the rating has been extended by a study of the area and velocity curves. Discharges December 24 to 31, 1909, were reduced 10 per cent because of slight ice conditions.

Daily discharge, in second-feet, of James River at Cartersville, Va., for 1907–1909—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	14,800	6,800	12,200	12,900	8,080	8,260	3,810	4,500	4,350	3,630	15,200	3,360
2	14,400	7,040	10,500	28,000	7,480	7,210	4,850	3,790	3,870	3,100	10,700	3,550
3	12,200	7,180	10,200	27,000	7,660	6,750	3,950	2,980	3,400	2,540	8,130	3,360
4	10,600	6,870	13,600	22,400	7,410	12,000	4,350	2,610	3,120	2,440	6,890	3,060
5	11,500	6,560	12,800	17,800	7,140	16,800	3,950	2,720	2,910	2,330	5,740	3,230
6	10,600	6,610	17,800	13,600	7,410	12,500	3,750	2,630	19,600	2,130	5,110	3,360
7	10,600	7,040	22,300	11,800	12,000	14,200	4,560	2,450	15,400	2,130	4,810	7,160
8	41,000	6,700	27,300	10,700	19,000	10,200	5,240	2,580	8,700	2,130	4,500	9,240
9	21,100	6,320	22,500	9,700	22,500	8,290	4,850	2,560	5,740	2,100	4,150	6,340
10	15,800	6,220	20,000	8,950	18,500	7,820	4,560	3,850	4,560	2,180	3,830	5,350
11	11,800	6,560	16,500	8,440	13,400	7,480	4,190	3,360	4,030	2,440	3,950	5,350
12	31,800	6,560	14,500	8,000	11,200	7,060	3,790	3,250	3,610	2,370	3,810	6,870
13	54,000	8,570	13,100	7,840	9,950	6,630	2,940	4,350	3,250	2,370	3,750	8,970
14	63,300	14,900	11,800	7,680	8,340	6,530	2,670	3,300	2,910	2,490	3,570	8,080
15	30,900	35,800	10,600	7,540	7,310	6,850	2,650	2,790	2,740	2,670	4,350	8,180
16	22,500	61,900	9,860	7,820	6,440	15,400	2,440	2,510	2,610	2,400	5,240	6,920
17	17,300	64,700	9,570	8,180	5,690	10,100	2,030	2,220	2,490	2,280	4,350	5,970
18	14,500	29,700	9,320	7,280	6,270	9,320	1,940	2,160	2,330	2,130	4,350	5,350
19	12,900	21,800	9,650	7,410	7,710	8,340	1,890	1,890	2,200	1,960	4,010	4,980
20	11,100	21,200	11,400	7,740	9,780	5,690	1,810	2,510	2,060	1,990	4,560	4,770
21	10,100	17,800	12,800	7,310	19,600	5,420	1,810	2,470	2,030	1,960	6,920	4,560
22	9,110	14,800	13,200	6,940	23,500	7,260	1,880	1,940	1,990	1,980	6,870	4,500
23	8,570	13,200	12,300	6,460	19,100	5,580	2,450	1,860	2,060	1,990	6,100	4,810
24	7,640	10,700	13,000	6,270	20,500	6,580	4,560	1,730	2,060	2,560	5,280	4,890
25	7,240	9,890	12,200	5,850	16,600	5,870	4,470	1,930	1,940	6,680	4,850	5,690
26	6,750	13,500	11,600	6,040	13,900	4,850	4,150	39,900	1,940	13,200	4,560	6,100
27	8,730	19,500	10,800	5,970	11,300	4,090	7,310	25,200	1,930	8,260	4,430	7,160
28	8,390	14,400	9,240	6,410	10,100	3,830	10,200	15,900	3,670	6,820	3,990	8,680
29	8,130	13,100	9,000	7,280	10,400	3,550	6,530	11,300	9,810	10,300	3,750	9,890
30	8,730	.....	8,310	6,820	9,860	3,830	7,460	7,040	5,510	19,600	3,550	13,600
31	7,360	.....	8,620	.....	11,600	.....	5,580	5,420	.....	20,300	.....	17,700
1909.												
1	22,800	8,700	13,200	10,400	9,320	9,950	5,740	1,990	1,600	1,690	1,820	1,690
2	20,200	7,010	12,000	9,600	12,800	13,600	6,040	5,060	1,530	1,600	1,730	1,660
3	17,200	6,750	10,600	8,650	12,200	12,400	6,150	4,350	1,470	1,440	1,690	1,600
4	13,400	6,630	11,600	8,030	15,300	15,700	5,690	3,170	1,370	1,410	1,730	1,570
5	19,600	6,530	11,500	7,660	10,500	23,400	5,130	2,810	1,330	1,370	1,770	1,600
6	33,700	6,270	11,400	7,310	9,140	19,000	4,730	2,790	1,410	1,410	1,820	1,730
7	28,100	6,040	13,400	6,990	8,230	13,900	5,240	2,920	1,340	1,440	1,730	1,760
8	22,200	5,970	12,800	6,200	7,460	11,300	5,420	2,870	1,410	1,410	1,730	1,860
9	17,100	7,920	12,000	5,830	6,890	10,100	4,980	2,440	1,470	1,410	1,610	1,930
10	13,400	15,900	12,100	5,350	6,460	16,200	5,350	2,470	2,060	1,410	1,660	1,990
11	10,900	23,100	12,200	5,280	7,310	14,500	4,850	2,440	2,940	1,370	1,820	1,890
12	9,660	30,200	11,500	5,350	13,200	14,700	3,830	1,990	2,400	1,760	1,810	1,820
13	8,420	22,400	10,700	5,460	11,500	12,800	3,440	2,030	1,890	4,350	1,760	1,960
14	7,790	17,600	10,100	13,300	9,410	10,100	3,510	1,990	1,630	5,240	1,740	9,410
15	7,710	13,100	9,350	32,700	7,920	9,190	3,250	1,930	1,810	4,150	1,730	12,400
16	8,000	11,900	8,890	47,300	7,060	9,600	3,170	2,160	1,820	3,530	1,710	13,400
17	11,500	11,100	8,570	22,400	6,200	8,650	3,060	2,980	1,930	3,360	1,820	8,030
18	15,400	10,300	7,610	18,900	5,870	11,000	2,910	3,400	2,220	2,370	1,820	6,010
19	17,200	12,700	7,160	13,500	5,150	11,600	2,690	3,100	2,790	2,150	1,860	4,980
20	14,700	18,300	6,970	11,700	4,770	10,100	2,510	2,690	4,680	2,130	1,860	4,070
21	14,800	17,900	6,680	10,800	6,270	6,100	2,720	2,440	3,830	1,890	1,790	3,510
22	15,300	13,000	7,160	9,680	19,300	5,740	2,510	2,160	3,130	1,930	1,820	3,570
23	18,100	15,400	7,770	9,140	31,400	5,330	2,270	1,960	2,790	1,930	1,810	3,060
24	19,400	17,300	7,820	10,000	21,700	5,040	2,200	1,890	2,440	1,860	1,860	2,510
25	18,200	22,200	10,600	11,300	16,300	4,980	2,160	1,860	2,100	1,890	1,890	1,980
26	17,000	20,000	19,000	11,900	14,200	5,020	2,130	1,760	1,990	1,880	1,860	1,980
27	14,800	19,300	21,800	10,600	17,300	4,980	1,960	1,790	1,690	1,860	1,690	2,260
28	12,300	17,400	19,800	9,300	22,600	5,200	2,300	1,760	1,600	1,760	1,730	2,300
29	10,900	.....	15,900	8,260	18,300	5,800	2,850	1,760	1,730	1,760	1,730	2,040
30	10,400	.....	13,300	7,660	15,400	6,630	2,400	1,660	1,690	1,770	1,710	1,890
31	9,620	.....	11,600	.....	10,800	.....	2,270	1,570	.....	1,760	.....	1,760

NOTE.—The daily discharges for 1907–1909 were obtained from two rating curves well defined below 25,800 second-feet. Above this the rating has been extended by a study of the area and velocity curves. Discharges December 24 to 31, 1909, were reduced 10 per cent because of slight ice conditions.

Monthly discharge of James River at Cartersville, Va., for 1907–1909.

[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.		
1907.						
January	18,000	5,550	10,100	1.62	1.87	A.
February	8,670	5,290	6,930	1.11	1.16	A.
March	17,500	5,880	10,700	1.72	1.98	A.
April	40,900	6,720	13,600	2.18	2.43	B.
May	25,400	4,530	8,720	1.40	1.61	B.
June	71,300	7,480	18,700	3.00	3.35	B.
July	6,530	2,530	4,000	.642	.74	A.
August	4,620	2,190	3,040	.488	.56	A.
September	61,700	2,080	7,280	1.17	1.30	B.
October	4,780	2,020	2,760	.443	.51	A.
November	28,200	2,210	8,130	1.30	1.45	B.
December	39,000	4,240	14,500	2.33	2.69	B.
The year	71,300	2,020	9,040	1.45	19.65	
1908.						
January	63,300	6,750	16,900	2.71	3.12	B.
February	64,700	6,220	16,100	2.58	2.78	B.
March	27,300	8,310	13,100	2.10	2.42	B.
April	28,000	5,850	10,200	1.64	1.83	B.
May	23,500	5,690	11,900	1.91	2.20	A.
June	16,800	3,550	7,940	1.27	1.42	A.
July	10,200	1,810	4,080	.655	.76	A.
August	39,900	1,730	5,600	.899	1.04	A.
September	19,600	1,930	4,430	.711	.79	A.
October	20,300	1,960	4,560	.732	.84	A.
November	15,200	3,550	5,380	.864	.96	A.
December	17,700	3,060	6,480	1.04	1.20	A.
The year	64,700	1,730	8,890	1.43	19.36	
1909.						
January	33,700	7,710	15,500	2.49	2.87	B.
February	30,200	5,970	14,000	2.25	2.34	B.
March	21,800	6,680	11,500	1.85	2.13	A.
April	47,300	5,280	11,700	1.88	2.10	B.
May	31,400	4,770	11,900	1.91	2.20	B.
June	23,400	4,980	10,400	1.67	1.86	A.
July	6,150	1,960	3,660	.587	.68	A.
August	5,060	1,570	2,460	.395	.46	A.
September	4,680	1,330	2,070	.332	.37	A.
October	5,240	1,370	2,110	.339	.39	A.
November	1,890	1,610	1,770	.284	.32	A.
December	13,400	1,570	3,490	.560	.65	B.
The year	47,300	1,330	7,550	1.21	16.37	

ROANOKE RIVER DRAINAGE BASIN.

DESCRIPTION.

Roanoke River is formed by the North and South forks, which rise among the eastern foothills of the Appalachian Mountains and unite near Lafayette, at the eastern edge of Montgomery County. From this junction the river flows in a general southeasterly direction and empties into the Atlantic through Albemarle Sound in North Carolina. The total drainage area is about 9,200 square miles. The section of river extending from a short distance below Roanoke to the junction of the Dan is known locally as Staunton River, and was so called in the reports of the United States Geological Survey prior to 1905.

Dan River, which rises in Surry County, N. C., and Patrick County, Va., and empties into the Roanoke near Clarksville, in the southwestern part of Mecklenberg County, Va., is by far the largest tributary, the other streams of the basin being relatively small and unimportant.

The drainage basin of the Roanoke is divided into two nearly equal parts by the fall line, which crosses the river between Weldon and Gaston. The eastern part, which is known geologically as the Coastal Plain, is built up of unconsolidated sands, gravels, loams, clays, and marls of recent geologic age. It is low and flat and so poorly drained that a large proportion of the area is swampy. The general slope of this section of the basin is from 1 to 3 feet per mile. The river is sluggish and is navigable by light-draft boats at all seasons as far west as Weldon. Above the fall line in the region known as the Piedmont Plateau, the country is more broken, and the river has greater fall, having cut its bed down to the underlying metamorphic rocks. Building stones are found in abundance in different sections. Along the river are many fine bottoms, which contain some of the best farming lands in the region. The surface is undulating, and the hills rise higher and higher toward the western margin. Altitudes within the basin range from sea level to 3,000 feet.

The Coastal Plain section of the basin is quite heavily timbered, and large quantities of timber and shingles are shipped. In the Piedmont Plateau area the proportion of forest covering has not been ascertained except for the area drained by the Dan, in which there are extensive timbered areas.

The mean annual rainfall for the drainage basin within the Piedmont Plateau ranges from 38 to 47 inches in different parts of the area, as determined from six Weather Bureau stations having records of five to sixteen years in length. In the Coastal Plain section the rainfall is somewhat greater, increasing toward coast line.

The drainage area of the Roanoke lies so far south the flow of the stream is relatively little affected by ice conditions.

The area contains no lakes, but owing to the hilly character of the upper basin sites for reservoirs of moderate capacity probably exist. Especially is this true for the portion of the basin drained by Dan River, where the river bed is solid rock overlain with sands and gravel between the rapids, affording excellent facilities for dams.

In 1905 a survey of Roanoke River was made by the United States Geological Survey from Roanoke, Va., to Weldon, N. C. This survey showed that the fall between the two points was 976 feet in a distance of 231 miles, or an average of 4.2 feet per mile.[a]

The United States Geological Survey has maintained records of flow in this basin since 1896, and the records compiled since that date

[a] Hydrography of Virginia: Bull. Geol. Survey Virginia No. 3, pp. 166-167.

show the year of greatest run-off to be 1901 and that of least run-off 1904. The total flow in the latter year was less than half that of the former. The region is subject to heavy rainstorms, which produce floods that rise very rapidly and subside as quickly.

The following special reports contain information regarding the surface waters of the Roanoke River basin:

Hydrography of Virginia: Bull. Geol. Survey of Virginia No. 3, 1906, pp. 163–213 (published by Virginia Board of Agriculture and Immigration, Richmond, Va.). This contains all records and discharge data collected in the Roanoke basin prior to 1906, revised by engineers of the United States Geological Survey.

Water power in North Carolina: Bull. No. 8, North Carolina Geol. Survey; postage 16 cents. This publication includes information regarding the water power of the Roanoke and its tributaries in North Carolina.

Water powers of North Carolina: Bull. North Carolina Geol. Survey (in preparation), Dr. J. H. Pratt, state geologist, Chapel Hill, N. C. This includes all records of discharge in the Roanoke basin prior to 1908, collected by engineers of the United States Geological Survey, except for Roanoke River at Roanoke, Tinker Creek at Roanoke, Back Creek near Roanoke, and Banister River at Houston.

Relation of Southern Appalachian Mountains to the development of inland water navigation and water power: U. S. Forest Service Circulars Nos. 143 and 144.

The following gaging stations have been maintained in the Roanoke basin by the United States Geological Survey:

Roanoke at Roanoke, Va., 1896–1909.
Roanoke at Randolph, Va., 1900–1906.
Roanoke above the Dan at Clarksville, Va., 1895–1898.
Roanoke at Neal, N. C., 1896–1903.
Tinker Creek at Roanoke, Va., 1907–8.
Back Creek near Roanoke, Va., 1907–8.
Dan at Madison, N. C., 1903–1908.
Dan at South Boston, Va., 1900–1907.
Dan at Clarksville, Va., 1895–1898.
Banister at Houston, Va., 1904–5.

ROANOKE RIVER AT ROANOKE, VA.

The station was established July 10, 1896, at the Walnut Street Bridge in Roanoke, to determine the availability of the stream for water-power development and to obtain comparative data. Observation of gage heights was discontinued July 14, 1906, but was resumed May 7, 1908, and the records are now being furnished to the United States Geological Survey through the courtesy of the Roanoke Railway and Electric Company.

The nearest important tributary is Tinker Creek, which enters Roanoke River about 3 miles below the gaging section. The overflow from Crystal Spring, which is approximately 2 second-feet, enters the Roanoke between Walnut Street Bridge, where the chain gage is located, and Jefferson Street Bridge, one-third mile above, where discharge measurements are usually made. Crystal Spring is the source of water supply for the city of Roanoke.

The records indicate that the discharge is not materially affected by ice conditions.

No change has been made in the datum of the gage. Owing to varying conditions of flow frequent measurements are required at low stages to adequately define the true discharge curve from year to year.

Discharge measurements of Roanoke River at Roanoke, Va., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 22[a]	G. C. Stevens	116	185	0.90	136
July 23[b]	do	102	251	1.00	151
September 10[a]	Stevens and Thomas	136	251	1.29	274

[a] Measurement at Walnut Street Bridge.
[b] Measurement at Jefferson Street Bridge. Gage height on staff gage at Jefferson Street Bridge.

Daily gage height, in feet, of Roanoke River at Roanoke, Va., for 1909.

[C. C. Hogshead, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	1.4	2.0	1.48	3.0	1.85	1.4	1.0	0.8	0.8	0.85	0.8
2	2.5	1.4	2.1	1.48	2.6	1.75	1.3	1.65	.8	.8	.85	.8
3	2.2	1.45	2.15	1.45	2.3	1.65	1.25	1.5	.75	.7	.75	.8
4	2.0	1.45	2.1	1.4	2.0	2.3	1.1	1.35	.75	.8	.8	.8
5	3.05	1.45	2.05	1.35	1.85	2.05	1.1	1.05	.7	.8	.8	.8
6	3.05	1.4	2.2	1.32	1.75	1.95	1.2	2.25	.8	.65	.7	.8
7	2.5	1.4	2.25	1.3	1.65	1.85	2.0	2.25	.8	.75	.8	.8
8	2.3	1.38	2.2	1.27	1.6	1.6	1.4	1.7	.85	.75	.8	.95
9	2.0	1.45	2.1	1.25	1.5	2.1	1.3	1.45	.85	.65	.7	.9
10	1.9	3.1	2.05	1.22	1.8	1.8	1.25	1.05	1.45	.75	.8	.9
11	1.8	2.4	1.85	1.22	2.0	1.7	1.2	1.0	1.2	1.7	.8	.9
12	1.7	2.0	1.82	1.2	1.8	1.6	1.15	1.0	1.0	1.75	.7	.9
13	1.65	1.95	1.79	1.3	1.65	1.5	1.1	1.0	.8	1.7	.8	.9
14	1.55	1.8	1.75	7.5	1.55	1.45	1.1	1.05	.85	1.5	.8	1.5
15	1.65	1.75	1.65	3.5	1.5	1.4	1.05	1.4	.85	1.1	.7	1.2
16	1.8	1.7	1.58	2.6	1.45	1.35	1.0	1.5	.8	1.0	.8	1.0
17	2.1	1.6	1.54	2.2	1.4	1.35	1.2	1.25	.9	.95	.8	.95
18	2.6	1.5	1.5	2.0	1.35	1.35	1.1	1.1	.9	.8	.7	.9
19	2.5	1.6	1.45	1.85	1.3	1.3	1.0	1.0	.8	.9	.8	.85
20	2.35	1.6	1.45	1.75	1.35	1.3	.95	.9	.9	.9	.8	.8
21	2.35	1.5	1.45	1.7	6.65	1.25	.95	.9	.9	.8	.7	.5
22	2.3	1.5	1.4	1.7	3.7	1.2	.9	.9	.8	.85	.8	.4
23	2.3	1.6	1.38	1.7	3.5	1.2	.93	.85	.9	.85	.8	.0
24	2.25	2.0	1.3	1.65	3.1	1.2	.9	.85	.85	.7	.7	.4
25	2.15	2.0	1.65	1.65	3.0	1.2	.8	.75	.75	.8	.8	.6
26	2.0	1.95	1.8	1.6	4.2	1.2	.85	.83	.83	.8	.8	.7
27	1.9	1.9	1.65	1.6	4.6	1.15	.95	.8	.83	.7	.7	.3
28	1.85	1.9	1.6	1.6	3.1	1.15	.9	.8	.7	.8	.8	.5
29	1.75	.....	1.58	1.5	2.5	1.2	.9	.8	.8	.8	.8	.65
30	1.65	.....	1.55	1.7	2.2	1.9	.9	.7	.8	.7	.7	.7
31	1.5	.....	1.5	.....	2.0	.....	.95	.8	.....	.8	.....	.6

NOTE.—The flow was retarded from about December 21 to 31 by freezing conditions.

Daily discharge, in second-feet, of Roanoke River at Roanoke, Va., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,660	326	690	366	1,660	585	326	166	110	110	123	110
2	1,130	326	770	366	1,230	519	279	459	110	110	123	110
3	850	351	810	351	940	459	258	376	98	86	98	110
4	690	351	770	326	690	940	200	302	98	110	110	110
5	1,720	351	730	302	585	730	200	183	86	110	110	110
6	1,720	326	850	288	519	655	237	895	110	75	86	110
7	1,130	326	895	279	459	585	690	894	110	98	110	110
8	940	317	850	266	430	430	326	488	123	98	110	151
9	690	351	770	258	376	770	279	351	123	75	86	136
10	620	1,780	730	245	550	550	258	183	351	98	110	136
11	550	1,030	585	245	690	488	237	166	237	488	110	136
12	488	690	564	237	550	430	218	166	166	519	86	136
13	459	655	544	279	459	376	200	166	110	488	110	136
14	403	550	519	7,630	403	351	200	183	123	376	110	376
15	459	519	459	2,260	376	326	183	326	123	200	86	237
16	550	488	419	1,230	351	302	166	376	110	166	110	166
17	770	430	398	850	326	302	237	258	136	151	110	151
18	1,230	376	376	690	302	302	200	200	136	110	86	136
19	1,130	430	351	585	279	279	166	166	110	136	110	123
20	985	430	351	519	302	279	151	136	136	136	110	110
21	985	376	351	488	6,480	258	151	136	136	110	86	.....
22	940	376	326	488	2,520	237	136	136	110	123	110	.....
23	940	430	317	488	2,260	237	145	123	136	123	110	.....
24	895	690	279	459	1,780	237	136	123	123	86	86	.....
25	810	690	459	459	1,660	237	110	98	98	110	110	.....
26	690	655	550	430	3,180	237	123	118	118	110	110	.....
27	620	620	459	430	3,720	218	151	110	118	86	86	.....
28	585	620	430	430	1,780	218	136	110	86	110	110	.....
29	519	.....	419	376	1,130	237	136	110	110	110	110	.....
30	459	.....	403	488	850	620	136	86	110	86	86	.....
31	376	.....	376	.....	690	.....	151	110	.....	110	.....	.....

NOTE.—The daily discharges are based on a well-defined rating. The flow was retarded by freezing from about December 21 to 31. The discharge for this period has been estimated at 40 second-feet per day.

Monthly discharge of Roanoke River at Roanoke, Va., for 1909.

[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.		
January	1,720	376	838	2.16	2.49	A.
February	1,780	317	531	1.37	1.43	A.
March	895	279	542	1.40	1.61	A.
April	7,630	237	737	1.90	2.12	A.
May	6,480	279	1,210	3.12	3.60	A.
June	940	218	413	1.06	1.18	A.
July	690	110	210	.541	.62	A.
August	895	86	248	.639	.74	A.
September	351	86	128	.330	.37	A.
October	519	75	158	.407	.47	A.
November	123	86	103	.265	.30	B.
December	376	.....	108	.278	.32	B.
The year	7,630	.....	436	1.12	15.25	

YADKIN OR PEDEE RIVER DRAINAGE BASIN.

DESCRIPTION.

Yadkin River, called Pedee River below the junction with the Uharie, rises on the eastern slope of the Blue Ridge Mountains in Caldwell, Watauga, and Wilkes counties, N. C., and flows in a general southeasterly direction across North Carolina and South Carolina, emptying into the Atlantic through Winyah Bay at Georgetown, S. C. The length of the stream from source to mouth by general course is about 300 miles, and the drainage area comprises about 10,600 square miles. The head of navigation is at Cheraw, S. C., about 149 miles above its mouth.

The river has no tributaries which compare with it in size. The larger of the tributaries are Little Pedee and Lynches rivers in South Carolina and South Yadkin River in North Carolina.

The upper part of the drainage basin is in the Appalachian Mountains proper and is largely forest covered. The extreme upper portion of the basin reaches an elevation of 3,000 feet, but the streams fall rapidly to 1,500 feet elevation, and reach 1,000 feet elevation above Wilkesboro, N. C. From Wilkesboro down to the fall line near Cheraw, S. C., the basin lies in the Piedmont Plateau. Above the fall line the rocks consist of various granites, gneisses, and schists; below the fall line these pass beneath the much newer sedimentary deposits of the Coastal Plain.

Ice and snow occur in noteworthy amounts only in the higher parts of the basin, but even there they do not affect the stream flow to any appreciable degree. The average rainfall for the basin is 50 to 60 inches in the upper portion and 45 to 50 inches in the lower portion. Storage is possible at a number of places, but owing to steep slopes of the streams especially good sites are probably lacking.

In North Carolina the main stream and many of its tributaries afford a great amount of power, much of which was been developed.

The following special reports contain information regarding the hydrography of the Yadkin River basin:

Water power in North Carolina: Bull. No. 8, North Carolina Geol. Survey, pp. 172–203; postage, 16 cents.

Water powers of North Carolina (in preparation): Bull. North Carolina Geological Survey, J. H. Pratt, state geologist, Chapel Hill, N. C. This report contains all records of discharge collected in the Yadkin River basin prior to 1908 by engineers of the United States Geological Survey.

Relation of southern Appalachian Mountains to the development of inland water navigation and water power: U. S. Forest Service Circulars Nos. 143 and 144.

Hydrography of the southern Appalachian Mountain region, part 2, by H. A. Pressey, 1902: Water-Supply Paper U. S. Geol. Survey No. 63. The Geological Survey has no copies of this paper for free distribution, but the report may be purchased (price, 15 cents) from the Superintendent of Documents, Washington, D. C.

The following gaging stations have been maintained in this river basin:

Yadkin River at North Wilkesboro, N. C., 1903–1909.
Yadkin River near Siloam, N. C., 1900–1901.
Yadkin River near Salisbury, N. C., 1895–1909.
Yadkin River near Norwood, N. C., 1896–1899.
Yadkin River near Pedee, N. C., 1906–1909.
Pedee River at Cheraw, S. C., 1909.

YADKIN RIVER AT NORTH WILKESBORO, N. C.

This station, which is located at the lower highway bridge between Wilkesboro and North Wilkesboro, about one-half mile below North Wilkesboro railroad station and three-fourths mile below the mouth of Reddie River, was established April 10, 1903, and was discontinued June 30, 1909.

The flow at this station is at times and for a few days only affected by ice, and stored water at mills probably affects gage heights to some some extent.

Measurements are made from the downstream side of the bridge to which the chain gage is attached. The datum of the gage has remained the same since the establishment of the station. Measuring conditions are poor. The bed of the stream is composed mainly of rock overlain in places with sand which shifts frequently. The right bank is low and subject to overflow, but all water must pass through the bridge approach. The left bank does not overflow.

No measurements have been made since 1907.

Owing to the unstable conditions of flow, monthly estimates as computed are liable to be considerably in error.

Daily gage height, in feet, of Yadkin River at North Wilkesboro, N. C., for 1909.

[Mrs. U. H. Wyatt, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	1.6	1.05	1.95	2.0	4.6	1.9	16	2.15	2.4	1.8	2.1	1.6	3.1
2	1.5	1.35	1.95	1.9	2.7	1.8	17	3.1	2.2	1.7	1.95	1.5	4.6
3	1.4	1.25	1.9	1.85	2.15	2.2	18	2.45	1.9	1.6	1.8	1.4	4.0
4	1.5	1.25	1.8	1.8	1.9	11.4	19	2.15	2.2	1.6	1.7	1.35	2.9
5	4.6	1.2	1.65	1.7	1.8	4.9	20	1.9	2.65	1.6	1.6	4.0	2.65
6	3.5	1.45	2.0	1.6	1.7	3.3	21	1.8	2.2	1.6	1.6	16.6	2.5
7	2.6	1.3	2.1	1.6	1.6	2.75	22	1.7	2.2	1.9	1.6	6.5	2.45
8	2.15	1.3	1.9	1.6	1.6	2.5	23	1.65	2.2	1.65	1.55	4.4	2.4
9	2.0	1.3	1.9	1.7	1.5	3.7	24	1.6	3.9	1.4	1.6	3.6	2.65
10	1.8	3.2	2.55	1.5	3.9	2.8	25	1.5	3.8	6.0	1.45	3.1	2.4
11	1.7	2.2	2.25	1.45	2.8	3.2	26	1.5	2.8	3.2	1.45	2.8	3.5
12	1.6	1.8	2.05	1.45	2.2	3.2	27	1.4	2.4	2.5	1.5	2.85	2.5
13	1.55	1.65	2.15	2.4	1.95	6.0	28	1.35	2.1	3.6	1.5	2.45	2.55
14	1.5	1.6	2.1	3.4	1.8	4.0	29	1.4	.....	2.85	1.4	2.25	3.0
15	1.5	1.6	1.9	2.4	1.65	4.0	30	1.4	.....	2.4	2.1	2.05	3.4
							31	.9	.....	2.2	.....	2.0	.....

Daily discharge, in second-feet, of Yadkin River near North Wilkesboro, N. C., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	1,080	755	1,320	1,360	3,710	1,280	16	1,408	1,680	1,220	1,440	1,080	2,310
2	1,010	920	1,320	1,280	1,950	1,220	17	2,310	1,520	1,140	1,320	1,010	3,710
3	950	862	1,280	1,250	1,480	1,520	18	1,720	1,280	1,080	1,220	950	3,140
4	1,010	862	1,220	1,220	1,280	10,500	19	1,480	1,520	1,080	1,140	920	2,130
5	3,710	835	1,110	1,140	1,220	4,000	20	1,280	1,900	1,080	1,080	3,140	1,900
6	2,670	980	1,360	1,080	1,140	2,490	21	1,220	1,520	1,080	1,080	15,700	1,770
7	1,860	890	1,440	1,080	1,080	2,000	22	1,140	1,520	1,280	1,080	5,600	1,720
8	1,480	890	1,280	1,080	1,080	1,770	23	1,110	1,520	1,110	1,040	3,520	1,680
9	1,360	890	1,280	1,140	1,010	2,860	24	1,080	3,040	950	1,080	2,760	1,900
10	1,220	2,400	1,820	1,010	3,040	2,040	25	1,010	2,950	5,100	980	2,310	1,680
11	1,140	1,520	1,560	980	2,040	2,400	26	1,010	2,040	2,400	980	2,040	2,670
12	1,080	1,220	1,400	980	1,520	2,400	27	950	1,680	1,770	1,010	2,080	1,770
13	1,040	1,110	1,480	1,680	1,320	5,100	28	920	1,440	2,760	1,010	1,720	1,820
14	1,010	1,080	1,440	2,580	1,220	3,140	29	950	.....	2,080	950	1,560	2,220
15	1,010	1,080	1,280	1,680	1,110	3,140	30	950	.....	1,680	1,440	1,400	2,580
							31	680	.....	1,520	.....	1,360	.....

NOTE.—These discharges are based on the rating curve used for 1907-8. As no measurements have been made since 1907, and owing to unstable conditions of flow, the results are liable to be considerably in error.

Monthly discharge of Yadkin River at North Wilkesboro, N. C., for 1909.

[Drainage area, 500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	3,710	680	1,320	2.64	3.04	C.
February	3,040	755	1,420	2.84	2.96	C.
March	5,100	950	1,550	3.10	3.57	C.
April	2,580	950	1,210	2.42	2.70	C.
May	15,700	920	2,300	4.60	5.30	C.
June	10,500	1,220	2,630	5.26	5.87	C.

YADKIN RIVER NEAR SALISBURY, N. C.

This station is located at Piedmont toll bridge, about 6 miles east of Salisbury, N. C., and 1,000 feet above the Southern Railway bridge. It is about 5 miles below the mouth of South Yadkin River. The station was originally established September 24, 1895, and has been maintained partly at the present location at the toll bridge, and partly at the Southern Railway bridge, where a second gage has been installed. From 1895 to May 31, 1899, and from 1903 to 1905, inclusive, published records of gage heights refer to the gage on the railroad bridge; the highway bridge was used from June 1, 1899, to December 31, 1902, and from January 1, 1906, to December 31, 1909, when the station was discontinued. The relation between the two gages at low stages, as based on a comparison made during 1905 and 1906, is as follows:

Relation of gages on Yadkin River.

Gage at Southern Railway bridge.....feet..	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0
Gage at Piedmont toll bridge.....do...	1.45	2.22	3.05	3.92	4.83	5.78	6.77	7.76	8.75

The datums of the chain gages remained unchanged during the maintenance of the station.

The left bank overflows for a short distance at extreme high stages; the right bank does not overflow. The bed of the stream is composed mainly of rock, but the collection of driftwood against the piers and of sand on the bed of the river causes variations in the relations between discharge and gage height. Records of discharge at this point are, however, fairly accurate.

Discharge measurements of Yadkin River at Salisbury, N. C., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 9	E. H. Swett	494	3,660	5.75	15,700
Do	do	495	3,890	6.34	19,700

Daily gage height, in feet, of Yadkin River near Salisbury, N. C., for 1909.

[J. T. Yarbrough, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.4	2.7	3.35	3.3	6.6	3.85	4.4	3.6	2.5	2.35	2.4	2.3
2	3.15	2.7	3.25	3.25	6.6	3.4	4.0	6.3	2.3	2.3	2.3	2.25
3	3.05	2.9	3.3	3.15	4.6	3.2	3.4	8.2	2.4	2.25	2.35	2.2
4	3.0	2.85	3.35	3.1	3.7	6.9	3.1	6.2	2.2	2.3	2.35	2.2
5	3.75	2.85	3.2	3.1	3.3	10.8	3.0	4.6	2.35	2.25	2.3	2.3
6	5.1	2.8	3.05	3.0	3.2	7.0	2.9	3.85	2.4	2.3	2.3	2.3
7	4.7	2.9	3.8	3.0	3.1	4.7	3.0	3.7	2.4	2.35	2.3	2.2
8	3.8	2.95	3.55	3.0	2.95	3.95	3.4	3.4	2.4	2.3	2.35	2.55
9	3.4	2.9	3.35	2.95	3.0	5.8	3.2	3.0	2.45	2.2	2.25	3.1
10	3.2	3.55	3.3	3.1	3.1	7.6	2.95	3.0	2.5	2.3	2.4	2.6
11	3.2	4.1	3.35	2.95	3.7	6.3	2.9	2.9	2.5	2.3	2.7	2.4
12	3.1	3.75	3.3	2.9	3.9	4.9	2.85	2.8	2.45	2.6	2.6	2.4
13	3.05	3.15	3.2	2.9	3.3	3.9	2.95	2.75	2.4	3.25	2.45	2.6
14	3.0	3.1	3.45	5.4	3.0	4.4	3.2	2.8	2.3	2.6	2.4	4.2
15	2.95	3.1	3.4	5.9	2.8	4.6	3.0	2.8	2.35	2.6	2.4	4.2
16	3.1	3.1	3.2	4.2	2.8	4.6	2.85	3.05	2.35	2.6	2.35	3.2
17	4.8	3.15	3.1	3.55	2.8	4.6	2.7	3.7	2.7	2.55	2.4	2.8
18	4.8	3.2	3.05	3.3	2.7	9.1	2.7	3.3	3.4	2.55	2.4	2.6
19	4.0	3.1	3.0	3.2	2.7	6.6	2.65	3.4	3.0	2.35	2.35	2.55
20	3.5	3.2	2.9	3.1	2.9	4.2	2.6	2.7	2.9	2.4	2.3	2.5
21	3.3	3.4	3.0	3.1	8.5	3.6	2.6	2.6	2.7	2.4	2.3	2.5
22	3.2	3.35	3.2	3.05	12.2	3.4	2.5	2.6	2.5	2.4	2.4	2.4
23	3.1	3.5	3.2	3.1	9.4	3.25	2.7	2.55	2.5	2.4	2.3	2.4
24	3.1	3.9	3.05	3.3	5.1	3.3	2.8	2.5	2.8	2.5	2.4	2.3
25	3.1	5.2	3.8	3.2	4.3	3.25	2.6	2.5	2.7	2.65	2.4	2.4
26	3.0	4.7	6.2	3.0	3.95	3.3	2.5	2.45	2.55	2.45	2.3	2.55
27	3.0	3.8	5.0	3.0	3.9	3.3	3.5	2.45	2.5	2.4	2.25	2.5
28	2.95	3.5	4.0	3.15	4.2	3.3	5.0	2.4	2.35	2.35	2.3	2.4
29	3.0	.....	4.5	3.1	3.8	4.7	5.0	2.4	2.3	2.35	2.3	2.4
30	2.9	.....	4.0	3.3	3.35	3.8	4.1	2.45	2.3	2.3	2.4	2.1
31	2.9	.....	3.55	.....	3.2	.....	3.35	2.55	.....	2.35	.....	1.95

Daily discharge, in second-feet, of Yadkin River near Salisbury, N. C., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,740	3,500	5,560	5,390	19,700	7,400	9,580	6,460	2,930	2,530	2,660	2,400
2	4,880	3,500	5,220	5,220	19,700	5,740	7,980	18,200	2,400	2,400	2,400	2,280
3	4,560	4,090	5,390	4,880	10,400	5,050	5,740	28,000	2,660	2,280	2,530	2,150
4	4,400	3,940	5,560	4,720	6,830	21,200	4,720	17,700	2,150	2,400	2,530	2,150
5	7,020	3,940	5,050	4,720	5,390	44,700	4,400	10,400	2,530	2,280	2,400	2,400
6	12,600	3,790	4,560	4,400	5,050	21,700	4,090	7,400	2,660	2,400	2,400	2,400
7	10,800	4,090	7,210	4,400	4,720	10,800	4,400	6,830	2,660	2,530	2,400	2,150
8	7,210	4,240	6,280	4,400	4,240	7,780	5,740	5,740	2,660	2,400	2,530	3,070
9	5,740	4,990	5,560	4,240	4,400	15,800	5,050	4,400	2,800	2,150	2,280	4,720
10	5,050	6,280	5,390	4,720	4,720	24,800	4,240	4,400	2,930	2,400	2,660	3,210
11	5,050	8,370	5,560	4,240	6,830	18,200	4,090	4,090	2,930	2,400	3,500	2,660
12	4,720	7,020	5,390	4,090	7,590	11,700	3,940	3,790	2,800	3,210	3,210	2,660
13	4,560	4,880	5,050	4,090	5,390	7,590	4,240	3,640	2,660	5,220	2,800	3,210
14	4,400	4,720	5,920	13,900	4,400	9,580	5,050	3,790	2,400	3,210	2,660	8,770
15	4,240	4,720	5,740	16,300	3,790	10,400	4,400	3,790	2,530	3,210	2,660	8,770
16	4,720	4,720	5,050	8,770	3,790	10,400	3,940	4,560	2,530	3,210	2,530	5,050
17	11,300	4,880	4,720	6,280	3,790	10,400	3,500	6,830	3,500	3,070	2,660	3,790
18	11,300	5,050	4,560	5,390	3,500	33,400	3,500	5,390	5,740	3,070	2,660	3,210
19	7,980	4,720	4,400	5,050	3,500	19,700	3,360	5,740	4,400	2,530	2,530	3,070
20	6,100	5,050	4,090	4,720	4,090	8,770	3,210	3,500	4,090	2,660	2,400	2,930
21	5,390	5,740	4,400	4,720	29,800	6,460	3,210	3,210	3,500	2,660	2,400	2,930
22	5,050	5,560	5,050	4,560	54,400	5,740	2,930	3,210	2,930	2,660	2,660	2,660
23	4,720	6,100	5,050	4,720	35,300	5,220	3,500	3,070	2,930	2,660	2,400	2,660
24	4,720	7,590	4,560	5,390	12,600	5,390	3,790	2,930	3,790	2,930	2,660	2,400
25	4,720	13,000	7,210	5,050	9,170	5,220	3,210	2,930	3,500	3,360	2,660	2,660
26	4,400	10,800	17,700	4,400	7,780	5,390	2,930	2,800	3,070	2,800	2,400	3,070
27	4,400	7,210	12,200	4,400	7,590	5,390	6,100	2,800	2,930	2,660	2,280	2,930
28	4,240	6,100	7,980	4,880	8,770	5,390	12,200	2,660	2,530	2,530	2,400	2,660
29	4,400	.....	9,990	4,720	7,210	10,800	12,200	2,660	2,400	2,530	2,400	2,660
30	4,090	.....	7,980	5,390	5,560	7,210	8,370	2,800	2,400	2,400	2,660	1,910
31	4,090	.....	6,280	.....	5,050	.....	5,560	3,070	.....	2,530	.....	1,570

NOTE.—These discharges are based on a rating curve that is fairly well defined.

Monthly discharge of Yadkin River near Salisbury, N. C., for 1909.

[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.		
January	12,600	4,090	5,890	1.73	1.99	B.
February	13,000	3,500	5,630	1.66	1.73	B.
March	17,700	4,090	6,280	1.85	2.13	B.
April	16,300	4,090	5,600	1.65	1.84	B.
May	54,400	3,500	10,200	3.00	3.46	B.
June	44,700	5,050	12,200	3.59	4.00	B.
July	12,200	2,930	5,130	1.51	1.74	B.
August	28,000	2,660	6,030	1.77	2.04	B.
September	5,740	2,150	3,000	.882	.98	B.
October	5,220	2,150	2,750	.809	.93	B.
November	3,500	2,280	2,580	.759	.85	B.
December	8,770	1,570	3,200	.941	1.08	B.
The year	54,400	1,570	5,710	1.68	22.77	

YADKIN RIVER NEAR PEDEE, N. C.

This station is located near Pedee, N. C., about 1,500 feet below the dam of the Rockingham Power Company. A vertical gage was installed August 9, 1906, by the engineers of the power company, for the purpose of keeping daily records of river height at the power site,

and the record has been maintained continuously since that time. Except for the discharge measurement made on November 13, 1908, all the measurements in 1908 and 1909 were made and furnished by the power company. Gage heights have been furnished by the company since August 9, 1906.

The measurements are made from a ferry boat at the ferry, a short distance below the gage. The section is somewhat rough and irregular, but is better than any other near-by section which was examined.

Computations of daily discharges for 1906 to 1909 have been based on a rating curve defined by measurements made since November 13, 1908, on the assumption that the measuring conditions have remained permanent throughout the entire period. Estimates for the earlier years are liable to some error. The extreme low portion of the rating curve is uncertain, as it is not covered by measurements.

Discharge measurements of Yadkin River near Pedee, N. C., in 1908 and 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1908.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
November 13	M. R. Hall	920	5,750	89.70	8,900
November 17	W. P. Snow	....	....	91.0	11,900
November 19	do	....	....	89.4	7,930
November 24	do	....	....	88.6	5,550
November 30	do	....	....	88.25	5,070
December 5	do	....	....	88.25	5,350
December 10	do	....	....	89.7	8,610
December 12	do	....	....	88.82	6,320
1909.					
July 21	W. S. Ide	....	4,230	87.86	4,150
July 22	do	....	4,220	87.77	4,130
September 4	do	....	3,620	87.47	2,990
September 30	do	....	3,850	87.46	3,500
October 1	do	....	3,810	87.42	3,650
October 4	do	....	3,790	87.38	2,850
October 5	do	....	3,700	87.34	3,390
October 7	do	....	3,750	87.32	3,340
October 12	do	....	3,710	87.33	3,460

Daily gage height, in feet, of Yadkin River near Pedee, N. C., for 1906–1909.

[C. M. Furman, jr., observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.						1906.					
1	....	101.65	89.3	88.6	88.45	16	94.2	....	88.3	88.35	88.5
2	....	97.1	89.25	88.55	88.35	17	94.7	88.65	88.25	88.45	88.4
3	....	91.9	89.25	88.5	88.35	18	94.35	88.65	88.3	88.45	88.5
4	....	94.1	90.5	88.5	88.4	19	....	88.95	91.7	88.35	89.05
5	....	92.5	92.0	88.4	88.25	20	92.45	89.35	97.15	90.1	89.9
6	....	91.0	90.95	88.45	88.2	21	92.35	89.85	96.45	94.6	90.6
7	....	89.95	89.85	88.4	88.35	22	91.7	89.25	91.45	91.55	90.5
8	....	89.55	89.65	88.35	88.3	23	92.2	89.45	90.9	89.8	89.75
9	88.55	89.25	89.25	88.35	88.3	24	91.35	90.05	90.2	89.4	89.15
10	88.35	89.0	88.75	88.35	88.2	25	90.15	89.35	89.65	89.0	88.8
11	88.35	88.9	88.6	88.25	88.6	26	....	89.35	89.4	88.85	88.4
12	....	88.75	88.75	88.3	90.3	27	94.45	88.55	89.2	88.8	88.2
13	89.0	89.1	88.55	88.35	89.55	28	91.1	88.4	88.95	88.5	88.4
14	90.2	90.05	88.45	88.3	88.95	29	96.75	88.65	88.8	88.55	88.85
15	91.2	90.65	88.45	88.4	88.55	30	96.0	88.8	88.8	88.5	89.0
						31	102.35	....	88.7	....	89.0

Daily gage height, in feet, of Yadkin River near Pedee, N. C., for 1906–1909—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	91.65	88.1	90.35	88.15	89.1	91.0	91.3	87.9	87.0	88.75	87.15	88.55
2	94.1	88.2	90.45	89.25	88.8	96.75	89.9	87.7	86.85	88.3	87.15	88.3
3	91.45	88.2	91.15	88.9	88.8	95.8	88.95	87.6	86.8	87.75	87.2	87.95
4	90.3	88.35	90.9	88.5	89.55	93.0	89.1	89.1	87.3	87.55	87.15	87.9
5	89.65	89.95	90.1	88.1	89.45	90.6	88.85	87.75	88.15	87.5	87.85	87.85
6	89.35	90.15	89.35	88.3	89.05	89.05	88.25	87.6	87.55	87.45	87.55	87.75
7	89.05	89.6	89.0	90.4	88.9	88.85	88.5	87.8	88.3	87.3	87.35	87.75
8	88.95	89.25	88.45	92.65	88.6	88.45	88.25	87.75	87.7	87.35	87.25	87.65
9	88.85	88.75	89.1	90.85	88.8	88.4	88.15	87.9	87.2	87.3	87.2	87.75
10	88.75	88.75	89.15	89.65	89.3	88.2	87.75	87.7	87.0	87.35	87.2	88.65
11	88.65	88.95	89.9	89.15	90.0	93.4	87.75	88.35	87.15	87.35	87.15	91.25
12	88.55	89.1	90.45	88.85	89.5	94.7	87.65	89.25	87.35	87.3	87.35	91.25
13	88.55	88.45	89.85	88.65	88.8	92.95	87.85	88.2	88.5	87.15	87.35	89.95
14	88.5	88.5	89.25	88.5	88.45	95.35	90.95	87.9	88.05	87.05	87.4	94.75
15	88.5	88.4	89.85	88.35	88.25	92.75	91.2	87.85	87.45	86.95	87.3	99.7
16	88.4	88.3	93.0	88.25	88.1	90.95	89.5	87.9	87.1	87.15	87.3	96.9
17	88.3	88.2	90.8	88.1	88.1	89.6	88.45	87.75	87.05	87.0	87.3	92.8
18	88.3	88.1	89.75	88.1	88.15	88.95	88.5	87.65	87.05	87.05	87.2	91.0
19	88.3	88.05	89.3	88.2	88.05	88.55	88.8	87.95	86.9	87.0	87.45	90.0
20	88.3	88.3	89.05	89.3	87.85	88.3	88.9	88.75	86.9	87.05	87.95	89.3
21	88.2	92.2	88.85	88.8	87.8	88.4	88.7	88.0	86.9	86.95	87.85	88.85
22	88.3	91.25	88.7	88.5	87.7	88.45	88.3	87.55	86.9	86.9	88.65	88.65
23	88.1	89.2	88.5	91.3	87.7	88.6	87.85	87.85	87.4	87.05	92.05	92.1
24	88.05	88.8	88.5	96.05	87.6	88.7	87.55	87.55	87.45	87.0	96.65	99.6
25	88.05	90.0	88.2	92.65	87.7	89.6	87.45	87.65	94.0	87.0	96.65	98.8
26	88.2	91.8	88.25	90.65	88.55	89.05	87.55	87.4	90.3	87.0	93.95	93.5
27	88.2	91.6	88.15	89.55	88.75	88.5	88.65	87.3	88.7	87.0	90.9	91.05
28	88.1	91.15	88.1	89.55	88.4	88.3	88.25	87.15	88.05	86.95	88.6	90.05
29	88.2	.....	88.15	90.3	88.6	91.3	87.65	87.1	88.8	86.95	88.9	89.5
30	88.0	.....	88.1	89.55	87.95	90.75	87.55	87.05	89.05	87.3	88.85	93.5
31	88.0	.....	88.05	.....	87.8	.....	87.85	87.0	.....	87.3	.....	98.35
1908.												
1	94.8	91.95	89.9	89.4	89.05	88.35	87.65	88.7	89.5	88.65	92.65	88.4
2	92.1	94.5	89.55	89.4	90.4	87.95	87.75	88.35	89.0	88.1	90.6	88.4
3	90.75	91.7	89.6	91.05	89.35	87.8	89.6	87.85	88.8	87.8	89.8	88.6
4	89.95	90.3	89.5	91.1	88.75	87.85	94.7	87.7	88.5	87.7	89.4	88.5
5	93.1	89.55	89.4	89.95	88.6	89.1	94.55	87.6	88.35	87.6	89.5	88.3
6	93.85	89.4	89.55	89.45	88.45	92.1	94.5	87.85	93.25	87.6	89.2	88.2
7	92.8	89.7	90.3	89.25	88.45	89.75	92.75	89.55	93.8	87.6	88.9	88.3
8	100.15	90.05	90.25	89.2	88.45	88.75	91.2	89.6	92.95	87.55	88.7	88.65
9	98.8	89.55	89.6	89.1	90.1	88.45	90.2	90.35	92.5	87.6	88.6	90.65
10	93.85	89.25	90.15	88.95	89.6	88.2	90.85	89.3	90.95	93.05	88.6	89.7
11	91.45	90.65	89.85	88.85	88.85	88.25	90.35	88.65	89.45	94.15	88.45	89.05
12	99.5	94.05	92.6	88.75	88.65	88.75	89.45	85.0	88.5	93.6	88.55	88.85
13	101.35	94.5	93.6	88.6	88.4	88.5	88.75	87.85	88.35	90.45	89.65	90.4
14	98.05	97.2	91.5	88.55	88.35	89.1	88.4	87.75	88.2	89.05	89.35	89.9
15	93.15	98.8	90.45	88.6	88.2	88.4	88.25	87.7	88.15	88.55	95.4	89.3
16	91.4	101.6	89.9	89.35	88.1	88.85	88.4	87.6	87.9	88.25	94.0	88.8
17	90.5	100.2	89.5	90.8	88.0	90.0	88.25	87.6	87.85	88.1	91.3	88.65
18	90.05	94.65	89.3	90.5	88.1	89.25	87.8	87.5	87.85	88.0	90.15	88.55
19	89.7	92.6	89.15	89.8	88.4	88.35	87.75	87.7	87.75	87.9	89.45	88.5
20	89.4	95.0	92.0	89.3	89.85	88.1	87.6	90.0	87.75	87.9	89.1	88.5
21	89.2	93.45	94.15	89.05	89.8	88.0	87.75	89.9	87.75	87.85	88.9	88.4
22	89.1	91.95	92.7	88.85	90.1	89.0	87.75	90.05	87.75	87.75	88.7	90.65
23	89.0	90.95	93.0	88.65	89.25	89.35	91.65	89.15	87.65	88.35	88.55	101.8
24	88.9	90.45	99.5	88.55	89.2	88.65	91.9	96.7	87.6	97.5	88.6	101.15
25	88.75	90.05	100.25	88.55	88.9	88.4	88.9	106.85	87.65	95.45	88.5	95.4
26	88.6	89.9	95.85	88.7	88.65	89.1	88.7	116.3	87.55	94.55	88.5	91.7
27	88.9	90.45	92.25	88.85	88.3	89.1	88.6	117.0	87.6	91.2	88.45	90.85
28	90.25	90.55	91.0	89.4	88.2	88.4	88.3	108.7	89.35	90.3	88.4	90.05
29	89.65	90.25	90.3	88.85	88.05	88.15	88.35	97.25	90.0	95.15	88.4	89.6
30	89.15	.....	89.8	88.8	88.0	87.85	88.95	93.0	89.25	96.8	88.3	89.35
31	88.75	.....	89.7	.....	88.15	.....	88.4	90.25	.....	94.7	.....	89.65
1909.												
1	90.3	88.5	89.8	89.7	94.8	89.0	90.35	89.55	87.85	87.4	87.4	87.25
2	89.85	88.35	89.5	89.3	99.0	89.7	91.9	93.7	87.6	87.4	87.45	87.35
3	89.3	88.15	89.4	89.1	95.3	89.2	90.35	101.35	87.55	87.4	87.45	87.35
4	89.05	88.4	89.55	88.95	91.1	97.95	89.4	100.45	87.4	87.35	87.4	87.4
5	89.0	88.4	89.65	88.8	89.85	101.95	88.95	95.0	87.35	87.3	87.4	87.3

Daily gage height, in feet, of Yadkin River near Pedee, N. C., for 1906–1909—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
6	89.85	88.55	89.25	88.75	89.25	99.9	88.75	91.75	87.35	87.4	87.4	87.3
7	91.4	88.85	89.8	88.6	88.9	94.0	88.6	92.55	87.5	87.35	87.5	87.3
8	90.75	88.85	90.6	88.55	88.65	91.4	88.95	90.9	87.5	87.45	87.65	87.35
9	89.75	88.7	90.0	88.55	88.5	90.6	89.3	89.65	87.5	87.45	87.6	87.4
10	89.25	92.2	89.8	88.55	88.5	94.15	89.05	89.1	87.55	87.35	87.5	87.45
11	89.05	95.15	90.35	88.6	88.75	94.8	88.65	89.45	87.6	87.3	87.5	87.9
12	89.0	91.85	89.65	88.5	89.45	92.65	88.45	88.8	87.6	87.35	87.75	87.65
13	88.9	90.5	89.45	88.45	89.45	91.15	88.3	88.7	87.6	87.45	88.0	87.6
14	88.9	89.75	90.0	88.6	88.75	90.65	88.75	89.0	87.5	88.85	87.7	89.4
15	89.0	89.35	90.3	92.15	88.4	91.8	89.65	90.35	87.45	88.1	87.6	90.7
16	89.7	89.3	89.75	91.85	88.25	91.65	88.95	89.5	87.45	87.8	87.5	90.15
17	92.4	89.3	89.3	90.2	88.2	92.4	89.05	89.5	87.75	88.1	87.5	89.0
18	92.8	89.2	89.0	89.4	88.2	92.15	88.35	89.75	89.1	87.95	87.5	88.35
19	91.8	89.2	88.85	88.95	88.0	97.15	88.2	89.2	89.8	87.7	87.45	88.0
20	90.6	90.1	88.6	88.8	88.2	93.6	88.2	89.6	89.0	87.45	87.5	87.95
21	89.9	90.0	88.6	88.65	95.45	90.55	87.9	88.25	88.65	87.45	87.4	87.9
22	89.6	89.95	88.9	88.55	100.9	89.7	87.8	88.05	88.2	87.5	87.3	87.75
23	89.3	91.65	89.1	88.55	100.65	89.55	87.75	87.85	87.85	87.65	87.4	87.6
24	89.05	93.3	89.0	88.55	95.65	89.2	88.05	87.85	89.95	87.65	87.4	87.5
25	89.0	92.25	88.9	89.05	91.45	89.15	88.35	87.75	89.2	87.8	87.35	87.5
26	89.0	92.55	91.6	88.85	90.5	89.1	87.95	87.7	88.55	87.9	87.45	87.7
27	88.85	91.25	92.65	88.6	90.75	92.25	88.0	87.65	88.05	87.65	87.35	88.05
28	88.8	90.3	90.9	88.35	90.85	90.55	90.5	87.7	87.75	87.45	87.35	88.0
29	88.65	.....	91.65	88.65	90.7	90.35	91.7	87.65	87.55	87.45	87.3	87.65
30	88.6	.....	91.2	88.65	90.0	91.4	91.2	88.65	87.45	87.4	87.3	87.45
31	88.6	.....	90.3	.....	89.25	.....	90.1	87.75	.....	87.45	.....	87.1

Daily discnarge, in second-feet, of Yadkin River near Pedee, N. C., for 1906–1909.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.						1906.					
1	.....	.....	7,600	5,930	5,580	16	.....	8,570	5,240	5,360	5,700
2	.....	.....	7,480	5,820	5,360	17	.....	6,040	5,140	5,580	5,470
3	.....	14,400	7,480	5,700	5,360	18	.....	6,040	5,240	5,580	5,700
4	.....	.....	10,700	5,700	5,470	19	.....	6,760	13,900	5,360	7,000
5	.....	.....	14,700	5,470	5,140	20	.....	7,720	.....	9,640	9,120
6	.....	12,000	11,900	5,580	5,140	21	.....	8,990	.....	.....	10,900
7	.....	9,250	8,990	5,470	5,360	22	13,900	7,480	13,200	13,500	10,700
8	.....	8,220	8,480	5,360	5,240	23	.....	7,980	11,700	8,860	8,730
9	5,820	7,480	7,480	5,360	5,240	24	12,900	9,510	9,900	7,850	7,240
10	5,360	6,880	6,280	5,360	5,020	25	9,770	7,720	8,480	6,880	6,400
11	5,360	6,640	5,930	5,140	5,930	26	.....	7,720	7,850	6,520	5,470
12	6,120	6,280	6,280	5,240	10,200	27	.....	5,820	7,360	6,400	5,020
13	6,880	7,120	5,820	5,360	8,220	28	12,300	5,470	6,760	5,700	5,470
14	9,900	9,510	5,580	5,240	6,760	29	.....	6,040	6,400	5,820	6,520
15	12,500	11,100	5,580	5,470	5,820	30	.....	6,400	6,400	5,700	6,880
						31	.....	.....	6,160	.....	6,880

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	13,800	4,810	10,300	4,920	7,120	12,000	12,800	4,400	2,820	6,280	3,060	5,820
2	.....	5,020	10,600	7,480	6,400	.....	9,120	4,020	2,600	5,240	3,060	5,240
3	13,200	5,020	12,400	6,640	6,400	.....	6,760	3,830	2,540	4,110	3,140	4,500
4	10,200	5,360	11,700	5,700	8,220	.....	7,120	7,120	3,300	3,740	3,060	4,400
5	8,480	9,250	9,640	4,810	7,980	10,900	6,520	4,110	4,920	3,650	4,300	4,300
6	7,720	9,770	7,720	5,240	7,000	8,100	5,140	3,830	3,740	3,560	3,740	4,110
7	7,000	8,350	6,880	10,400	6,640	6,520	5,700	4,200	5,240	3,300	3,390	4,110
8	6,760	7,480	5,580	.....	5,930	5,580	5,140	4,110	4,020	3,390	3,220	3,920
9	6,520	6,280	7,120	11,600	6,400	5,470	4,920	4,400	3,140	3,300	3,140	4,110
10	6,280	6,280	7,240	8,480	7,600	5,020	4,110	4,020	2,820	3,390	3,140	6,040

Daily discharge, in second-feet, of Yadkin River near Pedee, N. C., for 1906–1909—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
11	6,040	6,760	9,120	7,240	9,380	.....	4,110	5,360	3,060	3,390	3,060	12,700
12	5,820	7,120	10,600	6,520	8,100	.....	3,920	7,480	3,390	3,300	3,390	12,700
13	5,820	5,580	8,990	6,040	6,400	.....	4,300	5,020	5,700	3,060	3,390	9,250
14	5,700	5,700	7,480	5,700	5,580	.....	11,900	4,400	4,700	2,900	3,480	.....
15	5,700	5,470	8,990	5,360	5,140	.....	12,500	4,300	3,560	2,750	3,300	.....
16	5,470	5,240	.....	5,140	4,810	11,900	8,100	4,400	2,980	3,060	3,300	.....
17	5,240	5,020	11,500	4,810	4,810	8,350	5,580	4,110	2,900	2,820	3,300	.....
18	5,240	4,810	8,730	4,810	4,920	6,760	5,700	3,920	2,900	2,900	3,140	12,000
19	5,240	4,700	7,600	5,020	4,700	5,820	6,400	4,500	2,680	2,820	3,560	9,380
20	5,240	5,240	7,000	7,600	4,300	5,240	6,640	6,280	2,680	2,900	4,500	7,600
21	5,020	.....	6,520	6,400	4,200	5,470	6,160	4,600	2,680	2,750	4,300	6,520
22	5,240	12,700	6,160	5,700	4,020	5,580	5,240	3,740	2,680	2,680	6,040	6,040
23	4,810	7,360	5,700	12,800	4,020	5,930	4,300	4,300	3,480	2,900	.....	.....
24	4,700	6,400	5,700	.....	3,830	6,160	3,740	3,740	3,560	2,820	.....	.....
25	4,700	9,380	5,020	.....	4,020	8,350	3,560	3,920	.....	2,820	.....	.....
26	5,020	14,200	5,140	11,100	5,820	7,000	3,740	3,480	10,200	2,820	.....	.....
27	5,020	13,600	4,920	8,220	6,280	5,700	6,040	3,300	6,160	2,820	11,700	12,100
28	4,810	12,400	4,810	8,220	5,470	5,240	5,140	3,060	4,700	2,750	5,930	9,510
29	5,020	.....	4,920	10,200	5,930	12,800	3,920	2,980	6,400	2,750	6,640	8,100
30	4,600	.....	4,810	8,220	4,500	11,300	3,740	2,900	7,000	3,300	6,520	.....
31	4,600	.....	4,700	.....	4,200	.....	4,300	2,820	.....	3,300	.....	.....
1908.												
1	.....	14,600	9,120	7,850	7,000	5,360	3,920	6,160	8,100	6,040	.....	5,470
2	.....	.....	8,220	7,850	10,400	4,500	4,110	5,360	6,880	4,810	10,900	5,470
3	11,300	13,900	8,350	12,100	7,720	4,200	8,350	4,300	6,400	4,200	8,860	5,930
4	9,250	10,200	8,100	12,300	6,280	4,300	.....	4,020	5,700	4,020	7,850	5,700
5	.....	8,220	7,850	9,250	5,930	7,120	.....	3,830	5,360	3,830	8,100	5,240
6	.....	7,850	8,220	7,980	5,580	.....	.....	4,300	.....	3,830	7,360	5,020
7	.....	8,600	10,200	7,480	5,580	8,730	.....	8,220	.....	3,830	6,640	5,240
8	.....	9,510	10,000	7,360	5,580	6,280	12,500	8,350	.....	3,740	6,160	6,040
9	.....	8,220	8,350	7,120	9,640	5,580	9,900	10,300	.....	3,830	5,930	11,100
10	.....	7,480	9,770	6,760	8,350	5,020	11,600	7,600	11,900	.....	5,930	8,600
11	13,200	11,100	8,990	6,520	6,520	5,140	10,300	6,040	7,980	.....	5,580	7,000
12	.....	.....	.....	6,280	6,040	6,280	7,980	.....	5,700	.....	5,820	6,520
13	.....	.....	.....	5,930	5,470	5,700	6,280	4,300	5,360	10,600	8,480	10,400
14	.....	.....	13,400	5,820	5,360	7,120	5,470	4,110	5,020	7,000	7,720	9,120
15	.....	.....	10,600	5,930	5,020	5,470	5,140	4,020	4,920	5,820	.....	7,600
16	13,100	.....	9,120	7,720	4,810	6,520	5,470	3,830	4,400	5,140	.....	6,400
17	10,700	.....	8,100	11,500	4,600	9,380	5,140	3,830	4,300	4,810	12,800	6,040
18	9,510	.....	7,600	10,700	4,810	7,480	4,200	3,650	4,300	4,600	9,770	5,820
19	8,600	.....	7,240	8,860	5,470	5,360	4,110	4,020	4,110	4,400	7,980	5,700
20	7,850	.....	14,700	7,600	8,990	4,810	3,830	9,380	4,110	4,400	7,120	5,700
21	7,360	.....	.....	7,000	8,860	4,600	4,110	9,120	4,110	4,300	6,640	5,470
22	7,120	14,600	.....	6,520	9,640	6,880	4,110	9,510	4,110	4,110	6,160	11,100
23	6,880	11,900	.....	6,040	7,480	7,720	13,800	7,240	3,920	5,360	5,820	.....
24	6,640	10,600	.....	5,820	7,360	6,040	14,400	.....	3,830	.....	5,930	.....
25	6,280	9,510	.....	5,820	6,640	5,470	6,640	.....	3,920	.....	5,700	.....
26	5,930	9,120	.....	6,160	6,040	7,120	6,160	.....	3,740	.....	5,700	13,900
27	6,640	10,600	.....	6,520	5,240	7,120	5,930	.....	3,830	12,500	5,580	11,600
28	10,000	10,800	12,000	7,850	5,020	5,470	5,240	.....	7,720	10,200	5,470	9,510
29	8,480	10,000	10,200	6,520	4,700	4,920	5,360	.....	9,380	.....	5,470	8,350
30	7,240	.....	8,860	6,400	4,600	4,300	6,760	.....	7,480	.....	5,240	7,720
31	6,280	.....	8,600	.....	4,920	.....	5,470	10,000	.....	.....	.....	8,480
1909.												
1	10,200	5,700	8,860	8,600	.....	6,880	10,300	8,220	4,300	3,480	3,480	3,220
2	8,990	5,360	8,100	7,600	.....	8,600	14,400	.....	3,830	3,480	3,560	3,390
3	7,600	4,920	7,850	7,120	.....	7,360	10,300	.....	3,740	3,480	3,560	3,390
4	7,000	5,470	8,220	6,760	12,300	.....	7,850	.....	3,480	3,390	3,480	3,480
5	6,880	5,470	8,480	6,400	8,990	.....	6,760	.....	3,390	3,300	3,480	3,300
6	8,990	5,820	7,480	6,280	7,480	.....	6,280	14,000	3,390	3,480	3,480	3,300
7	13,100	6,520	8,860	5,930	6,640	.....	5,930	.....	3,650	3,390	3,650	3,300
8	11,300	6,520	10,900	5,820	6,040	13,100	6,760	11,700	3,650	3,560	3,920	3,390
9	8,730	6,160	9,380	5,820	5,700	10,900	7,600	8,480	3,650	3,560	3,830	3,480
10	7,480	.....	8,860	5,820	5,700	.....	7,000	7,120	3,740	3,390	3,650	3,560
11	7,000	.....	10,300	5,930	6,280	.....	6,040	7,980	3,830	3,300	3,650	4,400
12	6,880	14,300	8,480	5,700	7,980	.....	5,580	6,400	3,830	3,390	4,110	3,920
13	6,640	10,700	7,980	5,580	7,980	12,400	5,240	6,160	3,830	3,560	4,600	3,830
14	6,640	8,730	9,380	5,930	6,280	11,100	6,280	6,880	3,650	6,520	4,020	7,850
15	6,880	7,720	10,200	.....	5,470	14,200	8,480	10,300	3,560	4,810	3,830	11,200

Daily discharge, in second-feet, of Yadkin River near Pedee, N. C., for 1906–1909—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
16	8,600	7,600	8,730	14,300	5,140	13,800	6,760	8,100	3,560	4,200	3,650	9,770
17	.....	7,600	7,600	9,900	5,020	.....	7,000	8,100	4,110	4,810	3,650	6,880
18	.....	7,360	6,880	7,850	5,020	.....	5,360	8,730	7,120	4,500	3,650	5,360
19	14,200	7,360	6,520	6,760	4,600	.....	5,020	7,360	8,860	4,020	3,560	4,600
20	10,900	9,640	5,930	6,400	5,020	.....	5,020	8,350	6,880	3,560	3,650	4,500
21	9,120	9,380	5,930	6,040	.....	10,800	4,400	5,140	6,040	3,560	3,480	4,400
22	8,350	9,250	6,640	5,820	.....	8,600	4,200	4,780	5,020	3,650	3,390	4,110
23	7,600	13,800	7,120	5,820	.....	5,220	4,110	4,300	4,300	3,920	3,480	3,830
24	7,000	.....	6,380	5,820	.....	7,360	4,700	4,360	9,250	3,920	3,480	3,650
25	6,880	.....	6,640	7,800	13,200	7,240	5,860	4,110	7,360	4,260	3,390	3,650
26	6,880	.....	13,600	6,520	10,700	7,120	4,580	4,220	6,520	4,400	3,560	4,020
27	6,520	12,700	.....	5,930	11,300	.....	4,660	3,920	4,700	3,920	3,390	4,700
28	6,400	10,200	11,700	5,360	11,600	10,300	10,700	4,020	4,110	3,560	3,390	4,600
29	6,040	.....	13,800	6,040	11,200	10,300	13,900	3,920	3,740	3,560	3,300	3,920
30	5,930	.....	12,500	6,040	9,380	13,100	12,500	5,040	3,560	3,480	3,300	3,560
31	5,930	.....	10,200	.....	7,480	.....	9,640	4,110	.....	3,560	.....	2,980

NOTE.—These discharges are based on a rating curve that is fairly well defined between 3,300 and 13,400 second-feet. Discharges for all missing days are above 14,700 second-feet. Below 3,300 second-feet the discharges are only approximate.

PEDEE RIVER AT CHERAW, S. C.

This station, which is located at the highway bridge at Cheraw, about one-half mile below the bridge of the Seaboard Air Line Railway, was established by the United States Weather Bureau April 1, 1891. The first discharge measurements by the United States Geological Survey were made during 1909.

Although the flood of August, 1908, had destroyed the gage, it was thought possible that the original gage datum could be preserved and a rating made which would apply for some of the previous years. A temporary gage was used until the new vertical gage attached to the new bridge pier was put into use on November 3, 1909. The low-water section of the temporary gage was so defective and variable that it is impossible to adjust the readings from it to the datum of the new gage, which is presumably on the original gage datum. The records from August 28, 1908, to November 2, 1909, therefore can not be supplied. The gage heights are furnished by the United States Weather Bureau.

Before the installation of the new gage, discharge measurements were made at the railroad bridge, and by means of reference points have been correctly adjusted to the present gage datum.

Conditions of flow appear fairly good but no rating has yet been developed.

Discharge measurements of Pedee River at Cheraw, S. C., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 12	W. A. Lamb	360	6,840	17.06	18,800
February 13	do	326	5,020	12.37	13,700

NOTE.—Measurements made from railway bridge.

Daily gage height, in feet, of Pedee River at Cheraw, S. C., for 1909.

[J. H. Powe, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	.....	1.9	11	2.4	2.8	21	2.1	3.4
2	.....	1.9	12	2.2	2.5	22	2.0	3.0
3	2.6	2.0	13	2.3	2.8	23	1.9	2.9
4	2.4	2.2	14	2.9	3.5	24	1.9	2.8
5	2.3	2.0	15	2.5	7.0	25	2.2	2.6
6	2.2	1.8	16	2.3	9.8	26	2.0	2.8
7	2.1	1.8	17	2.3	6.3	27	1.9	3.0
8	3.9	1.9	18	2.2	4.8	28	1.9	3.3
9	2.9	2.2	19	2.1	3.5	29	2.0	3.1
10	2.5	1.9	20	2.1	3.9	30	1.9	2.8
						31	.....	2.7

NOTE.—Gage heights refer to gage on new pier at highway bridge.

SANTEE RIVER DRAINAGE BASIN.

DESCRIPTION.

Santee River, which is formed by the Congaree and Wateree rivers, drains a large area extending from the Blue Ridge Mountains in western North Carolina through the central portion of South Carolina to the Atlantic Ocean. The total length of the basin, measured in the general direction of the course of the river, is about 300 miles.

Wateree River, the more northerly of the two streams, rises on the eastern slope of the Blue Ridge Mountains in McDowell County, N. C., and flows first eastward, then southeastward across North Carolina and a portion of South Carolina to its junction with the Congaree. In North Carolina and also that part of its course in South Carolina above Wateree Creek, it is known as Catawba River.

The Congaree is formed by the junction of Broad and Saluda rivers at Columbia, S. C., whence it flows in a southeasterly direction for about 60 miles to its junction with the Wateree. Broad River rises on the eastern slope of the Blue Ridge Mountains in McDowell and Henderson counties, N. C., and Saluda River rises in Pickens and Greenville counties, S. C.

The upper portion of the basin is mountainous, its extreme elevation being 3,000 to 5,000 feet in the Catawba basin and 2,000 to 3,000 feet in the areas drained by Broad and Saluda rivers. These upper portions, even to elevations much below 2,000 feet, are largely covered with forests, but the greater part of the area is an agricultural section where much of the land is under cultivation. As in the Yadkin River basin, the areas lying above the fall line—the mountain and Piedmont Plateau portions—are made up of various granite, gneisses, and schists, which pass the much newer sedimentary deposits of the coastal plain a short distance below Columbia, S. C.

Snow and ice have little effect on stream flow and the operation of gaging stations in this region. The average annual rainfall is from 45 inches in the central and lower portions to 60 inches near the headwaters. In general, the storage opportunities of this basin appear somewhat meager on account of the steep slopes and narrow valleys by which it is characterized.

Excellent water-power sites are found everywhere above the fall line, which passes near Camden and Columbia, S. C., and many large powers have already been developed.

The following special reports contain information regarding the hydrography of the Santee River basin:

Water power in North Carolina: Bull. North Carolina Geol. Survey No. 8 (postage 16 cents).

Water powers of North Carolina (in preparation): Bull. North Carolina Geol. Survey, Dr. J. H. Pratt, state geologist, Chapel Hill, N. C. This report will contain all records of discharge collected in the Santee River basin prior to 1908 by engineers of the United States Geological Survey.

Relation of southern Appalachian Mountains to the development of inland water navigation and water powers: U. S. Forest Service Circulars Nos. 143 and 144.

Hydrography of the southern Appalachian Mountain region, part 2, by H. A. Pressey, 1902: Water-Supply Paper U. S. Geol. Survey No. 63. This publication is no longer available for free distribution, but may be purchased (price 15 cents) from the Superintendent of Documents, Washington, D. C.

River surveys and profiles made during 1903, by W. C. Hall and J. C. Hoyt: Water-Supply Paper U. S. Geol. Survey No. 115. This report and separate sheets showing the Catawba and Broad River profiles may be obtained by applying to the Director United States Geological Survey, Washington, D. C.

The following gaging stations have been maintained in this river basin:

Catawba River at Old Fort, N. C., 1907.
Catawba River near Morganton, N. C., 1900–1909.
Catawba River near Catawba, N. C., 1896–1905.
Catawba River near Rockhill, S. C., 1895–1903.
Wateree River near Camden, S. C., 1904–1909.
Mill Creek at Old Fort, N. C., 1907.
Linville River at Fonta Flora, N. C., 1907–8.
Linville River near Bridgewater, N. C., 1900.
Johns River at Collettsville, N. C., 1907.
Johns River near Morganton, N. C., 1900–1901.
Broad River (of the Carolinas) 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 Logan's store, N. C., 1907–8.
Saluda River near Waterloo, S. C., 1896–1905.
Saluda River near Ninety Six, S. C., 1905.

CATAWBA RIVER NEAR MORGANTON, N. C.

This station, which is located at the highway bridge on the road from Morganton to Hartland, 1 mile north of Morganton and about 200 yards below the mouth of Upper Creek, was established June 19, 1900. In May, 1901, the bridge and gage were destroyed as the result of a very high flood. The present station was established May 15, 1903, and has been maintained continuously except from July 1, 1906, to January 16, 1907, when no gage reader was available, and from December 22 to 31, 1907, until it was discontinued June 30, 1909.

The gage and measuring section are located at the bridge which was built in place of the one carried away by the flood of May, 1901. The low-water flow has no doubt been somewhat affected by the operation of mills above.

The datum of the gage has remained the same since May 15, 1903. No determined relation exists between the datum of the original and the present gages. The right bank overflows slightly; the left bank does not overflow. A fairly good low-water rating curve has been developed and conditions of flow are generally constant except for relatively short periods.

Discharge measurements of Catawba River near Morganton, N. C., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 10	E. H. Swett	190	1,230	3.84	4,180
Do	do	190	1,200	3.64	3,840
June 11	do	181	1,100	3.38	3,240

Daily gage height, in feet, of Catawba River near Morganton, N. C., for 1909.

[Oscar A. Gillam, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	2.15	1.7	3.55	2.0	1.95	2.25	16	3.5	2.0	2.6	3.0	1.8	2.7
2	2.1	1.7	3.45	2.0	1.8	2.15	17	3.5	3.6	2.5	2.9	1.75	2.6
3	2.0	1.7	3.4	1.95	1.7	2.0	18	3.0	3.0	2.4	2.95	1.7	2.5
4	5.9	1.7	3.2	1.9	1.65	14.0	19	2.5	4.5	2.25	2.85	1.7	2.45
5	4.5	1.7	3.0	1.85	1.6	8.0	20	2.25	3.75	2.2	2.8	8.8	2.25
6	3.5	1.65	2.5	1.8	1.55	6.0	21	2.1	3.7	2.25	2.85	16.3	2.35
7	3.0	1.65	2.25	1.85	5.4	5.2	22	2.05	3.65	2.2	2.7	8.0	2.25
8	2.75	1.65	2.5	1.75	3.55	4.5	23	2.05	3.4	2.2	2.8	7.0	2.15
9	2.5	1.6	2.4	1.65	3.0	4.0	24	2.0	3.0	2.1	2.75	6.2	2.0
10	2.3	3.6	2.3	1.5	2.5	4.2	25	2.0	2.9	5.6	2.7	5.5	1.9
11	2.15	2.9	2.9	1.6	2.0	3.3	26	1.95	2.8	3.5	2.55	4.2	1.9
12	2.1	2.5	2.85	1.6	1.95	3.0	27	1.9	2.75	3.25	2.4	4.0	1.9
13	2.05	2.15	2.75	4.0	1.9	3.0	28	1.85	2.6	3.0	2.25	3.55	1.85
14	2.0	2.1	2.7	3.5	1.8	2.9	29	1.8	.....	2.75	2.15	2.95	1.85
15	1.95	2.1	2.65	3.3	1.85	2.85	30	1.7	.....	2.6	2.0	2.7	1.8
							31	1.7	.....	2.5	.....	2.5	.....

Daily discharge, in second-feet, of Catawba River near Morganton, N. C., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1.....	1,600	1,060	3,430	1,420	1,360	1,720	16.....	3,360	1,420	2,160	2,680	1,180	2,290
2.....	1,540	1,060	3,290	1,420	1,180	1,600	17.....	3,360	3,500	2,030	2,550	1,120	2,160
3.....	1,420	1,060	3,220	1,360	1,060	1,420	18.....	2,680	2,680	1,900	2,620	1,060	2,030
4.....	7,490	1,060	2,940	1,300	1,000	26,400	19.....	2,030	4,870	1,720	2,480	1,060	1,960
5.....	4,870	1,060	2,680	1,240	950	12,000	20.....	1,720	3,720	1,660	2,420	13,800	1,720
6.....	3,360	1,000	2,030	1,180	895	7,700	21.....	1,540	3,650	1,720	2,480	32,200	1,840
7.....	2,680	1,000	1,720	1,240	6,490	6,110	22.....	1,480	3,580	1,660	2,290	12,000	1,720
8.....	2,360	1,000	2,030	1,120	3,430	4,870	23.....	1,480	3,220	1,660	2,420	9,800	1,600
9.....	2,030	950	1,900	1,000	2,680	4,100	24.....	1,420	2,680	1,540	2,360	8,120	1,420
10.....	1,780	3,500	1,780	840	2,030	4,400	25.....	1,420	2,550	6,880	2,290	6,680	1,300
11.....	1,600	2,550	2,550	950	1,420	3,080	26.....	1,360	2,420	3,360	2,100	4,400	1,300
12.....	1,540	2,030	2,480	950	1,360	2,680	27.....	1,300	2,360	3,010	1,900	4,100	1,300
13.....	1,480	1,600	2,360	4,100	1,300	2,680	28.....	1,240	2,160	2,680	1,720	3,430	1,240
14.....	1,420	1,540	2,290	3,360	1,180	2,550	29.....	1,180	.....	2,360	1,600	2,620	1,240
15.....	1,360	1,540	2,220	3,080	1,240	2,480	30.....	1,060	.....	2,160	1,420	2,290	1,180
							31.....	1,060	.....	2,030	.....	2,030	.....

NOTE.—These discharges are based on a rating curve that is fairly well defined below discharge 1,500 second-feet. Above 1,500 second-feet the curve is poorly defined.

Monthly discharge of Catawba River near Morganton, N. C., for 1909.

[Drainage area, 758 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	7,490	1,060	2,070	2.73	3.15	A
February	4,870	950	2,170	2.86	2.98	A
March	6,880	1,540	2,430	3.21	3.70	B
April	4,100	840	1,930	2.55	2.84	A
May	32,200	895	4,310	5.69	6.56	B
June	26,400	1,180	3,600	4.75	5.30	B

WATEREE RIVER NEAR CAMDEN, S. C.

This station has been maintained by the United States Weather Bureau since 1891 at the toll bridge, about 2 miles west of Camden. Camden is located about 45 miles above the mouth of Wateree River and about 5 miles below the fall line. The United States Geological Survey has published records of discharge since August 12, 1904.

The United States Weather Bureau gage was in three sections, of which only the one reading from 15 to 32 feet, painted on the upstream cylindrical pier on the right bank, was in good condition up to 1908. On August 12, 1904, a chain gage was installed on the bridge at the same datum as the upper section of the United States Weather Bureau gage.

The flood of August, 1908, washed out the bridge and both the United States Geological Survey chain gage and the United States Weather Bureau vertical staff gage. This last gage was replaced September 1, 1908, at presumably the same datum, by repainting it on a pier that was left standing at the opposite end of the bridge.

The exact datum of this new gage has not been accurately determined. For low and ordinary stages a temporary short section is used, which has been subject to some change in location and possibly in datum. A permanent chain gage can not be installed until the new bridge, which is now in process of construction, is completed.

Some uncertainty exists regarding the datum to which the gage heights were referred prior to the establishment of the chain gage in August, 1904. Conditions of flow are favorable for a good rating curve, and very little shift in the river bed has occurred since discharge measurements have been made at this point up to the time of the August, 1908, flood. Measurements since that time, made at the railroad bridge, about a mile above, indicate a great amount of change, which possibly may be due to change in the datum of the gage.

Both banks are high, but are liable to overflow at extreme high water. The river below the station has a very small slope, which is unfavorable for good rating at high stages, as the position of the flood crest will greatly affect the slope. The high part of the curve has been somewhat modified to give a greater discharge for high stages.

The river is subject to power regulation above the station, which probably affects the daily mean gage heights considerably, especially during low water.

Discharge measurements of Wateree River near Camden, S. C., 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 15	W. A. Lamb	360	5,400	11.20	6,860
February 16	do	360	5,510	11.58	7,310

NOTE.—Measurement made from railroad bridge, about one-half mile above regular station.

Daily gage height, in feet, of Wateree River near Camden, S. C., for August 1, 1908, to December 31, 1909.

[H. Arthur Brown, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.						1908.					
1	10.6	19.5	8.3	18.6	8.2	16	5.2	7.0	7.5	20.3	9.2
2	8.5	13.2	7.7	15.6	9.2	17	6.2	6.9	7.2	16.7	8.4
3	7.4	10.0	7.1	12.6	9.1	18	7.1	6.7	7.3	13.3	8.5
4	6.2	11.0	7.0	11.2	8.4	19	6.45	8.0	6.8	10.8	8.9
5	6.7	10.0	6.9	12.0	8.2	20	8.85	8.0	7.0	9.4	6.9
6	6.2	17.0	6.9	11.2	7.6	21	9.55	7.5	7.1	8.4	9.4
7	7.5	25.0	6.7	10.2	7.7	22	12.4	7.4	7.4	7.9	12.4
8	10.0	20.0	6.6	10.8	8.4	23	.....	7.2	8.4	7.3	26.9
9	12.8	18.0	6.5	9.4	8.0	24	.....	7.8	9.8	8.6	29.1
10	13.0	17.0	9.9	8.8	7.7	25	29.0	7.6	24.6	9.6	24.8
11	9.4	15.0	15.6	8.6	7.9	26	35.0	7.0	24.8	8.6	18.6
12	7.3	12.0	12.0	8.2	9.6	27	38.4	7.8	19.0	8.4	12.6
13	6.7	9.0	10.9	8.8	10.6	28	35.4	9.2	15.8	8.2	12.0
14	6.4	9.7	11.2	10.1	10.2	29	32.6	9.1	22.2	6.4	10.4
15	5.45	7.7	9.0	21.6	9.2	30	.....	8.2	25.3	8.0	9.8
						31	21.0	.....	23.1	.....	8.9

Daily gage height, in feet, of Wateree River near Camden, S. C., for August 1, 1908, to December 31, 1909—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	8.6	8.4	11.9	10.8	9.0	10.9	13.4	12.4	9.8	9.8	7.3	5.9
2	9.8	8.4	10.6	11.3	27.6	10.4	12.4	12.7	9.4	9.6	7.0	5.7
3	9.4	8.6	11.4	9.9	25.6	13.2	14.5	22.9	9.3	8.6	8.8	5.7
4	9.0	8.5	10.9	10.4	18.3	28.3	15.3	25.8	8.4	8.7	7.7	5.5
5	9.8	8.6	10.6	9.6	15.3	31.6	12.8	23.8	8.8	8.3	7.2	6.3
6	9.3	7.4	9.6	9.9	11.6	29.4	13.9	18.6	10.9	12.3	7.0	6.5
7	13.5	7.4	9.2	9.9	12.6	25.6	15.3	12.7	11.0	11.3	8.3	5.9
8	16.0	9.5	8.5	9.4	11.8	19.5	13.7	12.4	11.4	10.4	8.9	5.5
9	13.2	8.6	10.8	9.8	9.8	17.0	11.4	11.8	11.1	10.4	8.6	6.1
10	11.1	14.6	15.2	9.7	10.2	21.7	10.8	11.0	9.3	8.7	7.8	6.6
11	9.9	23.5	17.1	9.4	9.3	22.5	9.8	10.5	9.0	7.7	8.4	7.6
12	8.8	18.7	16.2	8.8	9.0	21.3	10.2	9.2	8.0	7.4	7.1	6.0
13	9.8	14.8	13.4	9.8	10.5	16.8	9.7	9.5	7.5	7.8	7.2	6.7
14	8.8	11.0	13.0	9.6	10.5	20.1	9.4	8.6	8.0	8.1	6.7	10.0
15	8.7	10.3	14.8	7.9	9.5	21.5	11.1	11.4	9.0	11.9	7.3	11.4
16	8.8	9.8	15.2	13.0	9.2	21.6	11.6	13.8	9.4	10.2	7.6	14.2
17	11.8	9.4	14.6	10.8	8.6	17.5	10.6	11.6	9.2	8.7	6.9	10.2
18	17.2	9.0	13.0	9.6	9.0	17.4	9.8	11.2	13.0	8.4	7.5	10.3
19	15.8	10.0	11.7	8.9	8.9	16.9	9.2	10.4	18.1	8.3	7.0	9.9
20	14.0	12.5	10.4	9.7	9.8	17.5	8.6	9.6	16.0	9.2	7.6	8.7
21	11.9	11.6	9.6	9.3	26.8	13.5	8.6	9.6	13.4	10.1	7.4	7.3
22	10.6	14.8	11.5	8.9	29.1	12.4	7.9	8.7	11.7	12.5	7.0	8.4
23	9.8	17.8	11.2	8.9	29.4	13.0	7.8	8.2	10.2	10.6	6.8	7.6
24	10.2	20.3	10.5	8.9	24.4	12.3	7.5	9.2	10.3	7.6	7.9	6.9
25	9.6	18.7	9.4	7.2	17.4	11.6	6.8	8.8	15.0	7.0	7.2	6.7
26	9.2	14.8	9.8	8.3	14.9	10.6	8.6	8.5	13.0	6.6	7.0	8.1
27	8.5	14.0	14.5	8.3	14.9	14.4	7.7	7.8	12.1	7.0	7.2	7.1
28	8.4	12.4	17.4	7.9	16.2	16.4	9.6	8.8	10.6	6.4	7.3	7.1
29	7.8	.....	15.0	8.8	15.1	13.6	16.4	8.9	10.9	6.8	6.2	6.8
30	8.0	.....	13.0	8.5	11.2	13.6	16.4	9.7	9.5	8.1	6.2	6.7
31	8.2	.....	12.1	.....	10.7	.....	13.3	10.5	.....	6.6	.....	6.4

NOTE.—Bridge and gage washed away by the flood of August, 1908. Maximum stage reached August 27, 1908, was 38.4 feet, which is the highest recorded since the establishment of this station.
Data for January to July, 1908, was published in Water-Supply Paper 242, pp. 69-72.

Daily discharge, in second-feet, of Wateree River near Camden, S. C., for August 1, 1908, to December 31, 1909.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.						1908.					
1	8,040	17,100	4,020	15,900	3,930	16	2,980	2,850	3,300	18,300	4,890
2	6,050	9,090	3,480	11,900	4,890	17	3,880	2,760	3,030	13,400	4,110
3	5,000	5,690	2,940	8,430	4,790	18	4,720	2,580	3,120	9,200	4,200
4	3,880	6,690	2,850	6,890	4,110	19	4,100	3,750	2,670	6,490	4,590
5	4,340	5,690	2,760	7,770	3,930	20	6,380	3,750	2,850	5,090	2,760
6	3,880	13,800	2,760	6,890	3,390	21	7,050	3,300	2,940	4,110	5,090
7	5,100	25,500	2,580	5,890	3,480	22	9,820	3,210	3,210	3,660	8,210
8	7,480	17,800	2,490	6,490	4,110	23	.....	3,030	4,110	3,120	28,500
9	10,200	15,000	2,400	5,090	3,750	24	.....	3,570	5,490	4,290	32,300
10	10,400	13,800	5,590	4,490	3,480	25	.....	3,390	24,900	5,290	25,200
11	6,900	11,200	11,900	4,290	3,660	26	.....	2,850	25,200	4,290	15,900
12	4,910	7,770	7,770	3,930	5,290	27	.....	3,570	16,400	4,110	8,430
13	4,340	4,690	6,590	4,490	6,290	28	.....	4,890	12,200	3,930	7,770
14	4,060	5,390	6,890	5,790	5,890	29	.....	4,790	21,100	2,320	6,090
15	3,200	3,480	4,690	20,200	4,890	30	.....	3,930	26,000	3,750	5,490
						31	.....	.....	22,500	.....	4,590

Daily discharge, in second-feet, of Wateree River near Camden, S. C., for August 1, 1908, to December 31, 1909—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	4,290	4,110	7,660	6,490	4,690	6,590	9,310	8,210	5,490	5,490	3,120	1,900
2	5,490	4,110	6,290	7,000	29,700	6,090	8,210	8,540	5,090	5,290	2,850	1,720
3	5,090	4,290	7,110	5,590	26,500	9,090	10,600	22,200	4,990	4,290	4,490	1,720
4	4,690	4,200	6,590	6,090	15,500	30,900	11,600	26,800	4,110	4,390	3,480	1,560
5	5,490	4,290	6,290	5,290	11,600	36,500	8,650	23,600	4,490	4,020	3,030	2,240
6	4,990	3,210	5,290	5,590	7,330	32,800	9,880	15,900	6,590	8,100	2,850	2,400
7	9,420	3,210	4,890	5,590	8,430	26,500	11,600	8,540	6,690	7,000	4,020	1,900
8	12,400	5,190	4,200	5,090	7,550	17,100	9,640	8,210	7,110	6,090	4,590	1,560
9	9,090	4,290	6,490	5,490	5,490	13,800	7,110	7,550	6,790	6,090	4,290	2,060
10	6,790	10,700	11,400	5,390	5,890	20,400	6,490	6,690	4,990	4,390	3,570	2,490
11	5,590	23,100	13,900	5,090	4,990	21,600	5,490	6,190	4,690	3,480	4,110	3,390
12	4,490	16,000	12,700	4,490	4,690	19,800	5,890	4,890	3,750	3,210	2,940	1,980
13	5,490	11,000	9,310	5,490	6,190	13,500	5,390	5,190	3,300	3,570	3,030	2,580
14	4,490	6,690	8,870	5,290	6,190	18,000	5,090	4,290	3,750	3,840	2,580	5,690
15	4,390	5,990	11,000	3,660	5,190	20,000	6,790	7,110	4,690	7,660	3,120	7,110
16	4,490	5,490	11,400	8,870	4,890	20,200	7,330	9,760	5,090	5,890	3,390	10,200
17	7,550	5,090	10,700	6,490	4,290	14,400	6,290	7,330	4,890	4,390	2,760	5,890
18	14,000	4,690	8,870	5,290	4,690	14,300	5,490	6,890	8,870	4,110	3,300	5,990
19	12,200	5,690	7,440	4,590	4,590	13,600	4,890	6,090	15,200	4,020	2,850	5,590
20	10,000	8,320	6,090	5,390	5,490	14,400	4,290	5,290	12,400	4,890	3,390	4,390
21	7,660	7,330	5,290	4,990	28,400	9,420	4,290	5,290	9,310	5,790	3,210	3,120
22	6,290	11,000	7,220	4,590	32,300	8,210	3,660	4,390	7,440	8,320	2,850	4,110
23	5,490	14,800	6,890	4,590	32,800	8,870	3,570	3,930	5,890	6,290	2,670	3,390
24	5,890	18,300	6,190	4,590	24,500	8,100	3,300	4,890	5,990	3,390	3,660	2,760
25	5,290	16,000	5,090	3,030	14,300	7,330	2,670	4,490	11,200	2,850	3,030	2,580
26	4,890	11,000	5,490	4,020	11,100	6,290	4,290	4,200	8,870	2,490	2,850	3,840
27	4,200	10,000	10,600	4,020	11,100	10,500	3,480	3,570	7,880	2,850	3,030	2,940
28	4,110	8,210	14,300	3,660	12,700	13,000	5,290	4,490	6,290	2,320	3,120	2,940
29	3,570	.....	11,200	4,490	11,300	9,530	13,000	4,590	6,590	2,670	2,150	2,670
30	3,750	.....	8,870	4,200	6,890	9,530	13,000	5,390	5,190	3,840	2,150	2,580
31	3,930	.....	7,880	.....	6,390	.....	9,200	6,190	.....	2,490	.....	2,320

NOTE.—These discharges are based on rating curves that are applicable as follows: August 1 to 22, 1908 (well defined between discharges 1,500 and 13,500 second-feet; same as the 1904–1908 curve); September 1, 1908, to December 31, 1909 (not well defined; at high stages the curve is only approximate).

Discharges August 23 to 31, 1908, not determined on account of flood. River goes out of its banks at about gage height 30 feet.

Data for January to July, 1908, was published in Water-Supply Paper 242, pp. 69–72.

Monthly discharge of Wateree River near Camden, S. C., for 1908 and 1909.

[Drainage area, 4,500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908.						
January	29,500	5,860	14,200	3.16	3.64	A.
February	28,700	6,810	15,500	3.44	3.71	A.
March	28,200	6,520	10,900	2.42	2.79	A.
April	8,820	5,380	6,630	1.47	1.64	A.
May	8,820	4,340	5,690	1.26	1.45	A.
June	9,320	3,880	5,560	1.24	1.38	A.
July	21,500	2,800	8,160	1.81	2.09	A.
August 1–22	10,400	2,980	5,760	1.28	1.05	A.
September	25,500	2,580	7,160	1.59	1.77	B.
October	26,000	2,400	8,020	1.78	2.05	B.
November	20,200	2,320	6,990	1.55	1.73	B.
December	32,300	2,760	7,550	1.68	1.94	B.

Monthly discharge of Wateree River near Camden, S. C., for 1908 and 1909—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1909.						
January	14,000	3,570	6,310	1.40	1.61	B.
February	23,100	3,210	8,440	1.88	1.96	B.
March	14,300	4,200	8,240	1.83	2.11	B.
April	7,000	3,030	5,150	1.14	1.27	B.
May	32,800	4,290	11,800	2.62	3.02	B.
June	36,500	6,090	15,300	3.40	3.79	B.
July	13,000	2,670	6,960	1.55	1.79	B.
August	26,800	3,570	8,090	1.80	2.08	B.
September	15,200	3,300	6,590	1.46	1.63	B.
October	8,320	2,320	4,630	1.03	1.19	B.
November	4,590	2,150	3,220	.716	.80	B.
December	10,200	1,560	3,410	.758	.87	B.
The year	36,500	1,560	7,340	1.63	22.12	

NOTE.—No discharge determined for August 23 to 31, 1908, on account of flood. Conditions during this period would not warrant any reliable estimates.

BROAD RIVER (OF THE CAROLINAS) AT UREE, N. C.

This station, which is located on Broad River at Uree, about 4 miles above the mouth of Cove Creek and about 3 miles below Buffalo Creek, was established May 17, 1907, in cooperation with the United States Forest Service, and was discontinued June 30, 1909.

The vertical staff gage is located about 130 feet below the bridge from which the discharge measurements are made. The gage datum has remained unchanged. Both banks are high and are not liable to overflow. The conditions of flow are probably constant, and a good rating has been developed for low stages. No measurements were made in 1909.

Daily gage height, in feet, of Broad River (of the Carolinas) at Uree, N. C., for 1909.

[W. M. Flynn, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	1.8	1.9	1.95	1.9	2.3	2.1	16	2.8	2.0	2.1	1.9	1.85	2.5
2	1.8	1.8	1.95	1.9	2.0	2.0	17	2.2	2.0	2.0	1.9	1.8	2.2
3	1.8	1.8	1.9	1.9	2.0	2.5	18	2.0	2.0	2.0	1.9	1.8	2.1
4	1.8	1.8	1.9	1.9	2.0	3.0	19	2.0	2.1	2.0	1.9	1.8	2.1
5	3.2	1.8	1.9	1.9	1.9	2.7	20	1.9	2.0	2.0	1.85	5.6	2.1
6	2.2	1.9	2.1	1.9	1.9	2.7	21	1.9	1.95	2.0	1.85	3.5	2.1
7	2.0	1.8	1.9	1.9	1.9	2.3	22	1.9	2.2	1.9	1.85	3.0	2.1
8	2.0	1.8	1.9	1.9	1.9	2.2	23	1.9	2.3	1.9	2.0	2.6	2.3
9	2.0	1.8	1.9	1.85	1.9	2.6	24	1.9	2.3	1.9	1.9	2.5	2.2
10	1.9	2.0	2.2	1.8	2.0	2.3	25	1.9	2.2	2.6	1.85	2.3	2.3
11	1.9	1.9	2.1	1.8	1.9	2.2	26	1.9	2.1	2.1	1.8	2.3	2.2
12	1.9	1.85	2.0	1.8	1.9	2.2	27	1.8	2.0	2.1	1.8	2.2	2.3
13	1.9	1.85	2.8	2.4	1.9	2.3	28	1.8	2.0	2.2	1.85	2.2	2.2
14	1.9	1.85	2.3	2.0	1.9	2.3	29	1.85	.....	2.0	1.85	2.1	2.3
15	1.9	2.0	2.2	2.0	1.9	2.2	30	1.8	.....	2.0	1.85	2.1	2.3
							31	1.7	.....	1.9	.....	2.1	.....

Daily discharge, in second-feet, of Broad River (of the Carolinas) at Uree, N. C., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	220	260	281	260	.....	.....	16	.....	302	.....	260	240	.....
2	220	220	281	260	302	302	17	.....	302	302	260	220	.....
3	220	220	260	260	302	.....	18	302	302	302	260	220	.....
4	220	220	260	260	302	.....	19	302	.....	302	260	220	.....
5	.....	220	260	260	260	.....	20	260	302	302	240	.....	.....
6	.....	260	.....	260	260	.....	21	260	281	302	240	.....	.....
7	302	220	260	260	260	.....	22	260	.....	260	240	.....	.....
8	302	220	260	260	260	.....	23	260	.....	260	302	.....	.....
9	302	220	260	240	260	.....	24	260	.....	260	260	.....	.....
10	260	302	.....	220	302	.....	25	260	.....	.....	240	.....	.....
11	260	260	.....	220	260	.....	26	260	.....	.....	220	.....	.....
12	260	240	302	220	260	.....	27	220	302	.....	220	.....	.....
13	260	240	.....	.....	260	.....	28	220	302	.....	240	.....	.....
14	260	240	.....	302	260	.....	29	240	.....	302	240	.....	.....
15	260	302	.....	302	260	.....	30	220	.....	302	240	.....	.....
							31	183	.....	260	.....	.....	.....

NOTE.—These discharges are based on a rating curve that is well defined between 88 and 220 second-feet. Discharges for all missing days January to June are above 300 second-feet.

GREEN RIVER NEAR SALUDA, N. C.

The station, which is located at the lower steel bridge about 5 miles southeast of Hendersonville, N. C., 3 miles west of Saluda, N. C., 3 miles northeast of Flat Rock, N. C., and 1 mile above the mouth of Hungry Creek, was established May 9, 1907, in cooperation with the United States Forest Service, although measurements referred to a bench mark have been previously made at this point. The station was discontinued June 30, 1909.

The datum of the chain gage, which is on the bridge, has remained the same since the establishment of the station. Measurements are made from the bridge. The banks will probably not overflow. Conditions of flow appear to be constant and a good low-water rating has been developed.

Discharge measurements of Green River near Saluda, N. C., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 17	E. H. Swett	44	167	2.99	444
Do	do	44	169	2.98	434

Daily gage height, in feet, of Green River near Saluda, N. C., for 1909.

[J. C. Gordon, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	2.1	2.1	2.4	2.4	4.3	2.4	16	2.2	2.7	2.4	2.2	2.2	2.7
2	2.1	2.1	2.5	2.4	2.9	2.3	17	2.6	2.4	2.4	2.2	2.2	3.0
3	2.1	2.0	2.4	2.3	2.6	3.2	18	2.4	2.3	2.3	2.2	2.2	2.8
4	2.1	2.0	2.4	2.3	2.5	6.0	19	2.3	2.5	2.3	2.2	2.1	2.6
5	4.2	2.0	2.3	2.3	2.5	3.2	20	2.3	2.4	2.4	2.2	4.2	2.6
6	2.7	2.2	2.5	2.3	2.4	2.8	21	2.2	2.3	2.3	2.1	2.9	2.6
7	2.4	2.1	2.3	2.3	2.3	2.6	22	2.2	2.6	2.3	2.1	2.7	2.9
8	2.3	2.0	2.3	2.2	2.3	2.6	23	2.3	3.2	2.2	2.6	2.5	2.6
9	2.3	2.0	2.3	2.3	2.3	6.2	24	2.2	3.4	2.2	2.3	2.4	2.6
10	2.3	3.2	2.8	2.2	3.2	3.5	25	2.2	2.9	4.2	2.2	2.3	2.5
11	2.2	2.4	2.5	2.2	2.4	3.1	26	2.2	2.7	2.8	2.2	2.3	2.5
12	2.2	2.3	2.5	2.2	2.3	2.9	27	2.1	2.6	2.6	2.2	2.2	2.4
13	2.2	2.2	2.7	2.5	2.3	3.0	28	2.1	2.5	2.9	2.2	2.2	2.4
14	2.2	2.2	2.7	2.4	2.3	2.8	29	2.1	.....	2.6	2.1	2.2	2.4
15	2.2	2.2	2.5	2.3	2.2	2.9	30	2.1	.....	2.6	2.1	2.2	2.5
							31	2.0	.....	2.5	.....	2.2	.....

Daily discharge, in second-feet, of Green River near Saluda, N. C., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	151	151	226	226	1,130	226	16	174	321	226	174	174	321
2	151	151	255	226	395	199	17	287	226	226	174	174	436
3	151	130	226	199	287	525	18	226	199	199	174	174	357
4	151	130	226	199	255	2,450	19	199	255	199	174	151	287
5	1,070	130	199	199	255	525	20	199	226	226	174	1,070	287
6	321	174	255	199	226	357	21	174	199	199	151	395	287
7	226	151	199	199	199	287	22	174	287	199	151	321	395
8	199	130	199	174	199	287	23	199	525	174	287	255	287
9	199	130	199	199	199	2,630	24	174	620	174	199	226	287
10	199	525	357	174	525	670	25	174	395	1,070	174	199	255
11	174	226	255	174	226	480	26	174	321	357	174	199	255
12	174	199	255	174	199	395	27	151	287	287	174	174	226
13	174	174	321	255	199	436	28	151	255	395	174	174	226
14	174	174	321	226	199	357	29	151	.....	287	151	174	226
15	174	174	255	199	174	395	30	151	.....	287	151	174	255
							31	130	.....	255	.....	174	.....

NOTE.—These discharges are based on a rating curve that is well defined between 40 and 520 second-feet. Above 950 second-feet the curve is only approximate.

Monthly discharge of Green River near Saluda, N. C., for 1909.

[Drainage area, 51 square miles.]

Month	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,070	130	212	4.16	4.80	A.
February	620	130	245	4.80	5.00	A.
March	1,070	174	274	5.37	6.19	A.
April	287	151	189	3.71	4.14	A.
May	1,130	151	286	5.61	6.47	B.
June	2,630	199	487	9.55	10.66	B.

SAVANNAH RIVER DRAINAGE BASIN.

DESCRIPTION.

Savannah River rises on the southern slope of the Blue Ridge Mountains in the northeast corner of Georgia and the northwest corner of South Carolina, some of its headwaters coming across the state line from North Carolina. Its general course is southeast, and it forms the boundary between Georgia and South Carolina from the North Carolina line to the Atlantic Ocean. The basin is about 260 miles long and contains about 11,100 square miles.

The principal tributaries are Tallulah, Seneca, and Broad rivers. The name Tugaloo River is applied to the main stream above the mouth of Seneca, and in turn it becomes Chattooga River above the mouth of Tallulah.

A small area of the upper end of the basin lying in the Appalachian Mountains has an elevation of 3,000 feet and even more, but the fall is very rapid down to about 1,000 feet in the Piedmont Plateau region, in which most of the drainage basin lies. The Coastal Plain portion of this basin, from Augusta, Ga., down, is comparatively narrow.

Above the fall line, which passes a few miles above Augusta, Ga., the main streams and many smaller tributaries afford excellent water powers, having good amount of fall and a large minimum flow.

The ice and snow conditions in this area have little or no effect on stream flow. The average annual rainfall reaches 70 inches in the extreme upper portion and ranges from 50 to 60 inches in the other parts. The basin contains a number of fairly good sites for storage reservoirs on the Tugaloo River and on the tributaries of the Seneca and on Broad River in Georgia.

The following special reports contain information regarding the hydrography of the Savannah River basin:

Water resources of Georgia, by B. M. and M. R. Hall: Water-Supply Paper U. S. Geol. Survey No. 197. This report contains data collected in this basin prior to 1906.

River surveys and profiles made during 1903, by W. C. Hall and J. C. Hoyt: Water-Supply Paper U. S. Geol. Survey No. 115. This report and separate sheets, showing the Catawba and Broad River profiles, may be obtained by applying to the Director, United States Geological Survey, Washington, D. C.

Relation of southern Appalachian Mountains to the development of inland water navigation and water power: U. S. Forest Service Circulars Nos. 143 and 144.

The following gaging stations have been maintained in this river basin:

Chattooga River near Clayton, Ga., 1907–8.
Tugaloo River near Toccoa, Ga., 1907–8.
Tugaloo River near Madison, S. C., 1898–1909.
Savannah River near Calhoun Falls, S. C., 1896–1903.
Savannah River at Woodlawn, S. C., 1905–1909.

Savannah River at Augusta, Ga., 1899–1906.
Stekoa Creek near Clayton, Ga., 1907–8.
Tallulah River at Tallulah Falls, Ga., 1900–1909.
Chauga River near Madison, S. C., 1907.
Seneca River near Clemson College, S. C., 1903–1905.
Broad River (of Georgia) near Carlton, Ga., 1897–1909.

TUGALOO RIVER NEAR MADISON, S. C.

The station was originally established at Cooks Ferry July 19, 1898, and was discontinued December 31, 1901, when the ferry was moved. It was reestablished July 7, 1903, at Holcombs Ferry, 1 mile west of Madison, S. C., and 900 feet below the Southern Railway bridge. It is about 1½ miles above the point where the old station was located and 2 miles below the mouth of Toccoa Creek. The data from this station have been used largely for water-power estimates.

The gage at Holcombs Ferry is a vertical staff in three sections. The low-water section, reading from 1 foot to 16 feet, is attached to a sycamore tree on the left bank, about 30 feet above the ferry landing. The second section reads from 16 to 22 feet and is attached to another sycamore tree on the left bank, about 18 feet above the ferry landing. The high-water section, reading from 21 to 31 feet, is fastened to a locust tree on the left bank at the fork of the road, about 175 feet from the ferry landing.

The gage heights are probably not seriously affected by artificial control, although there are some flash dams on headwater streams used for booming logs, and when the water from one of these dams is released considerable rise occurs at the station for a few hours, often amounting to a foot or more.

The datum of both gages has remained constant during the period of their maintenance. There is, however, no established relation between the two gage zeros. The datum of the present gage is 630.10 feet above sea level.

Discharge measurements are made from a small boat held in place by a cable stretched across the river. Both banks are moderately high, but will overflow for about 200 feet on each side at extreme high stages. The bed of the river is sandy and changeable, necessitating frequent changes in the rating. The high-water part of the rating curve has not yet been developed.

Discharge measurements of Tugaloo River near Madison, S. C., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
September 9	E. H. Swett	162	574	3.38	1,170
September 10	do	162	545	3.26	1,120
November 12	do	156	426	2.72	770
November 13	do	156	422	2.70	806

Daily gage height, in feet, of Tugaloo River near Madison, S. C., for 1909.

[T. A. Spencer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.9	3.6	5.6	5.8	17.0	6.6	5.8	4.0	3.1	3.35	2.65	2.55
2	4.0	3.65	5.7	5.4	8.4	5.6	5.4	5.3	3.0	3.2	2.85	2.5
3	3.5	3.55	5.3	5.4	6.8	9.8	5.4	5.1	3.0	3.15	2.75	2.7
4	3.8	3.5	5.2	5.3	6.1	20.0	5.1	4.8	3.0	3.1	2.65	2.5
5	7.6	3.45	5.1	5.3	5.8	13.0	4.9	4.9	3.2	3.1	2.65	2.5
6	5.8	4.1	5.3	5.0	5.5	9.9	6.5	4.45	3.1	3.2	2.6	2.5
7	4.8	4.0	5.2	5.0	5.1	8.9	4.9	5.3	3.0	2.9	2.8	4.2
8	4.4	3.8	5.3	5.2	5.1	7.9	5.1	4.4	3.05	2.8	2.7	6.8
9	4.2	3.7	5.0	5.4	4.85	7.8	5.7	4.3	3.8	2.95	2.7	4.2
10	3.9	9.8	11.2	5.1	6.6	9.9	5.6	5.1	3.3	2.9	2.75	3.4
11	3.85	6.3	7.1	4.9	6.0	7.1	5.0	4.5	3.2	3.25	2.65	3.1
12	3.8	4.1	7.2	4.8	5.3	6.7	4.9	4.0	3.15	3.7	2.75	3.0
13	3.9	4.2	14.8	5.1	5.0	6.3	4.7	3.85	3.05	3.5	2.7	13.8
14	4.0	5.4	15.5	6.6	4.9	6.3	6.3	4.6	3.0	2.85	2.85	9.0
15	4.0	5.4	9.1	5.4	4.8	6.8	5.7	4.8	3.1	6.4	2.7	5.9
16	4.7	9.8	7.8	5.0	4.5	6.1	4.7	5.2	4.4	4.2	2.65	4.9
17	7.4	7.0	7.2	5.0	4.8	7.0	5.3	5.0	5.0	2.9	2.8	4.3
18	6.2	5.7	6.6	4.8	4.5	6.3	4.7	4.05	3.85	3.3	3.0	4.05
19	4.9	5.5	6.2	4.75	4.5	5.7	4.5	3.8	3.5	3.2	2.8	3.9
20	4.4	6.9	6.4	4.6	15.5	5.6	4.3	3.7	3.3	3.2	2.6	3.8
21	4.3	5.6	6.1	4.5	14.0	5.8	4.1	3.6	3.1	3.15	2.9	3.6
22	4.2	7.0	6.1	4.5	14.0	8.3	4.1	3.5	3.65	3.2	2.65	3.5
23	4.1	10.2	5.8	4.7	11.0	6.7	4.25	3.45	8.3	2.85	3.0	3.3
24	4.4	8.9	5.5	5.3	8.7	6.1	4.2	3.4	8.4	3.1	3.0	3.2
25	4.2	8.0	8.5	4.6	7.7	5.8	4.0	3.45	4.9	2.75	2.7	3.8
26	4.1	6.8	7.4	4.9	7.2	5.8	3.95	3.3	4.1	2.75	2.7	4.0
27	3.8	6.1	6.6	4.6	7.3	6.9	4.0	3.3	3.8	2.85	2.6	3.5
28	3.8	5.8	7.2	5.1	6.7	6.3	4.0	3.2	3.55	2.75	2.8	3.4
29	3.8	.....	9.9	4.65	6.1	6.0	3.9	3.3	3.4	2.75	2.6	3.3
30	3.9	.....	6.3	4.75	6.0	6.0	4.4	3.2	3.35	2.65	2.6	2.85
31	3.5	.....	5.9	.....	6.1	.....	4.1	3.15	.....	2.85	.....	3.0

Daily discharge, in second-feet, of Tugaloo River near Madison, S. C., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,540	1,320	2,980	3,170	14,300	3,940	3,170	1,610	996	1,150	760	711
2	1,610	1,360	3,070	2,790	5,740	2,980	2,790	2,700	940	1,060	860	687
3	1,250	1,280	2,700	2,790	4,140	7,140	2,790	2,510	940	1,030	809	784
4	1,460	1,250	2,600	2,700	3,460	17,300	2,510	2,250	940	996	760	687
5	4,940	1,220	2,510	2,700	3,170	10,300	2,340	2,340	1,060	996	760	687
6	3,170	1,690	2,700	2,420	2,880	7,240	3,840	1,960	996	1,060	735	687
7	2,250	1,610	2,600	2,420	2,510	6,240	2,340	2,700	940	886	834	1,760
8	1,920	1,460	2,700	2,600	2,510	5,240	2,510	1,920	968	834	784	4,140
9	1,760	1,390	2,420	2,790	2,300	5,140	3,070	1,840	1,460	913	784	1,760
10	1,540	7,140	8,540	2,510	3,940	7,240	2,980	2,510	1,120	886	809	1,180
11	1,500	3,650	4,440	2,340	3,360	4,440	2,420	2,000	1,060	1,090	760	996
12	1,460	1,690	4,540	2,250	2,700	4,040	2,340	1,610	1,030	1,390	809	940
13	1,540	1,760	12,100	2,510	2,420	3,650	2,170	1,500	968	1,250	784	11,100
14	1,610	2,790	12,800	3,940	2,340	3,650	3,650	2,080	940	860	860	6,340
15	1,610	2,790	6,440	2,790	2,250	4,140	3,070	2,250	996	3,750	784	3,260
16	2,170	7,140	5,140	2,420	2,000	3,460	2,170	2,600	1,920	1,760	760	2,340
17	4,740	4,340	4,540	2,420	2,250	4,340	2,700	2,420	2,420	886	834	1,840
18	3,550	3,070	3,940	2,250	2,000	3,650	2,170	1,650	1,500	1,120	940	1,650
19	2,340	2,880	3,550	2,210	2,000	3,070	2,000	1,460	1,250	1,060	834	1,540
20	1,920	4,240	3,750	2,080	12,800	2,980	1,840	1,390	1,120	1,060	735	1,460
21	1,840	2,980	3,460	2,000	11,300	3,170	1,690	1,320	996	1,030	886	1,320
22	1,760	4,340	3,460	2,000	11,300	5,640	1,690	1,250	1,360	1,060	760	1,250
23	1,690	7,540	3,170	2,170	8,340	4,040	1,800	1,220	5,640	860	940	1,120
24	1,920	6,240	2,880	2,700	6,040	3,460	1,760	1,180	5,740	996	940	1,060
25	1,760	5,340	5,840	2,080	5,040	3,170	1,610	1,220	2,340	809	784	1,460
26	1,690	4,140	4,740	2,340	4,540	3,170	1,570	1,120	1,690	809	784	1,610
27	1,460	3,460	3,940	2,080	4,640	4,240	1,610	1,120	1,460	860	735	1,250
28	1,460	3,170	4,540	2,510	4,040	3,650	1,610	1,060	1,280	809	834	1,180
29	1,460	.....	7,240	2,120	3,460	3,360	1,540	1,120	1,180	809	735	1,120
30	1,540	.....	3,650	2,210	3,360	3,360	1,920	1,060	1,150	809	735	860
31	1,250	.....	3,260	.....	3,460	.....	1,690	1,030	.....	860	.....	940

NOTE.—These discharges are based on a rating curve that is fairly well defined between discharges 690 and 1,600 second-feet.

Monthly discharge of Tugaloo River near Madison, S. C., for 1909.

[Drainage area, 593 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	4,940	1,250	1,990	3.36	3.87	B.
February	7,540	1,220	3,260	5.50	5.73	B.
March	12,800	2,420	4,520	7.62	8.78	B.
April	3,940	2,000	2,480	4.18	4.66	B.
May	14,300	2,000	4,660	7.86	9.06	B.
June	17,300	2,980	4,910	8.28	9.24	B.
July	3,840	1,540	2,300	3.88	4.47	B.
August	2,700	1,030	1,740	2.93	3.38	B.
September	5,740	940	1,550	2.61	2.91	B.
October	3,750	809	1,090	1.84	2.12	B.
November	940	735	804	1.36	1.52	B.
December	11,100	687	1,860	3.14	3.62	B.
The year	17,300	687	2,600	4.38	59.36	

SAVANNAH RIVER AT WOODLAWN, S. C.

This station is located at the Charleston and Western Carolina Railway bridge, 1,000 feet from the depot at Woodlawn, S. C., 17 miles above Augusta, Ga., and 10 miles above the Augusta water-power dam. It is 5 miles above Stevens Creek, which is a large tributary from the Carolina side. The station was established November 9, 1905, and has been maintained continuously except from August 27, to October 12, 1908, when the gage was destroyed by a flood which washed out the two main spans of the east-channel bridge. Records for this station are considered very valuable for water-power estimates and other run-off studies connected with this important drainage basin. The gage is read twice a day in order to equalize any fluctuations due to water-power operations, which are, however, but slight. No diversions of water affect the station.

The original gage was of the standard chain type attached to the railroad bridge. The present temporary staff gage, used since October 12, 1908, consists of three vertical sections attached to trees from 50 to 80 feet above the bridge. The datum of both gages is the same and has not changed since their installation.

Discharge measurements are made from the upstream side of the railway bridge.

Both banks overflow slightly at extreme high stages. An island, which divides the channel into two sections, is also overflowed at high stages, the overflow passing through about 900 feet of wooden trestle. The bed of the stream is composed mainly of rock and is quite rough, causing broken and irregular current in some portions of the cross section. Conditions of flow have changed somewhat since 1908, prob-

ably due to a span of iron bridge lying crosswise in the main channel a short distance below in what was originally the deepest and swiftest part. This obstruction probably did not affect the 1907–8 rating materially, as the trusswork was less obstructed than later on.

The monthly estimates for August to December, 1908, as published in Water-Supply Paper 242 are liable to some error and should be used with caution. Measurements in 1909 and in January, 1910, indicate that the obstruction has altered the previously existing channel conditions and necessitates a new rating for 1909. The natural conditions appear to be constant.

Discharge measurements of Savannah River at Woodlawn, S. C., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 11	M. R. Hall	593	3,470	5.72	8,690
December 14	E. H. Swett	612	5,230	8.22	19,400

Daily gage height, in feet, of Savannah River at Woodlawn, S. C., for 1909.

[J. C. Parks, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.2	5.3	7.0	6.8	9.8	5.85	8.2	6.0	4.5	4.5	4.6	4.5
2	6.8	5.2	6.8	6.6	15.0	5.7	7.1	6.9	4.45	4.45	4.8	4.3
3	6.2	5.0	7.6	6.5	10.6	9.3	5.9	10.4	4.4	4.4	4.65	4.3
4	6.0	4.9	6.8	6.2	8.1	15.1	6.4	10.2	4.4	4.4	4.25	4.2
5	6.2	4.9	6.4	5.95	7.4	16.9	5.4	9.3	4.4	5.45	3.95	4.1
6	9.6	4.8	8.0	5.7	6.4	15.0	6.9	8.6	4.4	5.1	4.15	4.2
7	8.6	6.4	8.2	5.9	6.2	10.1	7.4	8.4	4.4	4.8	4.1	4.3
8	7.5	6.4	7.7	6.0	6.1	7.8	9.1	7.8	4.4	4.5	3.9	4.45
9	6.8	6.1	7.0	6.1	5.95	7.2	11.9	6.8	4.4	4.5	3.95	7.4
10	6.3	13.8	9.7	6.2	5.75	6.8	10.0	6.2	4.45	4.4	3.95	6.4
11	6.2	15.4	9.0	6.1	8.0	6.8	7.3	5.7	4.4	4.6	3.9	5.45
12	6.0	11.5	11.4	6.0	7.2	8.7	6.2	6.2	4.45	4.8	3.9	4.75
13	5.9	9.0	14.4	6.0	6.1	8.4	5.8	5.9	4.45	4.5	4.2	4.7
14	5.8	9.0	15.7	5.9	5.8	7.8	7.4	7.4	4.45	4.4	4.0	8.4
15	5.7	9.0	16.0	6.6	5.65	7.4	8.6	7.0	4.4	4.4	4.1	8.4
16	5.65	9.0	11.0	6.2	5.5	7.0	6.9	6.5	4.45	4.5	4.15	6.7
17	10.6	9.0	8.4	6.0	5.5	7.2	6.4	5.9	4.5	4.4	4.1	5.95
18	11.2	8.6	7.4	5.85	5.6	6.8	8.3	5.55	5.75	4.4	4.0	4.8
19	8.8	8.0	7.6	5.6	5.35	7.8	6.2	5.3	7.8	4.6	4.1	4.1
20	7.7	7.7	8.4	5.5	5.85	7.2	5.8	5.1	11.3	10.8	4.0	4.1
21	7.0	8.8	7.8	5.4	9.9	6.2	5.65	4.9	8.6	8.7	3.95	4.1
22	6.6	14.3	7.6	5.4	12.0	6.3	5.45	4.9	7.1	5.35	4.3	4.5
23	6.0	13.2	7.5	5.6	10.4	7.5	5.3	4.7	6.5	4.45	4.4	4.1
24	5.9	8.8	7.4	6.6	8.8	6.8	6.2	4.7	6.1	4.35	4.2	4.15
25	5.8	8.0	7.5	6.0	7.7	6.2	6.0	4.7	5.4	4.3	4.1	5.55
26	6.0	7.4	10.0	5.8	7.1	6.4	5.6	4.7	5.6	4.2	4.2	5.55
27	5.85	7.0	8.6	5.7	6.8	6.8	5.6	4.65	5.2	4.15	4.4	4.5
28	5.6	7.1	8.0	6.5	6.7	6.8	5.6	4.65	5.0	4.2	4.4	4.1
29	5.5	.....	8.4	6.8	6.6	6.5	5.35	4.7	4.95	4.1	4.7	4.0
30	5.4	.....	7.6	6.3	7.0	6.5	5.15	4.65	4.8	4.1	4.45	4.0
31	5.4	.....	7.0	.....	6.8	.....	6.4	4.5	.....	4.45	.....	3.95

Daily discharge, in second-feet, of Savannah River at Woodlawn, S. C., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10,300	7,410	13,400	12,600	27,000	9,100	18,600	9,600	5,350	5,350	5,590	5,350
2	12,600	7,130	12,600	11,800	57,400	8,620	13,800	13,000	5,230	5,230	6,080	4,880
3	10,300	6,590	15,800	11,400	31,500	24,200	9,270	30,400	5,110	5,110	5,710	4,880
4	9,600	6,330	12,600	10,300	18,100	58,000	11,000	29,200	5,110	5,110	4,760	4,650
5	10,300	6,330	11,000	9,440	15,000	69,200	7,700	24,200	5,110	7,850	4,090	4,420
6	25,900	6,080	17,600	8,620	11,000	57,400	13,000	20,600	5,110	6,860	4,540	4,650
7	20,600	11,000	18,600	9,270	10,300	28,700	15,000	19,600	5,110	6,080	4,420	4,880
8	15,400	11,000	16,300	9,600	9,940	16,700	23,200	16,700	5,110	5,350	3,980	5,230
9	12,600	9,940	13,400	9,940	9,440	14,200	39,000	12,600	5,110	5,350	4,090	15,000
10	10,600	50,200	26,400	10,300	8,780	12,600	28,100	10,300	5,230	5,110	4,090	11,000
11	10,300	59,900	22,600	9,940	17,600	12,600	14,600	8,620	5,110	5,590	3,980	7,850
12	9,600	36,600	36,000	9,600	14,200	21,100	10,300	10,300	5,230	6,080	3,980	5,960
13	9,270	22,600	53,800	9,600	9,940	19,600	8,940	9,270	5,230	5,350	4,650	5,830
14	8,940	22,600	61,700	9,270	8,940	16,700	15,000	15,000	5,230	5,110	4,200	19,600
15	8,620	22,600	63,600	11,800	8,460	15,000	20,600	13,400	5,110	5,110	4,420	19,600
16	8,460	22,600	33,800	10,300	8,000	13,400	13,000	11,400	5,230	5,350	4,540	12,200
17	31,500	22,600	19,600	9,600	8,000	14,200	11,000	9,270	5,350	5,110	4,420	9,440
18	34,900	20,600	15,000	9,100	8,310	12,600	19,100	8,160	8,780	5,110	4,200	6,080
19	21,600	17,600	15,800	8,310	7,560	16,700	10,300	7,410	16,700	5,590	4,420	4,420
20	16,300	16,300	19,600	8,000	9,100	14,200	8,940	6,860	35,500	32,600	4,200	4,420
21	13,400	21,600	16,700	7,700	27,500	10,300	8,460	6,330	20,600	21,100	4,090	4,420
22	11,800	53,200	15,800	7,700	39,500	10,600	7,850	6,330	13,800	7,560	4,880	5,350
23	9,600	46,600	15,400	8,310	30,400	15,400	7,410	5,830	11,400	5,230	5,110	4,420
24	9,270	21,600	15,000	11,800	21,600	12,600	10,300	5,830	9,940	5,000	4,650	4,540
25	8,940	17,600	15,400	9,600	16,300	10,300	9,600	5,830	7,700	4,880	4,420	8,160
26	9,600	15,000	28,100	8,940	13,800	11,000	8,310	5,830	8,310	4,650	4,650	8,160
27	9,100	13,400	20,600	8,620	12,600	12,600	8,310	5,710	7,130	4,540	5,110	5,350
28	8,310	13,800	17,600	11,400	12,200	12,600	8,310	5,710	6,590	4,650	5,110	4,420
29	8,000	.....	19,600	12,600	11,800	11,400	7,560	5,830	6,460	4,420	5,830	4,200
30	7,700	.....	15,800	10,600	13,400	11,400	7,000	5,710	6,080	4,420	5,230	4,200
31	7,700	.....	13,400	.....	12,600	.....	11,000	5,350	.....	5,230	.....	4,090

NOTE.—These discharges are based on a rating curve that is fairly well defined between 5,400 and 9,600 second-feet.

Monthly discharge of Savannah River at Woodlawn, S. C., for 1909.

[Drainage area, 6,600 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	34,900	7,700	12,900	1.95	2.25	A.
February	59,900	6,080	21,000	3.18	3.31	A.
March	63,600	11,000	22,300	3.38	3.90	A.
April	12,600	7,700	9,870	1.50	1.67	A.
May	57,400	7,560	16,500	2.50	2.88	A.
June	69,200	8,620	19,100	2.89	3.22	A.
July	39,000	7,000	13,100	1.98	2.28	A.
August	30,400	5,350	11,300	1.71	1.97	A.
September	35,500	5,110	8,240	1.25	1.40	B.
October	32,600	4,420	6,780	1.03	1.19	B.
November	6,080	3,980	4,650	.705	.79	B.
December	19,600	4,090	7,020	1.06	1.22	B.
The year	69,200	3,980	12,700	1.92	26.08	

TALLULAH RIVER AT TALLULAH FALLS, GA.

This station is located at the wagon bridge at Tallulah Falls, about one-fourth mile above the beginning of the falls proper. It was established August 29, 1900, but the record for that year extended only to October 19. Readings were resumed January 18, 1901, and

were again discontinued December 31, 1901. On July 15, 1904, the station was reestablished and observations have been continued without break, except from July 1 to August 15, 1909. On August 16, 1909, the station was reestablished by special request of the North Georgia Electric Company.

The data furnished by this station are valuable for water-power estimates and on account of the unusual interest attached to the falls. (See Pl. IV.) The flow is not perceptibly affected by artificial control of water.

The original staff gage, established in 1900, about 50 feet above the bridge, is still in place, and other gages which have superseded it have been set to agree with the original datum. The present gage is of the standard chain type and is located on the bridge, from which discharge measurements are made. Both banks are high and not subject to overflow. The bed of the stream is rough and composed of rocks. Conditions of flow have changed slightly since the establishment of the station. The rating curve developed for this station is reproduced as Plate III.

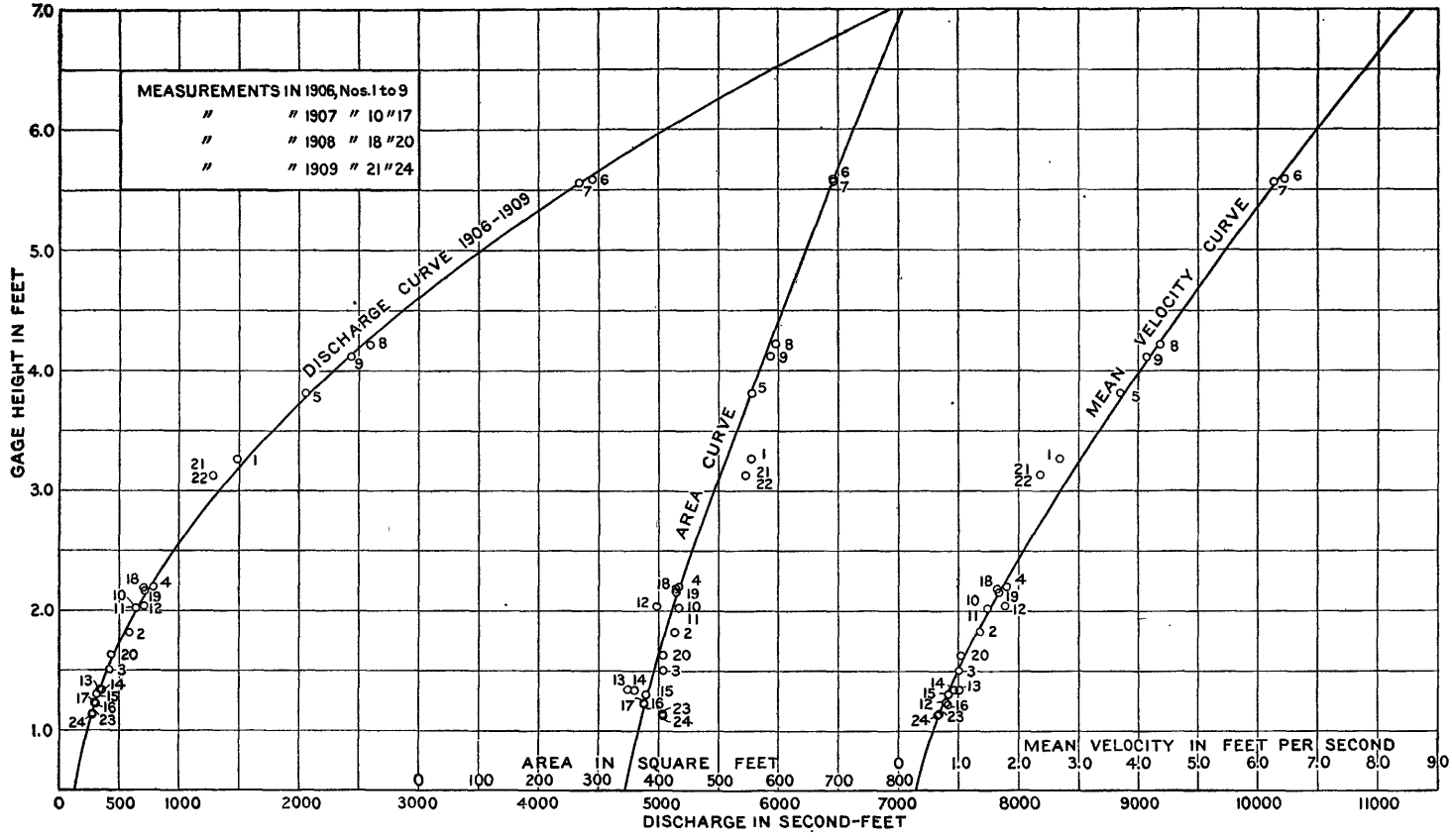
Discharge measurements of Tallulah River at Tallulah Falls, Ga., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 11	M. R. Hall	64	544	3.13	1,280
Do	do	64	545	3.13	1,280
October 31	E. H. Swett	60	409	1.14	278
Do	do	60	409	1.13	272

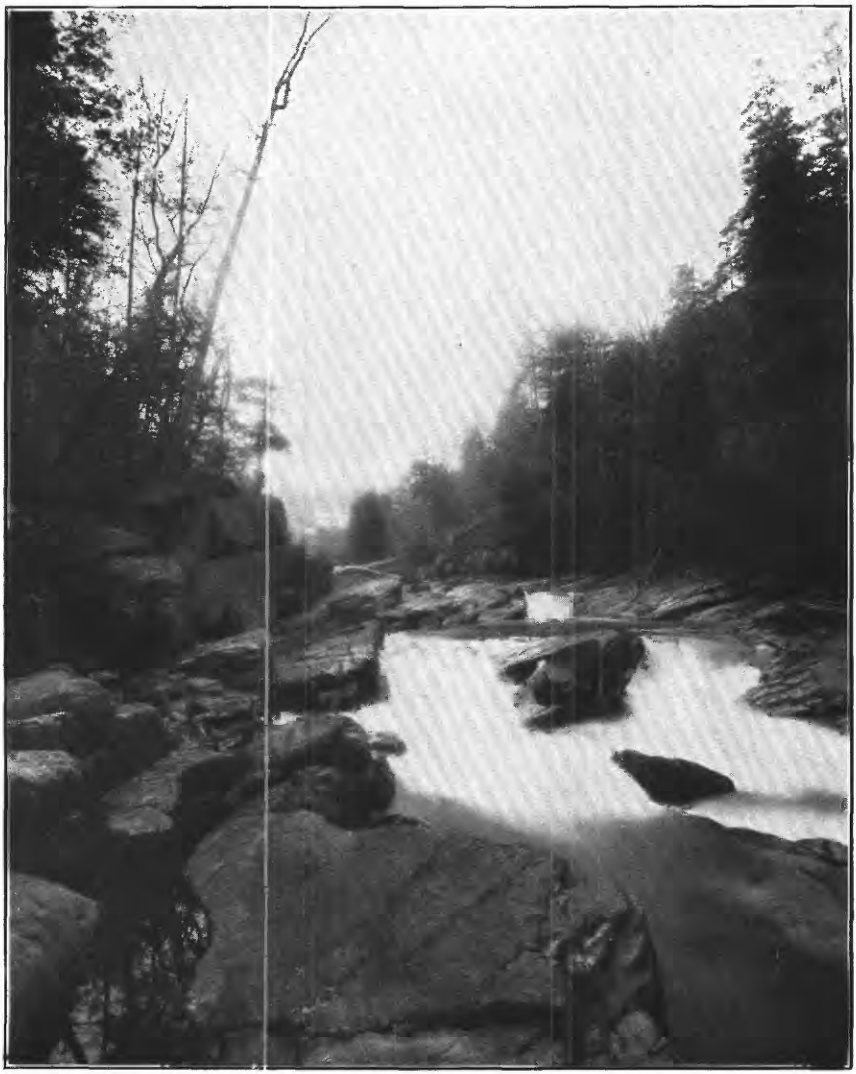
Daily gage height, in feet, of Tallulah River at Tallulah Falls, Ga., for 1909.

[A. I. McKay, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.4	1.7	2.5	2.6	5.5	2.9	.....	.....	1.3	1.3	1.1	1.0
2	1.3	1.7	2.6	2.6	5.1	2.9	.....	.....	1.2	1.3	1.15	1.0
3	2.4	1.7	2.5	2.5	4.0	3.8	.....	.....	1.2	1.2	1.1	1.0
4	3.9	1.8	2.3	2.5	3.9	8.0	.....	.....	1.2	1.2	1.1	1.0
5	2.3	1.6	2.3	2.5	3.0	4.5	.....	.....	1.2	1.2	1.1	1.0
6	1.9	2.5	2.5	2.7	2.7	4.4	.....	.....	1.2	1.2	1.1	1.0
7	1.7	2.7	2.4	2.6	2.4	3.9	.....	.....	1.2	1.2	1.1	3.3
8	1.6	3.0	2.4	2.5	2.3	3.7	.....	.....	1.2	1.2	1.1	2.2
9	1.4	4.0	2.4	2.5	2.3	4.2	.....	.....	1.3	1.15	1.1	1.65
10	1.5	3.5	3.6	2.4	4.2	3.0	.....	.....	1.3	1.2	1.1	1.4
11	1.4	2.7	3.0	2.3	3.9	3.1	.....	.....	1.3	1.65	1.1	1.3
12	1.9	2.6	2.8	2.3	3.0	3.0	.....	.....	1.2	1.25	1.1	1.35
13	1.8	2.6	5.3	2.5	2.7	2.9	.....	.....	1.2	1.2	1.1	4.6
14	2.0	2.7	5.7	2.4	2.4	2.8	.....	.....	1.2	1.7	1.0	2.8
15	2.2	2.7	4.9	2.3	2.2	2.8	.....	.....	1.4	2.65	1.0	2.25
16	2.3	2.6	3.3	2.3	2.4	2.8	.....	1.7	1.4	1.7	1.0	1.95
17	2.3	2.6	3.3	2.3	2.3	2.8	.....	1.7	1.5	1.55	1.3	1.75
18	2.2	2.6	3.0	2.3	2.3	2.7	.....	1.6	1.4	1.4	1.1	1.7
19	2.2	2.6	2.9	2.3	2.7	2.6	.....	1.6	1.3	1.3	1.05	1.65
20	2.1	2.8	2.9	2.4	4.0	2.5	.....	1.6	1.3	1.3	1.0	1.6
21	2.1	2.9	2.9	2.5	5.0	2.5	.....	1.5	1.2	1.35	1.0	1.5
22	2.0	3.9	2.8	2.9	5.2	2.9	.....	1.5	2.1	1.3	1.0	1.4
23	2.0	3.4	2.7	3.4	4.8	2.7	.....	1.5	2.6	1.3	1.25	1.35
24	2.0	3.2	2.6	2.4	3.2	2.6	.....	1.4	2.6	1.2	1.1	1.4
25	2.0	2.9	4.8	2.4	3.1	2.5	.....	1.4	2.6	1.2	1.05	1.8
26	1.9	2.8	3.1	2.3	3.1	2.5	.....	1.4	2.6	1.2	1.0	1.55
27	1.9	2.8	2.9	2.2	2.9	2.7	.....	1.3	1.6	1.2	1.0	1.45
28	1.8	2.5	3.9	2.0	2.8	2.7	.....	1.3	1.4	1.2	1.0	1.4
29	1.8	.....	3.0	3.3	2.7	2.7	.....	1.4	1.3	1.2	1.0	1.4
30	1.8	.....	2.8	5.0	2.7	2.6	.....	1.4	1.3	1.15	1.0	1.25
31	1.7	.....	2.7	.....	2.8	.....	.....	1.3	.....	1.1	.....	1.45



DISCHARGE, AREA, AND MEAN VELOCITY CURVES FOR TALLULAH RIVER AT TALLULAH FALLS, GA.



PORTION OF FALLS ON TALLULAH RIVER NEAR TALLULAH FALLS, GA.

Daily discharge, in second-feet, of Tallulah River at Tallulah Falls, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	360	485	960	1,030	4,260	1,260	.....	.....	325	325	264	237
2	325	485	1,030	1,030	3,670	1,260	.....	.....	293	325	278	237
3	890	485	960	960	2,290	2,080	.....	.....	293	293	264	237
4	2,180	530	825	960	2,180	9,000	.....	.....	293	293	264	237
5	825	440	825	960	1,340	2,870	.....	.....	293	293	264	237
6	580	960	960	1,100	1,100	2,750	.....	.....	293	293	264	237
7	485	1,100	890	1,030	890	2,180	.....	.....	293	293	264	1,600
8	440	1,340	890	960	825	1,980	.....	.....	293	293	264	760
9	360	2,290	890	960	825	2,510	.....	.....	325	278	264	462
10	400	1,780	1,880	890	2,510	1,340	.....	.....	325	293	264	360
11	360	1,100	1,340	825	2,180	1,420	.....	.....	325	452	264	325
12	580	1,030	1,180	825	1,340	1,340	.....	.....	293	309	264	342
13	530	1,030	3,960	960	1,100	1,260	.....	.....	293	293	264	3,000
14	635	1,100	4,570	890	890	1,180	.....	.....	293	485	237	1,180
15	760	1,100	3,390	825	760	1,180	.....	.....	360	1,070	237	792
16	825	1,030	1,600	825	890	1,180	.....	485	360	485	237	608
17	825	1,030	1,600	825	825	1,180	.....	485	400	420	325	508
18	760	1,030	1,340	825	825	1,100	.....	440	360	360	264	485
19	760	1,030	1,260	825	1,100	1,030	.....	440	325	325	250	462
20	695	1,180	1,260	890	2,290	960	.....	440	325	325	237	440
21	695	1,260	1,260	960	3,530	960	.....	400	293	342	237	400
22	635	2,180	1,180	1,260	3,810	1,260	.....	400	695	325	237	360
23	635	1,690	1,100	1,690	3,260	1,100	.....	400	1,030	325	309	342
24	635	1,510	1,030	890	1,510	1,030	.....	360	1,030	293	264	360
25	635	1,260	3,260	890	1,420	960	.....	360	1,030	293	250	530
26	580	1,180	1,420	825	1,420	960	.....	360	1,030	293	237	420
27	580	1,180	1,260	760	1,260	1,100	.....	325	440	293	237	380
28	530	960	2,180	635	1,180	1,100	.....	325	360	293	237	360
29	530	.....	1,340	1,600	1,100	1,100	.....	360	325	293	237	360
30	530	.....	1,180	3,530	1,100	1,030	.....	360	325	278	237	309
31	485	.....	1,100	.....	1,180	.....	.....	325	.....	264	.....	380

NOTE.—These discharges are based on a rating curve that is well defined between 120 and 5,100 second-feet. Mean discharges for July 1 to 31 and August 1 to 15 estimated as 780 and 636 second-feet, respectively, by comparison with Tugaloo River near Madison, S. C.

Monthly discharge of Tallulah River at Tallulah Falls, Ga., for 1909.

[Drainage area, 191 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	2,180	325	647	3.39	3.91	A.
February	2,290	440	1,130	5.92	6.16	A.
March	4,570	825	1,550	8.12	9.36	A.
April	3,530	635	1,050	5.50	6.14	A.
May	4,260	760	1,710	8.95	10.32	A.
June	9,000	960	1,660	8.69	9.70	A.
July	.....	.....	780	4.08	4.70	B.
August	.....	.....	510	2.67	3.08	B.
September	1,030	293	431	2.26	2.52	A.
October	1,070	264	348	1.82	2.10	B.
November	325	237	257	1.35	1.51	B.
December	3,000	237	547	2.86	3.30	A.
The year	9,000	237	885	4.63	62.80	

NOTE.—Mean discharges July 1 to 31 and August 1 to 15 estimated by comparison with discharges of Tugaloo River, near Madison, S. C. See footnote to daily discharges.

BROAD RIVER (OF GEORGIA) NEAR CARLTON, GA.

The station, which is located at the Seaboard Air Line Railway bridge, 3 miles east of Carlton, Ga., and 2 miles above the mouth of the south fork, was established May 27, 1897. Gage readings are taken by the United States Weather Bureau and are furnished to the United States Geological Survey.

Records of this station are valuable for water-power studies, both on Broad River and the Savannah River, of which it is a tributary. The flow is affected little or not at all by artificial control or by diversions. Measurements are made from the upstream side of the bridge.

The datum of the chain gage, which is on the bridge, has remained constant since the establishment of the station; its elevation is 384 feet above sea level. The left bank overflows for about 400 feet at a gage height of about 16 feet. The bed of the stream is sand and gravel and slightly changeable.

Daily gage height, in feet, of Broad River (of Georgia) near Carlton, Ga., for 1909.

[M. C. Power, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov	Dec.
1	4.0	2.65	3.2	3.4	8.5	3.0	3.2	3.2	2.35	2.35	2.55	2.45
2	3.6	2.65	3.6	3.4	9.5	3.0	3.0	3.4	2.35	2.25	2.55	2.45
3	3.0	2.65	4.2	3.4	7.3	8.0	3.0	6.9	2.25	2.25	2.55	2.45
4	3.0	2.65	3.8	3.2	5.0	12.7	3.0	8.4	2.25	2.25	2.45	2.55
5	3.8	2.65	3.4	3.2	3.6	8.6	2.85	5.3	2.25	2.25	2.45	2.55
6	8.0	3.4	3.0	3.0	3.4	4.9	2.8	4.5	2.25	2.35	2.45	2.55
7	6.6	3.0	5.3	3.0	3.2	4.0	3.4	5.6	2.25	2.35	2.45	2.55
8	4.0	2.75	4.6	3.4	3.0	3.8	5.5	3.8	2.25	2.35	2.45	5.0
9	3.4	2.65	4.0	3.4	3.0	3.4	6.5	3.4	2.25	2.35	2.45	4.9
10	3.0	8.6	9.1	3.2	3.2	3.2	5.0	3.0	2.65	2.35	2.45	3.4
11	3.0	6.8	8.4	3.0	4.5	3.0	3.8	3.0	2.55	2.35	2.45	3.0
12	3.0	5.0	5.6	3.0	3.8	3.0	3.4	2.85	2.35	2.55	2.45	2.85
13	3.0	4.2	7.4	3.2	3.4	3.0	3.2	2.75	2.35	2.45	2.45	3.6
14	3.0	4.9	10.0	3.4	3.2	2.85	3.4	2.65	2.35	2.45	2.45	5.1
15	3.0	4.5	9.2	3.4	3.0	3.6	3.6	2.65	2.35	6.8	2.45	4.6
16	3.0	6.0	5.0	3.2	3.0	3.4	3.2	3.0	4.1	5.1	2.45	3.6
17	5.8	5.5	4.5	3.0	3.0	3.2	3.4	3.0	5.5	3.2	2.45	3.4
18	5.0	4.4	4.2	3.0	3.0	3.2	3.4	2.75	8.4	3.0	2.45	3.0
19	4.2	3.8	3.8	3.0	2.85	3.0	3.2	2.65	4.0	3.0	2.45	3.0
20	3.8	4.6	3.8	3.0	3.8	3.0	3.0	2.55	3.4	2.85	2.45	3.0
21	3.4	4.0	4.5	3.0	7.8	3.0	3.0	2.55	2.85	2.75	2.45	3.0
22	3.4	9.5	4.3	2.85	7.5	3.0	2.75	2.55	2.85	3.0	2.45	3.0
23	3.2	11.8	4.0	3.4	5.5	3.2	3.0	2.55	3.0	3.0	2.55	2.75
24	3.0	9.7	3.8	3.6	4.8	3.6	3.0	2.45	3.4	3.0	2.55	2.45
25	3.0	6.0	7.7	3.6	4.0	3.4	3.4	2.45	3.0	3.0	2.55	3.0
26	3.0	4.7	4.5	3.6	3.6	3.4	3.2	2.45	3.0	3.0	2.55	4.0
27	2.85	3.8	4.0	3.6	3.6	4.6	3.0	2.45	2.75	2.75	2.45	3.2
28	2.85	3.6	4.2	4.0	4.0	4.8	2.75	2.45	2.55	2.75	2.45	3.0
29	2.75	.....	4.5	3.8	3.2	5.1	2.65	2.35	2.45	2.75	2.45	2.65
30	2.65	.....	3.8	3.6	3.2	3.6	3.8	2.35	2.35	2.75	2.45	2.45
31	2.65	.....	3.4	.....	3.2	.....	3.4	2.35	.....	2.55	.....	2.25

Daily discharge, in second-feet, of Broad River (of Georgia), near Carlton, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,880	835	1,220	1,370	7,490	1,070	1,220	1,220	670	670	778	722
2	1,540	835	1,540	1,370	8,990	1,070	1,070	1,370	670	620	778	722
3	1,070	835	2,060	1,370	5,780	6,760	1,070	5,220	620	620	778	722
4	1,070	835	1,700	1,220	2,880	14,200	1,070	7,340	620	620	722	778
5	1,700	835	1,370	1,220	1,540	7,640	965	3,210	620	620	722	778
6	6,760	1,370	1,070	1,070	1,370	2,770	930	2,350	620	670	722	778
7	4,820	1,070	3,210	1,070	1,220	1,880	1,370	3,560	620	670	722	778
8	1,880	898	2,450	1,370	1,070	1,700	3,440	1,700	620	670	722	2,880
9	1,370	835	1,880	1,370	1,070	1,370	4,690	1,370	620	670	722	2,770
10	1,070	7,640	8,370	1,220	1,220	1,220	2,880	1,070	835	670	722	1,370
11	1,070	5,090	7,340	1,070	2,350	1,070	1,700	1,070	778	670	722	1,070
12	1,070	2,880	3,560	1,070	1,700	1,070	1,370	965	670	778	722	965
13	1,070	2,060	5,920	1,220	1,370	1,070	1,220	898	670	722	722	1,540
14	1,070	2,770	9,760	1,370	1,220	965	1,370	835	670	722	722	2,990
15	1,070	2,350	8,530	1,370	1,070	1,540	1,540	835	670	5,090	722	2,450
16	1,070	4,050	2,880	1,220	1,070	1,370	1,220	1,070	1,970	2,990	722	1,540
17	3,800	3,440	2,350	1,070	1,070	1,220	1,370	1,070	3,440	1,220	722	1,370
18	2,880	2,260	2,060	1,070	1,070	1,220	1,370	898	7,340	1,070	722	1,070
19	2,060	1,700	1,700	1,070	965	1,070	1,220	835	1,880	1,070	722	1,070
20	1,700	2,450	1,700	1,070	1,700	1,070	1,070	778	1,370	965	722	1,070
21	1,370	1,880	2,350	1,070	6,480	1,070	1,070	778	965	898	722	1,070
22	1,370	8,990	2,160	965	6,060	1,070	898	778	965	1,070	722	1,070
23	1,220	12,700	1,880	1,370	3,440	1,220	1,070	778	1,070	1,070	778	898
24	1,070	9,300	1,700	1,540	2,660	1,540	1,070	722	1,370	1,070	778	722
25	1,070	4,050	6,340	1,540	1,880	1,370	1,370	722	1,070	1,070	778	1,070
26	1,070	2,560	2,350	1,540	1,540	1,370	1,220	722	1,070	1,070	778	1,880
27	965	1,700	1,880	1,540	1,540	2,450	1,070	722	898	989	722	1,220
28	965	1,540	2,060	1,880	1,880	2,660	898	722	778	898	722	1,070
29	898	.....	2,350	1,700	1,220	2,990	835	670	722	898	722	835
30	835	.....	1,700	1,540	1,220	1,540	1,700	670	670	898	722	722
31	835	.....	1,370	.....	1,220	.....	1,370	670	.....	778	.....	620

NOTE.—These discharges are based on a rating curve that is well defined between 305 and 9,800 second-feet.

Monthly discharge of Broad River (of Georgia), near Carlton, Ga., for 1909.

[Drainage area, 762 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	6,760	835	1,670	2.19	2.52	A.
February	12,700	835	3,130	4.11	4.28	A.
March	9,760	1,070	3,120	4.09	4.72	A.
April	1,880	965	1,300	1.71	1.91	A.
May	8,990	965	2,430	3.19	3.68	A.
June	14,200	965	2,290	3.00	3.35	A.
July	4,690	835	1,440	1.89	2.18	A.
August	7,340	670	1,470	1.93	2.22	A.
September	7,340	620	1,190	1.56	1.74	A.
October	5,090	620	1,050	1.38	1.59	A.
November	778	722	735	.965	1.08	B.
December	2,990	620	1,250	1.64	1.89	A.
The year	14,200	620	1,760	2.30	31.16	

ALTAMAHA RIVER DRAINAGE BASIN.

DESCRIPTION.

Altamaha River rises in the north central part of Georgia along the southern slope of the Chattahoochee Ridge, flows in a southeasterly direction, and discharges into the Atlantic Ocean near Darien. The basin is about 250 miles long and has an area of 14,100 square miles.

The two main tributaries forming the Altamaha are Oconee and Ocmulgee rivers, which unite about 100 miles above Darien. Oconee River rises in Hall County and flows in a southeasterly direction to the Altamaha. Apalachee River enters the Oconee near the southeast corner of Morgan County. Little River enters the main stream about 15 miles above Milledgeville, Ga. Ocmulgee River, the westernmost of the main tributaries, rises in Fulton, Dekalb, and Gwinnett counties; Yellow, South, and Alcovy rivers are its upper tributaries. Towaliga River enters the Ocmulgee at about the southwest corner of Jasper County, which is above Macon. Ohoopee River is a tributary of the Altamaha about 30 miles below the junction of Oconee and Ocmulgee rivers.

The portion above the fall line which passes near Milledgeville and Macon lies entirely in the Piedmont Plateau, and contains great masses of granite, including Stone Mountain in Dekalb County, 16 miles east of Atlanta, which rises about 700 feet above the surrounding country and covers several square miles of area. The larger part of the basin lies in the Coastal Plain region. Very little of this basin is too steep for agriculture, and only a rather small amount of original forest remains. Probably the larger part of the lands now wooded consists of second-growth timber on lands once cultivated in the Piedmont region and cut-over timber lands in the southern portion.

The mean annual rainfall of the basin is about 50 inches. The basin contains many good reservoir sites for partial storage in connection with power plants, and larger sites are no doubt available, especially on Oconee River. Above the fall line all of the streams have considerable slope and afford many excellent sites for water-power development.

The following special reports contain information regarding the hydrography of the Altamaha River basin:

Water resources of Georgia, by B. M. and M. R. Hall: Water-Supply Paper U. S. Geol. Survey No. 197. This report contains data on stream flow, water power, and river surveys collected prior to 1906.

River surveys and profiles made during 1903, by W. C. Hall and J. C. Hoyt: Water-Supply Paper U. S. Geol. Survey No. 115. This report and separate sheets showing Catawba and Broad river profiles may be obtained by applying to the Director, United States Geological Survey, Washington, D. C.

Relation of southern Appalachian Mountains to the development of inland water navigation and water power: U. S. Forest Service Circulars Nos. 143 and 144.

The following gaging stations have been maintained in this river basin:

South River near Lithonia, Ga., 1903–4.
Ocmulgee River near Jackson, Ga., 1906–1909.
Ocmulgee River near Flovilla, Ga., 1901–1905.
Ocmulgee River at Macon, Ga., 1893–1909.
Yellow River at Almon, Ga., 1897–1901.
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., 1901–2.
Oconee River near Greensboro, Ga., 1903–1909.
Oconee River at Carey, Ga., 1896–1898.
Oconee River at Fraleys Ferry near Milledgeville, Ga., 1905–1909.
Oconee River at Milledgeville, Ga., 1893–1905.
Oconee River at Dublin, Ga., 1898–1909.
Middle Oconee River near Athens, Ga., 1901–2.
Apalachee River near Buckhead, Ga., 1901–1908.
Ohoopee River near Reidsville, Ga., 1903–1907.

OCMULGEE RIVER NEAR JACKSON, GA.

The station, which is located at Pittmans Ferry, 8 miles southeast of Jackson and 6 miles above the old Flovilla station at Lamars Ferry, was established May 18, 1906, to take the place of the Lamars Ferry station, for which records of discharge had been obtained from July 26, 1901, to September 27, 1902; from July 1 to December 31, 1903; and from August 1, 1904, to December 31, 1905.

Yellow Water Creek comes in one-half mile below the station, and Tussahaw Creek enters 3 miles above. The station is three-fourths mile below the dam now under construction by the Central Georgia Power Company. (See Pl. V, *B*.) Water powers above cause moderate fluctuations of gage heights, but the mean of two readings a day is thought to be sufficiently accurate.

The datum of the vertical staff gage, the lowest section of which is located 15 feet above the ferry cable, has remained constant since the establishment of the station.

Both banks overflow at high stages for about 200 feet. The current is rather sluggish at low stages, and as all measurements are made from a boat it is not practicable to make flood measurements.

Conditions of discharge are constant, as a permanent rock shoal about 400 feet below the station controls the height of water at the gage. The channel at the section is deep and subject to some filling in of the bottom.

Discharge measurements of Ocmulgee River near Jackson, Ga., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 29	M. R. Hall	305	1,930	5.61	3,360
Do	do	305	1,930	5.61	3,390
May 30	do	305	1,880	5.44	2,960
Do	do	305	1,880	5.44	2,970
April 23	G. F. Harley	312	2,410	7.68	7,380
April 24	do	314	2,620	8.33	8,740
July 13	do	298	1,540	4.77	1,410
July 19	do	298	1,480	4.58	1,070
October 8	E. H. Swett	293	1,330	4.23	550
Do	do	293	1,320	4.24	500

Daily gage height, in feet, of Ocmulgee River near Jackson, Ga., for 1909.

[C. A. Pittman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.45	4.55	5.25	5.2	6.35	5.6	4.6	5.05	4.3	4.3	4.4	4.4
2	5.05	4.55	5.4	5.1	6.8	5.7	4.65	5.4	4.3	4.3	4.65	4.4
3	5.1	4.6	5.3	5.1	6.0	6.9	4.6	7.7	4.2	4.3	4.7	4.4
4	4.9	4.6	5.15	5.0	5.4	6.5	4.5	8.9	4.2	4.3	4.5	4.4
5	4.85	4.55	5.0	4.95	5.3	6.0	4.45	8.1	4.2	4.2	4.4	4.4
6	5.2	5.7	5.1	5.0	5.1	5.5	6.2	6.4	4.2	4.2	4.4	4.4
7	5.1	5.3	5.35	5.1	5.0	5.2	5.65	5.6	4.2	4.2	4.4	4.55
8	4.9	5.0	5.35	5.3	4.95	5.0	5.5	5.65	4.3	4.2	4.35	4.9
9	4.9	4.9	5.25	5.25	4.9	4.85	5.4	5.9	4.25	4.2	4.45	4.8
10	4.8	9.7	11.1	5.1	5.65	4.8	5.4	5.4	4.25	4.2	4.4	4.65
11	4.8	9.0	9.4	5.0	5.4	4.7	5.15	5.1	4.25	4.2	4.4	4.5
12	4.7	6.6	12.4	5.0	5.05	4.7	4.95	6.3	4.3	4.2	4.4	4.5
13	4.7	7.0	13.4	5.0	4.9	4.7	4.8	5.7	4.2	4.2	4.35	5.05
14	4.8	6.3	12.6	5.0	4.8	4.75	4.9	5.15	4.2	4.2	4.35	5.25
15	4.8	8.0	10.9	5.0	4.8	4.8	4.85	5.4	4.2	6.25	4.35	5.0
16	4.85	9.3	7.7	4.9	4.8	5.05	4.75	5.75	5.35	6.2	4.35	4.8
17	5.4	7.5	6.6	4.9	4.9	5.45	4.6	5.1	4.9	6.0	4.4	4.7
18	5.4	6.2	6.0	4.85	4.8	5.4	4.7	4.8	5.5	5.6	4.45	4.6
19	5.1	6.4	5.8	4.8	4.75	5.1	4.55	4.6	5.9	5.0	4.5	4.6
20	4.95	6.3	6.9	4.8	5.05	5.0	4.5	4.55	4.9	4.6	4.4	4.7
21	4.9	5.8	8.8	4.8	5.3	5.0	4.4	4.5	4.55	4.5	4.4	4.7
22	4.8	5.95	7.3	4.9	5.2	5.1	4.4	4.45	4.7	5.25	4.4	4.6
23	4.8	7.8	6.2	7.2	5.0	5.5	4.7	4.4	4.6	4.9	4.8	4.55
24	4.75	7.0	5.8	8.2	4.9	5.1	4.6	4.4	4.65	4.75	5.1	4.55
25	4.72	6.6	6.2	6.2	4.8	4.9	4.6	4.35	5.35	4.6	4.85	4.85
26	4.7	6.0	6.3	5.8	4.9	5.0	4.5	4.35	4.7	4.5	4.65	5.3
27	4.7	5.6	5.85	5.5	5.0	4.95	4.45	4.35	4.5	4.5	4.5	5.1
28	4.6	5.4	5.7	5.6	5.0	4.85	4.7	4.3	4.4	4.4	4.5	4.85
29	4.6	.....	5.6	5.45	5.1	4.75	4.7	4.3	4.35	4.4	4.4	4.7
30	4.6	.....	5.4	5.2	5.0	4.65	4.7	4.4	4.3	4.4	4.4	4.65
31	4.6	.....	5.35	.....	6.0	.....	5.15	4.3	.....	4.4	.....	4.55

Daily discharge, in second-feet, of Ocmulgee River near Jackson, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,740	1,040	2,340	2,240	4,590	3,050	1,120	1,940	665	665	810	810
2	1,940	1,040	2,640	2,040	5,510	3,260	1,200	2,640	665	665	1,200	810
3	2,040	1,120	2,440	2,040	3,870	5,720	1,120	7,360	525	665	1,290	810
4	1,640	1,120	2,140	1,840	2,640	4,900	960	9,820	525	665	960	810
5	1,560	1,040	1,840	1,740	2,440	3,870	885	8,180	525	525	810	810
6	2,240	3,260	2,040	1,840	2,040	2,840	4,280	4,690	525	525	810	810
7	2,040	2,440	2,540	2,040	1,840	2,240	3,150	3,050	525	525	810	1,040
8	1,640	1,840	2,540	2,440	1,740	1,840	2,840	3,150	665	525	738	1,640
9	1,640	1,640	2,340	2,340	1,640	1,560	2,640	3,660	595	525	885	1,460
10	1,460	11,500	14,300	2,040	3,150	1,460	2,640	2,640	595	525	810	1,200
11	1,460	10,000	10,800	1,840	2,640	1,290	2,140	2,040	595	525	810	960
12	1,290	5,100	17,000	1,840	1,940	1,290	1,740	4,480	665	525	810	960
13	1,290	5,920	19,000	1,840	1,640	1,290	1,460	3,260	525	525	738	1,940
14	1,460	4,480	17,400	1,840	1,460	1,380	1,640	2,140	525	525	738	2,340
15	1,460	7,970	13,900	1,840	1,460	1,460	1,560	2,640	525	4,380	738	1,840

A. ETOWAH RIVER NEAR CARTERSVILLE, GA.

B. OCMULGEE RIVER NEAR JACKSON, GA.

Showing power house and dam of Central Georgia Power Company under construction.

Daily discharge, in second-feet, of Ocmulgee River near Jackson, Ga., for 1909—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	1,560	10,600	7,360	1,640	1,460	1,940	1,380	3,360	2,540	4,280	738	1,460
17	2,640	6,940	5,100	1,640	1,640	2,740	1,120	2,040	1,640	3,870	810	1,290
18	2,640	4,280	3,870	1,560	1,460	2,640	1,290	1,460	2,840	3,050	885	1,120
19	2,040	4,690	3,460	1,460	1,380	2,040	1,040	1,120	3,660	1,840	960	1,120
20	1,740	4,480	5,720	1,460	1,940	1,840	960	1,040	1,640	1,120	810	1,290
21	1,640	3,460	9,610	1,460	2,440	1,840	810	960	1,040	960	810	1,290
22	1,460	3,770	6,540	1,640	2,240	2,040	810	885	1,290	2,340	810	1,120
23	1,460	7,560	4,280	6,330	1,840	2,840	1,290	810	1,120	1,640	1,460	1,040
24	1,380	5,920	3,460	8,380	1,640	2,040	1,120	810	1,200	1,380	2,040	1,040
25	1,320	5,100	4,280	4,280	1,460	1,640	1,120	738	2,540	1,120	1,560	1,560
26	1,290	3,870	4,480	3,460	1,640	1,840	960	738	1,290	960	1,200	2,440
27	1,290	3,050	3,560	2,840	1,840	1,740	885	738	960	960	900	2,040
28	1,120	2,640	3,260	3,050	1,840	1,560	1,290	665	810	810	960	1,560
29	1,120	.....	3,050	2,740	2,040	1,380	1,290	665	738	810	810	1,290
30	1,120	.....	2,640	2,240	1,840	1,200	1,290	810	665	810	810	1,200
31	1,120	.....	2,540	.....	3,870	.....	2,140	665	.....	810	.....	1,040

NOTE.—These discharges are based on a rating curve that is well defined between 525 and 1,400 second-feet.

Monthly discharge of Ocmulgee River near Jackson, Ga., for 1909.

[Drainage area, 1,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	2,740	1,120	1,640	1.17	1.35	A.
February	11,500	1,040	4,500	3.21	3.34	A.
March	19,000	1,840	6,020	4.30	4.96	A.
April	8,380	1,460	2,470	1.76	1.96	A.
May	5,510	1,380	2,230	1.59	1.83	A.
June	5,720	1,200	2,230	1.59	1.77	A.
July	4,280	810	1,550	1.11	1.28	A.
August	9,820	665	2,550	1.82	2.10	A.
September	3,660	525	1,090	.779	.87	B.
October	4,380	525	1,260	.900	1.04	A.
November	2,040	738	953	.681	.76	B.
December	2,440	810	1,290	.921	1.06	A.
The year	19,000	525	2,320	1.66	22.32	

OCMULGEE RIVER AT MACON, GA.

This station is located at the Fifth Street Bridge in the city of Macon, near the Southern Railway passenger depot, and about 500 feet above the Central of Georgia Railroad bridge. The United States Weather Bureau established a gage at Macon on January 21, 1893, and October 18, 1895, discharge measurements were begun by the United States Geological Survey. Gage heights are furnished by the United States Weather Bureau.

Above Macon, Ocmulgee River and most of its tributaries afford abundant water power, and the station furnishes data for water power estimates, navigation, and general run-off studies. Some fluctuation in gage heights at low stages is probably caused by control of flow at mills above. As at other stations situated just below the fall line, rapidly rising or falling stages are likely to be attended by variations in surface slope, causing greater or less discharge than for the normal rating.

The United States Weather Bureau gage originally used at this station is a heavy timber bolted to a pier of the Central of Georgia Railroad bridge. On October 9, 1905, a standard chain gage was installed on the Fifth Street Bridge, where discharge measurements are made. These gages have been referred to the same datum and have given practically the same readings, varying slightly owing to surface slope between locations.

Both banks are high and neither is subject to overflow. The bed of the river is soft and shifting and a great amount of change in the station rating curve has occurred at the result of changes in the river bed at and below the station.

Discharge measurements of Ocmulgee River at Macon, Ga., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 6	M. R. Hall	260	1,840	5.68	2,510
July 27	E. H. Swett	242	1,120	3.10	1,400
October 7	do	235	902	2.28	852
Do	do	235	910	2.34	895
November 22	do	237	943	2.42	991
November 24	do	249	1,390	4.27	2,070

Daily gage height, in feet, of Ocmulgee River at Macon, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.7	2.7	6.4	6.7	8.4	9.2	3.8	5.1	2.5	2.7	2.5	2.5
2	6.0	2.6	6.1	6.5	11.7	6.8	3.8	4.3	2.3	2.6	2.5	2.5
3	4.9	2.7	5.8	6.2	10.9	8.1	3.8	8.5	2.3	2.5	3.5	2.5
4	4.3	2.7	6.3	6.1	8.5	13.0	3.4	13.3	2.3	2.4	3.5	2.5
5	4.5	2.9	5.7	5.8	6.7	10.5	3.2	13.7	2.3	2.4	3.0	2.5
6	7.3	4.0	5.3	5.8	6.1	8.6	8.7	12.1	2.3	2.3	2.7	2.5
7	6.4	8.5	8.0	5.7	5.5	6.5	9.4	9.3	2.3	2.3	2.6	2.1
8	6.0	6.4	7.1	6.3	5.2	5.6	8.2	6.4	2.2	2.2	2.5	3.5
9	4.6	4.7	6.5	6.9	5.0	4.9	6.6	7.7	2.5	2.2	2.5	3.9
10	4.2	17.6	16.4	6.4	4.7	4.5	6.3	7.5	2.3	2.2	2.5	3.8
11	3.9	17.0	18.7	6.0	9.4	4.3	6.0	6.4	2.3	2.1	2.5	3.2
12	3.9	14.0	15.3	5.5	6.8	4.0	4.9	5.1	2.4	2.1	2.5	2.9
13	3.8	10.2	20.4	5.7	5.4	4.0	4.6	9.0	2.3	2.1	2.5	3.0
14	3.9	15.5	19.8	5.7	4.9	4.1	4.9	7.5	2.2	2.1	2.5	5.0
15	3.9	13.0	18.2	5.7	4.7	4.2	5.1	6.5	2.2	2.3	2.4	5.2
16	3.9	17.6	15.9	5.5	4.5	4.7	4.1	6.8	3.2	8.7	2.4	4.3
17	4.3	15.6	11.9	5.3	4.3	5.3	3.8	7.2	8.0	8.3	2.5	3.6
18	6.0	12.3	10.2	5.1	4.8	6.5	4.2	5.2	5.0	7.2	2.5	3.3
19	6.0	9.9	9.4	4.8	4.6	6.2	3.8	4.1	9.8	6.2	2.5	3.2
20	4.9	11.7	8.6	5.0	5.0	5.2	3.4	3.5	6.9	4.4	2.8	3.3
21	4.3	10.5	16.6	4.9	5.9	4.7	3.2	3.2	4.6	3.4	2.6	3.6
22	4.1	10.7	16.5	4.6	6.3	5.0	3.1	3.1	3.6	3.0	2.4	3.6
23	4.0	12.3	12.3	4.9	5.7	5.2	2.9	2.9	5.3	5.3	2.5	3.5
24	3.8	13.1	9.9	11.6	4.9	6.1	2.8	2.8	8.5	4.3	4.1	3.1
25	3.4	12.0	9.0	12.3	4.9	5.8	3.5	2.7	4.3	3.6	4.7	3.0
26	3.6	10.9	10.6	9.7	4.5	4.6	3.2	2.7	5.5	3.3	3.9	4.0
27	3.5	8.8	9.8	8.3	4.6	5.2	3.0	2.6	3.8	3.0	3.6	5.2
28	3.4	7.4	8.6	7.4	5.1	4.3	3.0	2.6	3.1	2.9	2.8	4.4
29	3.2	.....	8.5	7.0	5.0	4.0	5.3	2.5	3.0	2.7	2.6	4.0
30	3.1	.....	8.2	6.5	5.1	4.0	4.2	2.4	2.8	2.6	2.6	3.5
31	3.0	.....	7.2	.....	6.5	.....	7.6	2.4	.....	2.6	.....	3.3

Daily discharge, in second-feet, of Ocmulgee River at Macon, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,610	1,110	3,400	3,610	4,830	5,490	1,770	2,560	990	1,110	990	990
2	3,140	1,050	3,200	3,470	8,360	3,680	1,770	2,070	870	1,050	990	990
3	2,430	1,110	3,010	3,270	7,280	4,600	1,770	4,910	870	990	1,590	990
4	2,070	1,110	3,340	3,200	4,910	10,600	1,530	11,300	870	930	1,590	990
5	2,190	1,230	2,940	3,010	3,610	6,810	1,410	12,300	870	930	1,290	990
6	4,030	1,890	2,680	3,010	3,200	4,990	5,070	8,940	870	870	1,110	990
7	3,400	4,910	4,530	2,940	2,820	3,470	5,670	5,580	870	870	1,050	990
8	3,140	3,400	3,890	3,340	2,620	2,880	4,680	3,400	810	810	990	1,350
9	2,250	2,310	3,470	3,750	2,490	2,430	3,540	4,310	990	810	990	1,830
10	2,010	28,700	23,000	3,400	2,310	2,190	3,340	4,170	870	810	990	1,770
11	1,830	25,800	34,200	3,140	5,670	2,070	3,140	3,400	870	750	990	1,410
12	1,830	13,200	18,200	2,820	3,680	1,890	2,430	2,560	930	750	990	1,230
13	1,770	6,480	43,100	2,940	2,750	1,890	2,250	5,310	870	750	990	1,290
14	1,830	19,000	39,900	2,940	2,430	1,950	2,430	4,170	810	750	990	2,490
15	1,830	10,600	31,700	2,940	2,310	2,010	2,560	3,470	810	870	930	2,620
16	1,830	28,700	20,800	2,820	2,190	2,310	1,950	3,680	1,410	5,070	930	2,070
17	2,070	19,500	8,640	2,680	2,070	2,680	1,770	3,960	4,530	4,760	990	1,650
18	3,140	9,260	6,480	2,560	2,370	3,470	2,010	2,620	2,490	3,960	990	1,470
19	3,140	6,160	5,670	2,370	2,250	3,270	1,770	1,950	6,060	3,270	990	1,410
20	2,430	8,360	4,990	2,490	2,490	2,620	1,530	1,590	3,750	2,130	1,170	1,470
21	2,070	6,810	23,900	2,430	3,080	2,310	1,410	1,410	2,250	1,530	1,050	1,650
22	1,950	7,040	23,400	2,250	3,340	2,490	1,350	1,350	1,650	1,290	930	1,650
23	1,890	9,260	9,260	2,430	2,940	2,620	1,230	1,230	2,680	2,680	990	1,590
24	1,770	10,800	6,160	8,220	2,430	3,200	1,170	1,170	4,910	2,070	1,950	1,350
25	1,530	8,790	5,310	9,260	2,430	3,010	1,590	1,110	2,070	1,650	2,310	1,290
26	1,650	7,280	6,920	5,960	2,190	2,250	1,410	1,110	2,820	1,470	1,830	1,890
27	1,590	5,150	6,060	4,760	2,250	2,620	1,290	1,050	1,770	1,290	1,650	2,620
28	1,530	4,100	4,990	4,100	2,560	2,070	1,290	1,050	1,350	1,230	1,170	2,130
29	1,410	.....	4,910	3,820	2,490	1,890	2,680	990	1,290	1,110	1,050	1,890
30	1,350	.....	4,680	3,470	2,560	1,890	2,010	930	1,170	1,050	1,050	1,590
31	1,290	.....	3,960	.....	3,470	.....	4,240	930	.....	1,050	.....	1,470

NOTE.—These discharges are based on a rating curve that is well defined.

Monthly discharge of Ocmulgee River at Macon, Ga., for 1909.

[Drainage area, 2,420 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	4,030	1,290	2,190	0.905	1.04	A.
February	28,700	1,050	9,040	3.74	3.90	A.
March	43,100	2,680	11,800	4.88	5.63	A.
April	9,260	2,250	3,580	1.48	1.65	A.
May	8,360	2,070	3,240	1.34	1.54	A.
June	10,600	1,890	3,190	1.32	1.47	A.
July	5,670	1,170	2,320	.959	1.11	A.
August	12,300	930	3,370	1.39	1.60	A.
September	6,060	810	1,780	.736	.82	A.
October	5,070	750	1,570	.649	.75	A.
November	2,310	930	1,180	.488	.54	A.
December	2,620	990	1,550	.640	.74	A.
The year	43,100	750	3,730	1.54	20.79	

OCONEE RIVER NEAR GREENSBORO, GA.

This station, which is located at the new wagon bridge about 5 miles west of Greensboro on the road to Madison, Ga., was established July 25, 1903, for the purpose of obtaining run-off data for this important water-power stream.

Town Creek enters above the station. A number of mills and factories above may cause considerable fluctuation in the low-water flow, but the gage is read twice a day and the mean of the two readings is believed to be sufficiently accurate.

The chain gage is attached to the downstream lower chord of the bridge from which measurements are made. The datum has not changed since the establishment of the station. The left bank is low and overflows at a stage of about 12 to 15 feet for a distance of about 600 feet. The flood of August, 1908, changed the conditions of flow at the station materially as indicated by the 1909 measurements, necessitating a recomputation of the monthly estimates of 1908 since August, based on a later rating curve.

Discharge measurements of Oconee River near Greensboro, Ga., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
January 26	W. A. Lamb	124	611	3.40	1,140
June 4	M. R. Hall	136	1,650	11.41	5,730
Do	do	136	1,660	11.59	5,780
August 13	do	122	591	3.35	1,090
Do	do	122	590	3.30	1,060
October 5	E. H. Swett	120	418	2.22	713
October 30	M. R. Hall	119	431	2.50	767
Do	do	119	433	2.44	763

Daily gage height, in feet, of Oconee River near Greensboro, Ga., for 1909.

[A. M. Thurmond, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.65	5.1	4.4	8.2	3.7	3.2	4.0	2.05	2.6	2.65	2.95
2	.....	2.85	5.1	4.3	11.1	3.8	3.25	4.2	2.1	2.4	2.5	2.9
3	.....	2.95	5.2	4.3	12.4	6.6	3.05	11.0	2.05	2.25	2.5	2.85
4	.....	2.85	5.8	4.1	10.4	11.0	3.05	13.6	1.95	2.35	2.45	2.3
5	.....	2.9	4.6	4.0	6.0	11.2	3.1	13.1	1.85	2.35	2.35	2.25
6	.....	5.5	5.1	4.2	4.6	7.1	3.5	11.2	1.9	2.45	2.35	2.25
7	.....	4.6	6.8	4.6	4.2	5.2	3.35	8.8	1.95	2.35	2.3	2.85
8	.....	3.65	7.2	4.8	3.95	4.2	10.4	5.7	2.15	2.1	2.3	4.6
9	.....	3.35	5.4	4.6	3.75	3.8	10.7	4.8	2.05	2.2	2.4	6.0
10	.....	13.7	14.0	4.4	4.0	3.55	10.2	4.4	2.15	2.05	2.4	4.0
11	.....	15.2	14.6	3.95	4.4	3.55	7.4	4.1	2.4	2.15	2.55	3.45
12	.....	13.1	16.4	3.75	3.95	3.85	4.6	3.6	2.15	2.05	2.4	3.05
13	.....	8.9	17.8	3.8	3.45	3.8	3.9	3.3	1.95	2.2	2.45	4.6
14	.....	10.0	17.0	4.0	3.35	3.65	6.0	3.55	2.05	2.7	2.4	5.4
15	.....	9.4	16.4	3.9	3.35	4.2	4.6	3.45	2.1	10.6	2.45	5.0
16	.....	10.4	14.2	3.65	3.2	5.9	4.4	4.1	3.1	12.0	2.45	4.4
17	.....	10.2	9.5	3.55	2.15	6.5	4.2	3.45	7.3	8.5	2.45	3.75
18	.....	7.6	6.2	3.55	2.15	5.6	4.0	3.3	6.8	4.2	2.4	3.0
19	.....	6.5	5.6	3.45	2.15	4.8	3.05	2.95	6.6	3.6	2.4	3.15
20	.....	7.2	5.8	3.4	7.0	3.55	2.85	2.9	4.6	3.1	2.3	3.5
21	4.1	6.9	9.4	3.45	7.3	3.35	2.85	3.35	4.0	3.1	2.2	3.25
22	3.9	6.1	8.6	3.45	6.0	3.45	2.8	2.35	3.6	3.6	2.85	2.95
23	3.75	13.2	6.7	7.8	5.2	3.95	3.15	2.45	3.35	3.6	2.5	2.9
24	3.65	15.4	5.2	5.0	4.6	4.8	4.0	2.4	7.4	2.95	2.85	3.55
25	3.6	14.4	6.4	4.4	3.9	4.0	3.65	2.3	6.8	2.8	2.65	3.95
26	3.65	11.2	9.5	4.4	3.75	3.55	2.95	2.35	5.0	2.7	2.35	4.5
27	3.4	7.0	6.2	4.4	3.95	5.4	3.0	2.3	4.1	2.6	2.25	4.2
28	3.25	5.4	5.6	5.6	5.2	4.0	2.85	2.2	2.9	2.55	2.3	3.65
29	3.25	.....	6.1	6.2	6.7	4.0	4.2	2.15	2.75	2.5	2.25	3.3
30	3.25	.....	5.6	5.8	4.1	3.45	4.6	2.25	2.85	2.45	2.55	2.8
31	2.75	.....	4.6	.....	3.8	.....	4.1	2.05	.....	2.4	.....	2.7

Daily discharge, in second-feet, of Oconee River near Greensboro, Ga., for September 1, 1908, to December 31, 1909.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1908.					1908.				
1	1,290	650	1,210	780	16	763	650	1,460	871
2	1,130	605	1,050	763	17	729	635	1,090	910
3	1,050	590	950	798	18	729	605	970	910
4	1,130	590	910	763	19	729	590	950	890
5	2,080	575	1,640	798	20	729	650	871	910
6	1,290	575	1,820	798	21	729	665	816	1,720
7	1,410	590	1,290	970	22	729	680	798	4,870
8	1,410	780	1,050	1,720	23	665	763	816	7,280
9	1,050	930	1,050	2,020	24	696	729	780	6,980
10	970	1,680	1,050	1,460	25	712	910	798	3,960
11	871	2,020	950	1,130	26	680	816	798	3,110
12	798	1,410	930	970	27	729	816	763	1,540
13	780	1,010	798	1,090	28	763	1,820	798	1,330
14	798	729	1,010	950	29	712	2,770	763	1,210
15	763	696	1,330	910	30	696	2,020	798	1,290
					31	.....	1,590	.....	1,290

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	.....	834	1,880	1,540	3,590	1,250	1,050	1,370	635	816	834	950
2	.....	910	1,880	1,500	5,480	1,290	1,070	1,460	650	746	780	930
3	.....	950	1,920	1,500	6,390	2,660	990	5,410	635	696	780	910
4	.....	910	2,220	1,410	5,000	5,410	990	7,280	605	729	763	712
5	.....	930	1,640	1,370	2,330	5,550	1,010	6,900	575	729	729	696
6	.....	2,080	1,880	1,460	1,640	2,940	1,170	5,550	590	763	729	696
7	.....	1,640	2,770	1,640	1,460	1,920	1,110	3,960	605	729	712	910
8	.....	1,230	2,990	1,720	1,350	1,460	5,000	2,180	665	650	712	1,640
9	.....	1,110	2,020	1,640	1,270	1,290	5,200	1,720	635	680	746	2,330
10	.....	7,360	7,580	1,540	1,370	1,190	4,870	1,540	665	635	746	1,370
11	.....	8,480	8,030	1,350	1,540	1,190	3,110	1,410	746	665	798	1,150
12	.....	6,900	9,380	1,270	1,350	1,310	1,640	1,210	665	635	746	990
13	.....	4,020	10,500	1,290	1,150	1,290	1,330	1,090	605	680	763	1,640
14	.....	4,740	9,850	1,370	1,110	1,230	2,330	1,190	635	852	746	2,020
15	.....	4,350	9,380	1,330	1,110	1,460	1,640	1,150	650	5,130	763	1,820
16	.....	5,000	7,730	1,230	1,050	2,280	1,540	1,410	1,010	6,110	763	1,540
17	.....	4,870	4,420	1,190	665	2,600	1,460	1,150	3,050	3,770	763	1,270
18	.....	3,230	2,440	1,190	665	2,120	1,370	1,090	2,770	1,460	746	970
19	.....	2,600	2,120	1,150	665	1,720	990	950	2,660	1,210	746	1,030
20	.....	2,990	2,220	1,130	2,880	1,190	910	930	1,640	1,010	712	1,170
21	1,410	2,820	4,350	1,150	3,050	1,110	910	1,110	1,370	1,010	680	1,070
22	1,330	2,380	3,830	1,150	2,330	1,150	890	729	1,210	1,210	910	950
23	1,270	6,980	2,720	3,350	1,920	1,350	1,030	763	1,110	1,210	780	930
24	1,230	8,630	1,920	1,820	1,640	1,720	1,370	746	3,110	950	910	1,190
25	1,210	7,880	2,550	1,540	1,330	1,370	1,230	712	2,770	890	834	1,350
26	1,230	5,550	4,420	1,540	1,270	1,190	950	729	1,820	852	729	1,590
27	1,130	2,880	2,440	1,540	1,350	2,020	970	712	1,410	816	696	1,460
28	1,070	2,020	2,120	2,120	1,920	1,370	910	680	930	798	712	1,230
29	1,070	.....	2,380	2,440	2,720	1,370	1,460	665	871	780	696	1,090
30	1,070	.....	2,120	2,220	1,410	1,150	1,640	696	910	763	798	890
31	871	.....	1,640	.....	1,290	.....	1,410	635	.....	746	.....	852

NOTE.—These discharges are based on a rating curve that is fairly well defined between 560 and 6,000 second-feet. Discharge January 1 to 20 estimated to average 1,260 second-feet per day on the basis of the discharge at Dublin, Ga.

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Monthly discharge of Oconee River near Greensboro, Ga., for 1908–9.

[Drainage area, 1,100 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908.[a]						
January	6,740	1,170	2,480	2.25	2.59	A.
February	8,300	1,620	3,920	3.56	3.84	A.
March	10,400	1,250	2,870	2.61	3.01	A.
April	9,100	1,250	3,110	2.83	3.16	A.
May	2,280	1,130	1,480	1.35	1.56	A.
June	4,970	882	1,320	1.20	1.34	A.
July	5,690	672	1,440	1.31	1.51	A.
August	25,300	620	3,940	3.58	4.13	B.
September	2,080	665	920	.836	.93	A.
October	2,770	575	972	.884	1.02	A.
November	1,820	763	1,010	.918	1.02	A.
December	7,280	763	1,770	1.61	1.86	A.
The year	25,300	575	2,100	1.91	25.97	
1909.						
January[b]		871	1,230	1.12	1.29	A.
February	8,480	834	3,720	3.38	3.52	A.
March	10,500	1,640	3,980	3.62	4.17	A.
April	3,350	1,130	1,560	1.42	1.58	A.
May	6,390	665	2,010	1.83	2.11	A.
June	5,550	1,110	1,840	1.67	1.86	A.
July	5,200	890	1,630	1.48	1.71	A.
August	7,280	635	1,840	1.67	1.92	A.
September	3,110	575	1,210	1.10	1.23	A.
October	6,110	635	1,250	1.14	1.31	A.
November	910	680	761	.692	.77	A.
December	2,330	696	1,200	1.09	1.26	A.
The year	10,500	575	1,850	1.68	22.73	

[a] The monthly discharge for September to December, 1908, supersedes that given in Water-Supply Paper 242. Revision is necessary because of change in section caused by flood of August 25 to 28, 1908.
[b] Discharge estimated January 1 to 20, 1909.

OCONEE RIVER AT FRALEYS FERRY, NEAR MILLEDGEVILLE, GA.

The station is located at Fraleys Ferry, 6 miles above Milledgeville, Ga., and about 4 miles below the mouth of Little River. It was established May 23, 1906, to take the place of the Milledgeville station and to supply important water-power data in addition to general run-off data. Records were discontinued December 31, 1908, but were resumed October 6, 1909. A temporary gage was maintained from October 20, 1905, to November 14, 1905, at Fraleys Ferry, and the original station at Milledgeville was maintained from August 22, 1903, to December 31, 1905. The Milledgeville station is now maintained by the United States Weather Bureau, but on account of the daily fluctuation caused by a milldam above and the shifting channel conditions at the station, mean monthly discharges have not been computed since 1904. At Fraleys Ferry, which is far above the influence of the dam at Milledgeville, the flow is only slightly affected by dams from above. Two gage readings a day are made in order to average any daily fluctuations which may occur.

The sloping staff gage is located 100 feet above the ferry at which discharge measurements are made. Owing to swiftness of current it has been impossible to make any measurements at high-water stages. The bed of the stream is sandy and changing, but rock shoals below control the water level at the station and a good rating has been developed for low stages.

Discharge measurements of Oconee River at Fraleys Ferry, near Milledgeville, Ga., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
October 6	E. H. Swett	277	1,380	5.33	1,310
Do	do	285	1,430	5.33	1,350

Daily gage height, in feet, of Oconee River at Fraleys Ferry, near Milledgeville, Ga., for 1909.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	5.55	5.6	11	5.3	5.55	5.95	21	5.8	5.55	6.25
2	.....	5.6	5.6	12	5.3	5.55	6.0	22	5.85	5.55	6.7
3	.....	5.7	5.6	13	5.4	5.55	6.1	23	6.15	7.0	6.4
4	.....	5.7	5.6	14	5.4	5.55	6.1	24	6.1	6.25	6.05
5	.....	5.6	5.7	15	7.1	5.55	6.05	25	5.95	6.25	5.95
6	5.3	5.5	5.8	16	.....	5.55	5.9	26	5.8	5.9	6.25
7	5.4	5.55	6.25	17	.....	5.55	5.7	27	5.7	5.75	6.6
8	5.5	5.55	6.85	18	7.4	6.0	5.65	28	5.6	5.65	6.35
9	5.35	5.6	6.4	19	6.15	6.5	5.7	29	5.6	5.65	6.25
10	5.3	5.6	6.05	20	5.9	6.5	5.8	30	5.6	5.6	6.0
								31	5.55	.....	6.15

NOTE.—Gage heights for October 16 and 17 assumed greater than 9 feet on basis of Oconee River near Greensboro, and known condition of the gage at this station.

Daily discharge, in second-feet, of Oconee River at Fraleys Ferry, near Milledgeville, Ga., for 1909.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	1,550	1,610	11	1,270	1,550	2,080	21	1,870	1,550	2,520
2	.....	1,610	1,610	12	1,270	1,550	2,150	22	1,940	1,550	3,250
3	.....	1,740	1,610	13	1,380	1,550	2,300	23	2,380	3,770	2,760
4	.....	1,740	1,610	14	1,380	1,550	2,300	24	2,300	2,520	2,220
5	.....	1,610	1,740	15	3,950	1,550	2,220	25	2,080	2,520	2,080
6	1,270	1,490	1,870	16	[a]10,000	1,550	2,010	26	1,870	2,010	2,520
7	1,380	1,550	2,520	17	[a] 7,000	1,550	1,740	27	1,740	1,800	3,080
8	1,490	1,550	3,500	18	4,500	2,150	1,680	28	1,610	1,680	2,680
9	1,320	1,610	2,760	19	2,380	2,920	1,740	29	1,610	1,680	2,520
10	1,270	1,610	2,220	20	2,010	2,920	1,870	30	1,610	1,610	2,150
								31	1,550	.....	2,380

[a] Discharge estimated by hydrograph comparison with other Oconee River stations.

NOTE.—These discharges are based on a rating curve that is well defined below discharge 5,600 second-feet.

Monthly discharge of Oconee River at Fraleys Ferry, near Milledgeville, Ga., for 1909.

[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 6–31	[a] 10,000	1,270	2,400	0.845	0.82	B.
November	3,770	1,490	1,850	.651	.73	A.
December	3,500	1,610	2,240	.789	.91	A.

[a] Estimated.

NOTE.—October 16 to 17 estimated.

OCONEE RIVER AT DUBLIN, GA.

The station is located at the iron highway bridge in the eastern part of Dublin. Continuous records of gage heights have been obtained at this point since February 11, 1898, supplied for most of the time by the United States Weather Bureau. Fragmentary records of gage heights and discharge measurements were obtained prior to 1898.

The staff gage is attached to the lower part of the Wrightsville and Tennille Railroad bridge, 500 feet downstream from the highway bridge at which measurements are made. Its datum has remained the same since its establishment.

Fluctuation caused by water powers above the station are unimportant. This portion of the river is navigable, and although the current is good at the station the slope below is small; it is therefore to be expected that rapidly rising or falling stages will cause much difference in surface slope and consequently in the discharge.

At a stage of about 20 feet the left bank overflows for 1,100 feet through an iron frame trestle approached to the bridge. This ground is thickly covered with brushy growth which probably retards the flow of water over the overflow section. The right bank does not overflow.

Scarcity of data covering the changes in channel conditions, as indicated by the discharge measurements of April 19, 1907, and April 7, 1909, make it difficult to determine with certainty what the daily and monthly discharges for 1907, 1908, and 1909 should be. The rating curves used are based on the available data and are intended to average the conditions as nearly as possible. Intercomparisons with Oconee River at Fraleys Ferry give fair results but do not show up very well for low-water periods. The accuracy of the monthly estimates for 1907–8 is more or less uncertain, especially at low stages. The monthly estimates for 1909 are probably better.

Discharge measurements of Oconee River at Dublin, Ga., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage. height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 7	M. R. Hall	253	1,840	3.88	4,480
November 23	E. H. Swett	226	1,040	.48	1,960

Daily gage height, in feet, of Oconee River at Dublin, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.8	1.8	14.0	7.8	3.5	4.0	2.4	3.4	0.1	0.4	0.4	0.4
2	2.4	1.7	12.4	6.4	5.9	4.1	2.3	3.9	.2	.2	.3	.3
3	3.4	1.6	9.5	5.5	7.5	3.2	1.7	3.6	.1	.1	.3	.3
4	2.9	1.6	6.4	5.0	8.2	2.9	1.5	4.4	— .1	.1	.4	.4
5	2.4	1.6	6.3	4.4	8.5	5.5	1.3	5.0	— .1	.1	.7	.4
6	3.8	1.6	5.9	4.1	8.5	6.8	.9	6.8	— .2	.1	.8	.4
7	2.0	2.3	5.4	3.7	8.0	7.5	3.7	7.5	— .1	.1	.6	.6
8	4.4	5.4	4.3	3.4	5.0	8.4	6.4	8.4	.0	.1	.5	.6
9	5.4	7.0	6.0	4.4	3.5	8.8	7.6	10.3	.2	.1	.5	.5
10	3.2	7.8	6.6	5.3	2.8	3.4	8.3	10.5	.2	.1	.4	1.6
11	3.5	7.6	7.4	5.0	2.6	2.9	8.4	9.5	.3	.1	.5	2.3
12	2.5	8.7	8.2	4.5	3.2	2.4	8.6	7.2	.3	.0	.5	2.0
13	2.2	10.2	10.9	3.8	3.5	1.9	8.7	5.4	.2	.0	.4	1.6
14	2.2	15.6	15.8	3.6	2.8	1.9	8.9	6.8	.1	.0	.4	1.3
15	2.3	15.8	20.0	3.3	2.4	2.1	4.9	7.5	.2	.0	.4	2.0
16	2.3	15.9	23.3	3.1	2.0	2.3	4.9	6.1	.2	.2	.4	3.2
17	2.4	14.8	21.7	3.0	1.8	2.3	5.4	4.3	1.1	4.3	.3	3.2
18	3.2	12.9	21.1	2.9	1.7	2.9	5.7	5.0	2.0	5.1	.3	3.2
19	5.3	13.0	18.4	2.8	2.4	4.6	3.9	5.4	4.5	6.4	.3	2.0
20	6.0	12.8	16.2	2.5	2.9	5.0	3.9	3.3	5.0	5.4	.5	2.2
21	5.2	12.4	14.4	2.4	5.9	5.0	2.8	2.1	5.4	2.1	.4	1.9
22	4.8	11.4	11.8	2.2	7.0	4.8	2.0	1.4	3.8	2.0	.4	1.7
23	4.3	9.9	14.2	2.1	7.5	4.1	2.5	1.0	2.1	1.5	.3	2.2
24	3.0	9.8	13.9	2.0	7.8	4.3	1.3	.7	1.9	1.3	.4	2.0
25	2.3	9.6	14.6	2.0	6.3	3.9	2.3	.5	3.3	1.9	.6	1.7
26	2.4	9.1	14.0	5.8	4.0	3.2	2.2	.2	4.3	1.5	2.6	1.2
27	2.3	11.9	12.5	5.6	3.2	3.1	2.0	.1	4.5	1.1	2.7	2.4
28	2.1	12.7	10.5	5.2	2.9	2.3	.9	.2	2.9	1.0	1.7	3.3
29	2.1	.....	10.2	4.8	2.8	2.4	1.0	.2	1.3	.5	.8	3.3
30	2.0	.....	10.0	4.4	3.2	3.0	1.7	.1	.8	.4	.4	2.6
31	1.1	.....	9.2	.....	4.3	.....	2.4	.1	.....	.4	.....	1.8

Daily discharge, in second-feet, of Oconee River at Dublin, Ga., for 1907–1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	4,050	3,330	6,320	2,430	4,550	2,700	7,700	7,040	1,250	8,540	1,100	8,540
2	6,380	5,250	7,480	2,520	4,350	2,700	8,060	7,150	1,020	8,900	1,180	7,940
3	7,370	8,300	7,700	2,700	4,050	5,550	6,490	5,050	950	8,540	1,180	6,820
4	7,700	9,860	8,900	2,790	4,250	5,550	5,950	2,700	800	4,550	1,180	6,050
5	8,300	10,800	9,860	2,880	4,550	2,970	4,850	2,700	1,850	2,970	1,250	4,550
6	6,600	11,700	11,300	2,970	4,750	3,150	3,870	2,520	2,610	2,700	1,320	4,050
7	5,350	12,700	12,100	3,330	6,050	2,610	4,050	2,340	2,700	2,430	1,320	3,600
8	4,550	13,200	11,800	3,780	4,150	2,430	2,970	2,250	2,430	2,250	1,400	3,510
9	4,150	17,200	8,300	4,550	3,600	2,170	3,150	2,250	1,850	2,170	1,400	3,330
10	4,050	18,000	5,550	4,750	7,940	2,010	2,790	1,850	3,240	2,250	1,250	2,700
11	4,050	15,700	5,050	4,350	7,700	1,930	1,930	1,780	3,600	2,700	1,250	2,700
12	3,870	11,300	4,750	3,960	6,600	1,850	1,020	2,250	4,150	2,170	1,250	2,790
13	3,780	6,600	4,450	3,960	6,050	1,850	1,780	2,700	2,880	1,850	1,100	2,880
14	3,600	5,950	4,250	3,150	4,750	1,850	1,850	2,700	2,610	1,780	1,780	7,150
15	3,600	5,050	4,250	3,150	4,550	2,520	2,700	4,150	1,850	1,620	2,430	11,100
16	3,600	4,650	5,050	3,150	4,250	4,550	3,150	3,150	1,550	1,620	2,250	11,400
17	3,330	4,350	5,750	3,330	4,250	4,850	3,150	3,420	1,400	1,700	2,170	13,200
18	3,150	5,150	5,050	5,050	3,600	3,150	2,790	5,150	1,250	1,620	1,850	14,200
19	3,060	4,050	4,750	5,350	3,780	2,250	2,520	5,050	1,180	1,480	1,930	14,600
20	3,060	4,250	4,550	7,150	3,600	1,930	2,250	4,550	1,100	1,320	1,930	12,100

Daily discharge, in second-feet, of Oconee River at Dublin, Ga., for 1907–1909—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	3,240	4,550	4,150	6,030	3,420	1,780	2,170	4,550	1,020	1,250	2,700	11,500
22	2,970	4,550	4,050	5,750	2,700	1,700	2,090	3,150	950	1,250	3,780	5,650
23	2,970	5,550	3,690	6,600	2,700	1,620	2,250	2,250	950	1,180	5,550	7,940
24	2,880	4,250	3,600	7,150	2,610	1,550	2,010	1,850	1,480	1,320	8,420	11,400
25	2,790	4,050	3,330	7,940	2,340	1,550	1,550	1,850	1,700	1,400	9,140	12,800
26	3,150	4,050	4,050	9,500	2,250	1,700	1,480	1,700	2,250	1,400	10,800	15,600
27	3,330	4,650	2,790	13,800	2,250	1,850	1,400	1,480	5,550	1,250	10,100	22,000
28	3,510	5,550	2,700	10,800	2,700	2,090	2,430	1,480	6,600	1,180	12,800	22,200
29	3,600	.....	2,700	7,040	2,610	3,600	2,170	1,400	3,150	1,180	11,400	20,200
30	3,510	.....	2,700	6,380	4,050	5,350	5,750	1,320	7,700	1,180	8,180	19,600
31	3,600	.....	2,430	.....	3,150	.....	8,300	1,250	.....	1,100	.....	12 800
1908.												
1	12,000	9,980	8,300	18,200	30,200	4,350	2,610	3,150	29,000	2,170	7,590	2,700
2	12,500	14,500	7,480	13,600	28,000	4,350	2,520	2,610	23,700	2,250	6,380	2,610
3	14,200	16,400	7,040	9,020	23,700	3,600	2,700	2,010	15,800	2,090	3,690	2,610
4	15,700	17,400	6,710	7,480	19,800	3,510	2,610	1,930	6,820	1,780	3,510	2,700
5	16,000	26,200	6,600	6,710	14,400	3,150	4,250	1,930	3,870	1,780	2,970	3,150
6	13,900	25,400	6,600	6,380	9,260	2,880	6,050	2,010	3,420	1,700	4,550	3,240
7	14,500	22,000	6,490	6,930	7,700	4,450	6,600	4,750	5,050	1,700	5,550	3,060
8	15,000	17,200	6,160	7,700	7,150	4,050	6,490	6,600	6,270	1,700	5,050	2,700
9	12,500	14,100	6,050	6,930	6,820	3,600	7,700	7,370	5,950	1,930	3,960	2,610
10	15,000	11,400	5,850	7,150	6,710	2,880	7,820	7,590	5,050	1,930	3,600	4,250
11	16,200	11,100	5,750	6,490	6,600	2,700	8,060	6,380	3,780	1,930	3,150	4,950
12	19,600	11,000	5,250	5,650	5,950	2,520	8,180	8,180	3,240	2,520	3,150	4,450
13	18,800	16,900	5,250	5,050	5,350	3,420	5,950	7,700	2,970	4,050	2,880	3,960
14	18,000	22,700	5,250	4,850	5,050	3,510	5,550	4,950	2,700	3,690	2,790	5,350
15	16,400	24,600	5,250	5,850	4,750	3,150	4,750	2,880	2,520	2,790	2,970	4,050
16	21,500	23,400	5,250	8,060	4,650	2,610	4,850	2,520	2,340	2,340	5,350	3,600
17	20,400	22,000	4,550	11,400	4,550	2,520	4,350	2,520	2,250	2,250	5,650	3,420
18	18,200	19,900	4,550	15,700	4,550	4,050	3,420	2,250	2,170	2,170	4,650	3,330
19	14,800	19,800	4,550	21,200	4,550	4,350	2,700	2,010	2,090	2,010	3,960	3,330
20	12,100	20,100	4,550	21,500	5,450	4,250	2,700	2,430	2,010	1,930	3,510	3,240
21	9,500	19,300	4,450	19,800	6,050	3,600	3,330	2,880	1,930	1,930	3,150	3,150
22	8,540	18,500	4,450	17,200	5,850	3,510	2,430	4,050	2,010	1,930	2,880	3,150
23	7,370	17,500	7,150	16,000	5,450	5,550	2,170	5,750	2,010	1,930	2,970	4,250
24	6,600	15,800	13,500	15,000	4,650	7,820	2,170	5,950	2,010	1,850	2,880	8,300
25	5,550	13,400	18,500	12,800	4,450	8,180	2,170	6,050	2,010	1,850	2,790	9,140
26	6,050	10,400	23,700	12,800	3,870	5,450	2,340	7,260	1,930	2,010	2,700	11,400
27	5,550	9,260	31,000	16,200	3,600	4,550	2,090	8,900	2,010	2,090	2,880	12,800
28	5,850	8,660	31,200	21,500	3,870	3,690	2,010	11,700	2,090	2,250	2,880	15,400
29	6,050	8,660	29,000	28,800	3,600	3,060	2,010	27,100	2,170	2,610	2,700	14,200
30	5,550	.....	25,400	32,200	3,600	2,790	2,010	34,200	2,170	3,870	2,700	10,500
31	5,750	.....	22,000	.....	3,780	.....	2,010	33,000	.....	6,930	.....	5,250
1909.												
1	3,830	2,990	18,100	9,010	4,420	4,880	3,490	4,340	1,680	1,900	1,900	1,900
2	3,490	2,910	15,500	7,390	6,840	4,970	3,400	4,780	1,750	1,750	1,820	1,820
3	4,340	2,830	11,200	6,400	8,650	4,170	2,910	4,520	1,680	1,680	1,820	1,820
4	3,920	2,830	7,390	5,850	9,490	3,920	2,750	5,260	1,560	1,680	1,900	1,900
5	3,490	2,830	7,280	5,260	9,870	6,400	2,590	5,850	1,560	1,680	2,120	1,900
6	4,700	2,830	6,840	4,970	9,870	7,830	2,270	7,830	1,500	1,680	2,200	1,900
7	3,150	3,400	6,290	4,600	9,250	8,650	4,600	8,650	1,560	1,680	2,040	2,040
8	5,260	6,290	5,160	4,340	5,850	9,740	7,390	9,740	1,620	1,680	1,970	2,040
9	6,290	8,050	6,950	5,260	4,420	10,300	8,770	12,400	1,750	1,680	1,970	1,970
10	4,170	9,010	7,610	6,180	3,830	4,340	9,610	12,700	1,750	1,680	1,900	2,830
11	4,420	8,770	8,530	5,850	3,660	3,920	9,740	11,200	1,820	1,680	1,970	3,400
12	3,580	10,100	9,490	5,350	4,170	3,490	10,000	8,290	1,820	1,620	1,970	3,150
13	3,320	12,200	13,300	4,700	4,420	3,070	10,100	6,290	1,750	1,620	1,900	2,830
14	3,320	20,800	21,200	4,520	3,830	3,070	10,400	7,830	1,680	1,620	1,900	2,590
15	3,400	21,200	28,300	4,260	3,490	3,240	5,750	8,650	1,750	1,620	1,900	3,150
16	3,400	21,300	33,900	4,080	3,150	3,400	5,750	7,060	1,750	1,750	1,900	4,170
17	3,490	19,500	31,200	4,000	2,990	3,400	6,290	5,160	2,430	5,160	1,820	4,170
18	4,170	16,300	30,200	3,920	2,910	3,920	6,620	5,850	3,150	5,960	1,820	4,170
19	6,180	16,500	25,600	3,830	3,490	5,450	4,780	6,290	5,350	7,390	1,820	3,150
20	6,950	16,200	21,800	3,580	3,920	5,850	4,780	4,260	5,850	6,290	1,970	3,320
21	6,070	15,500	18,800	3,490	6,840	5,850	3,830	3,240	6,290	3,240	1,900	3,070
22	5,650	14,000	14,600	3,320	8,050	5,650	3,150	2,670	4,700	3,150	1,900	2,910
23	5,160	11,800	18,400	3,240	8,650	4,970	3,580	2,350	3,240	2,750	1,820	3,320
24	4,000	11,600	17,900	3,150	9,010	5,160	2,590	2,120	3,070	2,590	1,900	3,150
25	3,400	11,400	19,100	3,150	7,280	4,780	3,400	1,970	4,260	3,070	2,040	2,910

Daily discharge, in second-feet, of Oconee River at Dublin, Ga., for 1907–1909—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
26	3,490	10,700	18,100	6,730	4,880	4,170	3,320	1,750	5,160	2,750	3,660	2,510
27	3,400	14,800	15,700	6,510	4,170	4,080	3,150	1,680	5,350	2,430	3,740	3,490
28	3,240	16,000	12,700	6,070	3,920	3,400	2,270	1,750	3,920	2,350	2,910	4,260
29	3,240	.....	12,200	5,650	3,830	3,490	2,350	1,750	2,590	1,970	2,200	4,260
30	3,150	.....	11,900	5,260	4,170	4,000	2,910	1,680	2,200	1,900	1,900	3,660
31	2,430	.....	10,800	.....	5,160	.....	3,490	1,680	.....	1,900	.....	2,990

NOTE.—The daily discharges for 1907 and 1908 are based on a rating curve that is only approximate. See description and footnote to monthly estimates for 1907 and 1908. Discharges for 1909 are based on a rating curve that is poorly defined. See description and footnote to monthly estimates for 1909.

Monthly discharge of Oconee River at Dublin, Ga., for 1907–1909.

[Drainage area, 4,180 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	8,300	2,790	4,170	0.998	1.15	
February	18,000	3,330	7,660	1.83	1.91	
March	12,100	2,430	5,610	1.34	1.54	
April	13,800	2,430	5,210	1.25	1.40	
May	7,940	2,250	4,130	.988	1.14	
June	5,550	1,550	2,710	.648	.72	
July	8,300	1,020	3,370	.806	.93	
August	7,150	1,250	3,000	.718	.83	
September	7,700	800	2,390	.572	.64	
October	8,900	1,100	2,480	.593	.68	
November	12,800	1,100	3,780	.904	1.01	
December	22,200	2,700	9,840	2.35	2.71	
The year	22,200	800	4,530	1.08	14.66	
1908.						
January	21,500	5,550	12,600	3.01	3.47	
February	26,200	8,660	16,800	4.02	4.34	
March	31,200	4,450	10,600	2.54	2.93	
April	32,200	4,850	12,900	3.09	3.45	
May	30,200	3,600	8,190	1.96	2.26	
June	8,180	2,520	3,940	.943	1.05	
July	8,180	2,010	4,020	.962	1.11	
August	34,200	1,930	7,370	1.76	2.03	
September	29,000	1,930	5,040	1.21	1.35	
October	6,930	1,700	2,390	.572	.66	
November	7,590	2,700	3,780	.904	1.01	
December	15,400	2,610	5,390	1.29	1.49	
The year	34,200	1,700	7,750	1.86	25.15	
1909.						
January	6,950	2,430	4,130	.988	1.14	D.
February	21,300	2,830	11,200	2.68	2.79	D.
March	33,900	5,160	15,700	3.76	4.34	C.
April	9,010	3,150	5,000	1.20	1.34	B.
May	9,870	2,910	5,630	1.35	1.56	B.
June	10,300	3,070	4,990	1.19	1.33	B.
July	10,400	2,270	5,030	1.20	1.38	B.
August	12,700	1,680	5,470	1.31	1.51	B.
September	6,290	1,500	2,820	.675	.75	B.
October	7,390	1,620	2,580	.617	.71	B.
November	3,740	1,820	2,090	.500	.56	B.
December	4,260	1,820	2,930	.701	.81	B.
The year	33,900	1,500	5,630	1.35	18.22	

NOTE.—The above estimates for 1907 and 1908 are based on the assumption that the measurement of April 19, 1907, indicated a shift in the channel conditions and affected both years. The monthly estimates are more or less uncertain, especially at low stages.

The monthly estimates for 1909 are more reliable than those for 1907 and 1908, but are still not good, owing to the lack of sufficient measurements to fully define the rating curve. Channel conditions were probably back to normal during the latter part of 1909.

EASTERN GULF OF MEXICO DRAINAGE.

APALACHICOLA RIVER DRAINAGE BASIN.

DESCRIPTION.

The Apalachicola basin is drained almost entirely by Chattahoochee and Flint rivers. These two main streams unite at the extreme southwest corner of Georgia to form Apalachicola River, which flows southward through Florida and empties into the Gulf of Mexico at Apalachicola. The basin is about 350 miles long and comprises an area of 19,500 square miles.

Chattahoochee River rises in the Blue Ridge Mountains in Lumpkin, White, and Habersham counties, Ga., near the northeast corner of the State, and flows southwesterly until it reaches the Alabama line at West Point, Ga., thence it flows southward, forming the western boundary of Georgia, until it reaches Apalachicola River at the southern boundary of the State. Its upper tributaries are Chestatee and Soque rivers, which join the Chattahoochee in Hall and Habersham counties, respectively. The basin of the Chattahoochee River which is slightly larger than that of the Flint, is peculiarly narrow, especially for the portion in the mountain and plateau regions. It lies between two ridges higher than the country on either side, like two great levees rescuing its water from the many encroaching tributaries of the Tallulah, Broad, Oconee, Ocmulgee, and Flint rivers on the south, and the Ocoee, Etowah, and Tallapoosa rivers on the north. The fall line is well defined at Columbus, Ga., where the river may be said to break through the southern rim of its plateau basin. The greatest amount of fall after leaving the small headwater streams occurs at and immediately above Columbus. The mountain portion of the basin, above Gainesville, Ga., is largely in forests and contains much land too steep for cultivation. The Piedmont Plateau and Coastal Plain areas are mostly cleared.

Flint River rises in Fulton County, Ga., a few miles south of Atlanta, and flows in a southerly direction to Apalachicola River. It drains the south central portion of Georgia, extending from Atlanta south to the Florida line. The principal tributaries of Flint are Whitewater, Elkins, Big Potato, Muckalee, Kinchafoonee, Ichawaynochaway, and Spring creeks. The upper portion of the Flint drains the granitic areas of the Piedmont Plateau, passing to the quartzites on the southern border, and, with less change in elevation than other Georgia streams, into Coastal Plain. The fall line is not so well defined as it is on the Chattahoochee River. The entire basin of the Flint is an agricultural country, and the lands are mostly cleared, both in the Plateau and Coastal Plain areas. Their roughest section containing the most waste lands is the pine moun-

tain region at the southern border of the Piedmont Plateau. An unusual feature of the regimen of its flow is that the lower area contributes more low-water flow per square mile than the upper portions. The river at Albany has a greater minimum run-off per square mile than it has at Woodbury.

The mean annual rainfall for the Apalachicola basin is about 50 inches, except for the upper portion of the Chattahoochee drainage, where it reaches 60 inches.

Opportunities for water-power development are great, and in most parts of the basin the demand for power is good.

The following special reports contain information regarding the hydrography of the Apalachicola River basin:

Water resources of Georgia, by B. M. and M. R. Hall: Water-Supply Paper, U. S. Geol. Survey No. 197. This contains data on stream flow, river surveys, and water power collected prior to 1906.

River surveys and profiles made during 1903, by W. C. Hall and J. C. Hoyt: Water-Supply Paper U. S. Geol. Survey No. 115. This report and separate sheets showing Catawba and Broad river profiles may be obtained by applying to the director, United States Geological Survey, Washington, D. C.

Relation of Southern Appalachian Mountains to the development of inland water navigation and water power: United States Forest Service circulars Nos. 143 and 144.

The following gaging stations have been maintained in this river basin:

Chattahoochee River near Aerial, 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., 1902–1909.
Chattahoochee River near Oakdale, Ga., 1895–1904.
Chattahoochee River at West Point, Ga., 1896–1909.
Chattahoochee River at Alaga, Ala., 1908–9.
Soque River near Demorest, Ga., 1904–1909.
Sweetwater Creek near Austell, Ga., 1904–5.
Flint River near Woodbury, Ga., 1900–1909.
Flint River near Mussela, Ga., 1907.
Flint River near Montezuma, Ga., 1905–1909.
Flint River at Albany, Ga., 1902–1909.
Flint River at Bainbridge, Ga., 1908–9.
Muckalee Creek near Albany, Ga., 1903.
Kinchafoonee Creek near Leesburg, Ga., 1905–1909.
Kinchafoonee Creek near Albany, Ga., 1903.
Ichawaynochaway Creek at Milford, Ga., 1905–1907.

CHATTAHOOCHEE RIVER NEAR AERIAL, GA.

The station, which is located at the highway bridge 2 miles south of Aerial, 7 miles west of Clarksville, and one-half mile above the mouth of Amy Creek, was established July 16, 1907, in cooperation with the United States Forest Service, and was discontinued June 30,

1909. The flow is probably slightly affected by the use of the water at some mills above.

The vertical staff gage is located 200 feet below the bridge. The datum has remained the same since the establishment of the station. A good rating has been developed for low stages.

The following discharge measurement was made by M. R. Hall:

June 12, 1909: Width, 84 feet; area, 245 square feet; gage height, 2.45 feet; discharge, 631 second-feet.

Daily gage height, in feet, of Chattahoochee River near Aerial, Ga., for 1909.

[G. P. Smith, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	1.6	1.5	2.2	2.35	5.7	2.2	16	2.3	2.8	3.1	2.1	2.0	2.35
2	1.55	1.5	2.4	2.3	3.0	2.2	17	2.6	2.4	2.9	2.1	1.95	2.35
3	1.5	1.6	2.4	2.3	2.6	3.0	18	2.2	2.3	2.75	2.05	1.9	2.3
4	1.6	1.6	2.1	2.2	2.5	(a)	19	2.0	2.3	2.6	2.0	1.9	2.2
5	4.1	1.55	2.1	2.2	2.35	3.9	20	1.9	2.4	2.65	2.0	7.8	2.2
6	2.3	1.95	2.35	2.15	2.25	3.2	21	1.85	2.2	2.55	2.0	5.8	2.2
7	2.0	1.7	2.3	2.2	2.2	3.0	22	1.8	3.4	2.5	1.95	4.6	2.5
8	1.9	1.6	2.2	2.1	2.15	3.0	23	1.8	3.9	2.4	2.25	3.4	2.3
9	1.8	1.6	2.1	2.2	2.1	2.7	24	1.8	3.1	2.35	2.05	3.0	2.2
10	1.75	4.2	3.7	2.1	3.6	2.6	25	1.75	2.7	4.1	2.0	2.7	2.3
11	1.7	2.4	2.6	2.1	2.2	2.55	26	1.7	2.5	2.7	2.2	2.6	2.2
12	1.7	2.1	2.55	2.05	2.1	2.5	27	1.7	2.4	2.5	2.1	2.7	2.5
13	1.6	2.7	7.8	2.4	2.05	2.4	28	1.65	2.3	4.0	2.2	2.5	2.5
14	1.8	2.45	4.5	2.3	2.0	2.35	29	1.7	.....	2.7	2.1	2.4	2.35
15	1.8	2.35	3.5	2.2	2.0	2.5	30	1.6	.....	2.55	2.1	2.4	2.2
							31	1.5	.....	2.45	.....	2.3	.....

a Water over the gage June 4.

Daily discharge, in second-feet, of Chattahoochee River near Aerial, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	280	250	510	580	.....	510	16	555	825	.....	465	420	580
2	265	250	605	555	945	510	17	710	605	885	465	400	580
3	250	280	665	555	710	945	18	510	555	795	444	380	555
4	280	280	465	510	655	.....	19	420	555	710	420	380	510
5	.....	265	465	510	580	.....	20	380	605	738	420	.....	510
6	555	400	580	488	532	.....	21	362	510	682	420	.....	510
7	420	310	555	510	510	945	22	345	.....	655	400	.....	655
8	380	280	510	465	488	945	23	345	.....	605	532	.....	555
9	345	280	465	510	465	765	24	345	.....	580	444	945	510
10	328	.....	.....	465	.....	710	25	328	765	.....	420	765	555
11	310	605	710	465	510	682	26	310	655	765	510	710	510
12	310	465	682	444	465	655	27	310	605	655	465	765	655
13	280	765	.....	605	444	605	28	295	555	.....	510	655	655
14	345	630	.....	555	420	580	29	310	.....	765	465	605	580
15	345	580	.....	510	420	655	30	280	.....	682	465	605	510
							31	250	.....	630	.....	555	.....

NOTE.—These discharges are based on a rating curve that is fairly well defined below 945 second-feet. Discharges for missing days, January to June, were greater than 945 second-feet.

CHATTAHOOCHEE RIVER NEAR NORCROSS, GA.

The station, which is located at Medlocks Bridge, about 4½ miles north of Norcross, 1½ miles above the mouth of John Creek, and 5 miles below the mouth of Suwanee Creek, was established January

9, 1903, to take the place of the Oakdale station about 30 miles below, which was maintained from July 30, 1896, to May 31, 1904, when its records became unreliable on account of the Bull Sluice power plant above.

Artificially controlled flow from water powers above causes some daily fluctuation in gage heights. To eliminate the error from this source the gage is read twice a day.

The original gage was a vertical staff attached to an oak tree on the right bank about 100 feet above the gage. A chain gage, established March 14, 1903, was read in connection with the vertical gage until June 28, 1905, when a standard chain gage was installed on the toll bridge. The datum of the vertical staff gage originally used and of the present chain gage has not been changed.

The 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. The bed of the stream is sandy and changeable, necessitating frequent discharge measurements and occasional changes in the rating.

Discharge measurements of Chattahoochee River near Norcross, Ga., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 4	W. A. Lamb	161	1,150	2.72	1,580
Do	M. R. Hall	161	1,150	2.72	1,670
May 18	do	166	1,400	3.54	2,400
Do	Hall and Swett	166	1,410	3.51	2,400
August 4	Hall and Thomas	180	1,970	7.06	6,540
Do	do	180	2,070	7.53	7,280
September 8	E. H. Swett	167	1,140	2.26	1,330
Do	do	167	1,140	2.26	1,330
October 23	M. R. Hall	165	1,140	2.67	1,630
Do	do	165	1,150	2.70	1,600
November 5	E. H. Swett	168	1,120	2.25	1,270
Do	do	168	1,120	2.24	1,290

Daily gage height, in feet, of Chattahoochee River near Norcross, Ga., for 1909.

[W. O. Medlock, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.05	2.7	4.0	4.4	12.8	3.85	3.75	3.0	2.3	2.4	2.3	2.15
2	2.85	2.7	4.6	4.3	10.8	3.7	3.7	3.2	2.2	2.3	2.3	2.1
3	2.7	2.75	4.4	4.2	5.8	4.9	3.6	7.2	2.2	2.3	2.4	2.15
4	2.8	2.7	3.95	4.1	5.0	8.6	3.65	6.4	2.2	2.25	2.3	2.15
5	8.9	2.7	3.75	4.0	4.6	10.2	3.3	4.4	2.25	2.2	2.25	2.1
6	7.5	3.1	4.8	4.0	4.4	6.1	3.3	3.65	2.3	2.2	2.2	2.1
7	4.4	3.15	5.4	4.1	4.2	5.2	3.45	3.6	2.25	2.5	2.2	4.4
8	3.7	2.85	4.4	4.2	4.0	4.7	6.7	3.4	2.25	2.25	2.2	6.4
9	3.35	3.2	3.95	4.2	3.9	4.5	5.4	3.2	2.3	2.2	2.2	3.75
10	3.25	8.7	10.5	4.1	4.1	4.2	4.8	3.05	2.5	2.2	2.2	3.0
11	3.15	7.2	7.8	3.85	4.6	4.2	4.1	3.1	2.5	2.4	2.2	2.7
12	3.05	4.5	7.0	3.8	3.85	4.0	3.7	2.9	2.3	2.8	2.2	2.6
13	3.0	5.8	9.8	3.9	3.7	3.95	3.5	2.85	2.25	2.4	2.2	3.3
14	3.0	5.8	14.4	4.3	3.6	4.0	5.1	3.1	2.25	2.35	2.2	6.6
15	3.25	5.4	11.6	4.0	3.6	5.2	4.8	3.45	2.2	6.6	2.1	4.2

Daily gage height, in feet, of Chattahoochee River near Norcross, Ga., for 1909—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	5.0	7.2	6.9	3.85	3.6	4.2	3.65	3.6	3.25	4.4	2.15	3.45
17	7.1	5.6	6.0	3.75	3.75	4.6	3.7	3.15	2.7	2.9	2.25	3.1
18	5.1	4.4	5.5	3.7	3.55	4.2	3.55	2.85	2.7	2.6	2.5	2.9
19	4.0	4.8	5.2	3.6	3.45	4.0	3.25	2.7	2.8	2.5	2.3	2.85
20	3.65	5.3	5.2	3.6	5.8	3.65	3.1	2.6	2.3	2.4	2.2	2.9
21	3.45	4.4	5.9	3.6	9.6	3.7	3.05	2.6	2.45	4.4	2.2	2.75
22	3.3	7.6	5.0	3.6	9.8	4.4	3.0	2.5	2.5	3.3	2.2	2.6
23	3.2	10.6	4.6	4.2	7.6	4.4	3.55	2.4	7.8	2.7	2.65	2.55
24	3.2	8.4	4.5	4.6	5.6	4.0	3.6	2.4	7.5	2.6	2.7	2.5
25	3.15	6.3	6.2	3.85	4.8	4.3	3.15	2.4	4.2	2.4	2.4	3.2
26	3.05	5.2	6.7	3.95	4.6	4.0	2.95	2.4	3.0	2.4	2.25	3.35
27	3.0	4.6	5.0	4.5	5.0	5.6	2.9	2.35	2.75	2.4	2.2	3.2
28	2.9	4.4	5.2	5.0	4.7	5.6	3.05	2.3	2.55	2.3	2.15	2.9
29	2.9	.....	6.4	4.2	4.2	5.0	2.9	2.3	2.5	2.3	2.1	2.75
30	2.9	.....	4.9	4.2	4.0	4.2	3.85	2.25	2.4	2.3	2.15	2.55
31	2.8	.....	4.6	.....	3.95	.....	3.3	2.3	.....	2.3	.....	2.4

Daily discharge, in second-feet, of Chattahoochee River near Norcross, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,960	1,640	2,870	3,270	16,100	2,720	2,620	1,910	1,300	1,380	1,300	1,170
2	1,780	1,640	3,480	3,170	12,600	2,570	2,570	2,090	1,220	1,300	1,300	1,130
3	1,640	1,680	3,270	3,070	4,900	3,820	2,470	6,790	1,220	1,300	1,380	1,170
4	1,730	1,640	2,820	2,970	3,940	8,960	2,520	5,670	1,220	1,260	1,300	1,170
5	9,440	1,640	2,620	2,870	3,480	11,600	2,180	3,270	1,260	1,220	1,260	1,130
6	7,240	2,000	3,700	2,870	3,270	5,280	2,180	2,520	1,300	1,220	1,220	1,130
7	3,270	2,040	4,420	2,970	3,070	4,180	2,320	2,470	1,260	1,470	1,220	3,270
8	2,570	1,780	3,270	3,070	2,870	3,590	6,080	2,270	1,260	1,260	1,220	5,670
9	2,220	2,090	2,820	3,070	2,770	3,370	4,420	2,090	1,300	1,220	1,220	2,620
10	2,140	9,120	12,100	2,970	2,970	3,070	3,700	1,960	1,470	1,220	1,220	1,910
11	2,040	6,790	7,690	2,720	3,480	3,070	2,970	2,000	1,470	1,380	1,220	1,640
12	1,960	3,370	6,500	2,670	2,720	2,870	2,570	1,820	1,300	1,730	1,220	1,560
13	1,910	4,900	10,900	2,770	2,570	2,820	2,370	1,780	1,260	1,380	1,220	2,180
14	1,910	4,900	19,000	3,170	2,470	2,870	4,060	2,000	1,260	1,340	1,220	5,940
15	2,140	4,420	14,000	2,870	2,470	4,180	3,700	2,320	1,220	5,940	1,130	3,070
16	3,940	6,790	6,360	2,720	2,470	3,070	2,520	2,470	2,140	3,270	1,170	2,320
17	6,640	4,660	5,150	2,620	2,620	3,480	2,570	2,040	1,640	1,820	1,260	2,000
18	4,060	3,270	4,540	2,570	2,420	3,070	2,420	1,780	1,640	1,560	1,470	1,820
19	2,870	3,700	4,180	2,470	2,320	2,870	2,140	1,640	1,730	1,470	1,300	1,780
20	2,520	4,300	4,180	2,470	4,900	2,520	2,000	1,560	1,300	1,380	1,220	1,820
21	2,320	3,270	5,020	2,470	10,600	2,570	1,960	1,560	1,430	3,270	1,220	1,680
22	2,180	7,390	3,940	2,470	10,900	3,270	1,910	1,470	1,470	2,180	1,220	1,560
23	2,090	12,300	3,480	3,070	7,390	3,270	2,420	1,380	7,690	1,640	1,600	1,510
24	2,090	8,640	3,370	3,480	4,660	2,870	2,470	1,380	7,240	1,560	1,640	1,470
25	2,040	5,540	5,410	2,720	3,700	3,170	2,040	1,380	3,070	1,380	1,380	2,090
26	1,960	4,180	6,080	2,820	3,480	2,870	1,860	1,380	1,910	1,380	1,260	2,220
27	1,910	3,480	3,940	3,370	3,940	4,660	1,820	1,340	1,680	1,380	1,220	2,090
28	1,820	3,270	4,180	3,940	3,590	4,660	1,960	1,300	1,510	1,300	1,170	1,820
29	1,820	.....	5,670	3,070	3,070	3,940	1,820	1,300	1,470	1,300	1,130	1,680
30	1,820	.....	3,820	3,070	2,870	3,070	2,720	1,260	1,380	1,300	1,170	1,510
31	1,730	.....	3,480	.....	2,820	.....	2,180	1,300	.....	1,300	.....	1,380

NOTE.—These discharges are based on a rating curve that is well defined below discharge 8,000 second-feet.

Monthly discharge of Chattahoochee River near Norcross, Ga., for 1909.

[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.		
January	9,440	1.640	2,770	2.37	2.73	A.
February	12,300	1,640	4,300	3.68	3.83	A.
March	19,000	2,620	5,560	4.75	5.48	A.
April	3,940	2,470	2,930	2.50	2.79	A.
May	16,100	2,320	4,560	3.90	4.50	A.
June	11,600	2,520	3,810	3.26	3.64	A.
July	6,080	1,820	2,630	2.25	2.59	A.
August	6,790	1,260	2,110	1.80	2.08	A.
September	7,690	1,220	1,890	1.62	1.81	A.
October	5,940	1,220	1,680	1.44	1.66	A.
November	1,640	1,130	1,270	1.09	1.22	A.
December	5,940	1,130	2,050	1.75	2.02	A.
The year	19,000	1,130	2,960	2.53	34.35	

CHATTAHOOCHEE RIVER AT WEST POINT, GA.

The station, which is located at the Montgomery Street Bridge in West Point, was established July 30, 1896, for the purpose of obtaining run-off data especially valuable for estimating the water power afforded by the river, the best of which occurs in the 35 miles lying between West Point and Columbus, Ga.

The operation of power plants above causes some fluctuations of flow at low stages, but is not thought to seriously affect the mean gage height, as the gage is read twice a day.

The chain gage is attached to the hand rail of the downstream footway, from which measurements are made. Its datum has remained the same since the station was established.

The right bank is high and overflows only at high water, when most of the town is flooded; the left bank is somewhat lower and overflows for about 800 feet at a gage height of 20 feet. Conditions at this point are practically permanent and a good rating has been developed.

Discharge measurements of Chattahoochee River at West Point, Ga., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 2	M. R. Hall	387	4,120	4.70	6,890
April 3	do	387	4,080	4.58	6,670
June 3	E. H. Swett	386	4,410	5.08	7,840
June 5	do	391	5,530	8.00	14,900
August 24	F. P. Thomas	386	3,450	2.70	3,130
August 25	do	386	3,460	2.80	3,150
Do	do	386	3,430	2.70	3,020
August 26	do	386	3,310	2.42	2,580
Do	do	386	3,350	2.50	2,620
August 27	do	386	3,340	2.69	2,900
Do	do	386	3,430	2.70	2,910

Daily gage height, in feet, of Chattahoochee River at West Point, Ga., for 1909.

[A. V. Dunn, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.5	2.9	4.8	5.0	7.6	4.8	4.4	4.1	4.9	2.2	2.4	2.5
2	3.4	2.9	4.6	4.8	11.0	4.3	3.9	3.5	3.05	2.2	2.55	2.5
3	3.2	2.95	4.7	4.6	11.7	5.4	3.8	8.7	2.85	2.4	2.8	2.5
4	3.15	2.9	4.8	4.5	9.8	8.7	4.0	15.5	2.65	2.3	2.55	2.65
5	3.1	2.9	4.4	4.4	5.8	8.1	3.4	12.0	2.55	2.25	2.5	2.75
6	5.8	4.4	4.4	4.3	5.1	8.9	3.4	8.8	2.45	2.3	2.55	2.55
7	7.7	4.6	5.5	4.4	4.8	7.5	3.7	7.8	2.35	2.3	2.55	2.9
8	5.6	3.9	6.6	4.8	4.4	5.3	4.0	5.4	2.3	2.3	2.6	4.2
9	4.3	3.8	6.0	4.9	4.3	4.7	6.4	4.8	2.55	2.4	2.45	5.4
10	3.75	11.1	16.0	4.8	6.7	4.3	7.2	4.5	2.6	2.35	2.25	5.2
11	3.5	12.2	15.6	4.4	5.5	4.2	5.5	4.0	2.6	2.2	2.35	4.0
12	3.4	9.4	15.0	4.3	4.7	4.1	4.5	3.6	2.9	2.3	2.4	3.7
13	3.35	7.5	19.0	4.5	4.4	4.0	4.0	4.1	2.8	2.3	2.45	6.0
14	3.45	9.5	17.2	5.0	4.1	3.9	4.5	5.0	2.3	2.55	2.5	5.8
15	3.5	10.8	14.9	4.8	3.9	4.4	4.0	5.4	2.3	3.1	2.4	5.2
16	3.65	14.4	13.6	4.6	4.1	4.6	4.7	4.4	2.9	5.9	2.3	5.2
17	4.6	13.4	12.2	4.3	4.3	4.8	4.3	4.2	2.75	5.4	2.7	4.2
18	5.9	8.2	7.0	4.1	4.1	4.4	3.9	3.7	3.15	3.9	2.9	3.8
19	5.8	7.0	6.4	4.0	3.9	4.3	3.55	3.3	3.4	3.15	2.7	3.7
20	4.6	7.2	8.2	3.9	4.2	4.3	3.4	3.15	3.05	3.0	2.7	3.75
21	4.0	6.5	13.0	3.85	4.6	5.0	3.15	2.9	2.7	2.9	2.85	3.55
22	3.7	8.8	10.4	3.8	6.2	5.6	3.9	2.8	2.7	3.6	2.7	3.5
23	3.55	9.0	7.5	5.4	7.4	4.9	3.3	2.75	2.7	4.2	3.25	3.35
24	3.5	10.7	6.0	9.2	7.0	4.8	3.75	2.65	3.9	3.5	4.1	3.4
25	3.3	10.0	5.9	6.6	5.8	4.9	3.55	2.7	6.6	3.1	3.6	3.85
26	3.3	7.4	6.2	7.6	5.0	4.4	3.4	2.45	5.0	2.75	3.1	4.5
27	3.2	6.0	6.8	6.4	5.4	4.4	3.15	2.6	3.5	2.75	2.95	4.0
28	3.1	5.2	6.0	6.8	5.2	4.1	3.1	2.5	3.0	2.6	2.75	3.95
29	3.05	.....	5.8	6.4	5.0	5.6	3.1	2.5	2.9	2.5	2.5	3.6
30	3.05	.....	5.9	5.5	4.6	4.9	3.75	2.4	2.8	2.5	2.5	3.4
31	2.95	.....	5.6	.....	4.3	.....	4.1	6.3	.....	2.5	.....	3.25

Daily discharge, in second-feet, of Chattahoochee River at West Point, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,280	3,170	7,060	7,520	13,900	7,060	6,170	5,510	7,290	2,100	2,380	2,530
2	4,080	3,170	6,610	7,060	23,900	5,950	5,090	4,280	3,430	2,100	2,600	2,530
3	3,700	3,260	6,830	6,610	26,100	8,440	4,880	16,900	3,080	2,380	3,000	2,530
4	3,610	3,170	7,060	6,390	20,100	16,900	5,300	39,100	2,760	2,240	2,600	2,760
5	3,520	3,170	6,170	6,170	9,400	15,200	4,080	27,100	2,600	2,170	2,530	2,920
6	9,400	6,170	6,170	5,950	7,750	17,400	4,080	17,200	2,460	2,240	2,600	2,600
7	14,100	6,610	8,680	6,170	7,060	13,600	4,680	14,400	2,310	2,240	2,600	3,170
8	8,920	5,090	11,300	7,060	6,170	8,210	5,300	8,440	2,240	2,240	2,680	5,730
9	5,950	4,880	9,880	7,290	5,950	6,830	10,800	7,060	2,600	2,380	2,460	8,440
10	4,780	24,200	40,800	7,060	11,600	5,950	12,800	6,390	2,680	2,310	2,170	7,980
11	4,280	27,800	39,400	6,170	8,680	5,730	8,680	5,300	2,680	2,100	2,310	5,300
12	4,080	18,900	37,400	5,950	6,830	5,510	6,390	4,480	3,170	2,240	2,380	4,680
13	3,980	13,600	51,200	6,390	6,170	5,300	5,300	5,510	3,000	2,240	2,460	9,880
14	4,180	19,200	44,900	7,520	5,510	5,090	6,390	7,520	2,240	2,600	2,530	9,400
15	4,280	23,200	37,000	7,060	5,090	6,170	5,300	8,440	2,240	3,520	2,380	7,980
16	4,580	35,300	32,500	6,610	5,510	6,610	6,830	6,170	3,170	9,640	2,240	7,980
17	6,610	31,900	27,800	5,950	5,950	7,060	5,950	5,730	2,920	8,440	2,840	5,730
18	9,640	15,400	12,300	5,510	5,510	6,170	5,090	4,680	3,610	5,090	3,170	4,880
19	9,400	12,300	10,800	5,300	5,090	5,950	4,380	3,890	4,080	3,610	2,840	4,680
20	6,640	12,800	15,400	5,090	5,730	5,950	4,080	3,610	3,430	3,340	2,840	4,780
21	5,300	11,100	30,500	4,980	6,610	7,520	3,610	3,170	2,840	3,170	3,080	4,380
22	4,680	17,200	21,900	4,880	10,400	8,920	5,090	3,000	2,840	4,480	2,840	4,280
23	4,380	17,700	13,600	8,440	13,300	7,290	3,890	2,920	2,840	5,730	3,800	3,980
24	4,280	22,900	9,880	18,300	12,300	7,060	4,780	2,760	5,090	4,280	5,510	4,080
25	3,890	20,700	9,640	11,300	9,400	7,290	4,380	2,840	11,300	3,520	4,480	4,980
26	3,890	13,300	10,400	13,900	7,520	6,170	4,080	2,460	7,520	2,920	3,520	6,390
27	3,700	9,880	11,800	10,800	8,440	6,170	3,610	2,680	4,280	2,920	3,260	5,300
28	3,520	7,980	9,880	11,800	7,980	5,510	3,520	2,530	3,340	2,680	2,920	5,200
29	3,430	.....	9,400	10,800	7,520	8,920	3,520	2,530	3,170	2,530	2,530	4,480
30	3,430	.....	9,640	8,680	6,610	7,290	4,780	2,380	3,000	2,530	2,530	4,080
31	3,260	.....	8,920	.....	5,950	.....	5,510	10,600	.....	2,530	.....	3,800

NOTE.—These discharges are based on a rating curve that is well defined.

Monthly discharge of Chattahoochee River at West Point, Ga., for 1909.

[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.		
January	14,100	3,260	5,280	1.60	1.84	A.
February	35,300	3,170	14,100	4.27	4.45	A.
March	51,200	6,170	18,200	5.52	6.36	A.
April	18,300	4,880	7,760	2.35	2.62	A.
May	26,100	5,090	9,290	2.82	3.25	A.
June	17,400	5,090	7,910	2.40	2.68	A.
July	12,800	3,520	5,430	1.65	1.90	A.
August	39,100	2,380	7,730	2.34	2.70	A.
September	11,300	2,240	3,610	1.09	1.22	A.
October	9,640	2,100	3,310	1.00	1.15	A.
November	5,510	2,170	2,870	.870	.97	A.
December	9,880	2,530	5,080	1.54	1.78	A.
The year	51,200	2,100	7,550	2.29	30.92	

CHATTAHOOCHEE RIVER AT ALAGA, ALA.

This station, which is located at the Atlantic Coast Line Railway bridge, one-fourth mile east of Alaga, 4 miles east of Gordon, and one-half mile west of Saffold, Ga., is about 35 miles above the junction of Chattahoochee and Flint rivers. The station was originally established in 1904 by the United States Weather Bureau, and discharge measurements were begun by the United States Geological Survey June 15, 1908. On this date the gage-chain length was determined, and its datum referred to a reference point on the iron bridge, accepting the chain length as it was. The original datum could not be determined, although the chain had no doubt stretched somewhat.

The river is navigable from its mouth to Columbus, Ga., a long distance above the station. Conditions of flow are probably changing on account of silting of the river bed.

Only three low-water measurements have been made at this station, one in 1908 and two in 1909. No rating curve has yet been developed.

Discharge measurements of Chattahoochee River at Alaga, Ala., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 3	E. H. Swett	265	4,440	7.35	9,940
November 30	do	246	3,460	2.77	4,530

Daily gage height, in feet, of Chattahoochee River at Alaga, Ala., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.3	4.0	11.2	11.7	14.0	8.7	8.0	6.6	2.8	3.6	2.3	2.7
2	5.3	3.9	9.9	11.1	15.4	7.8	8.3	7.6	4.8	3.2	2.3	2.7
3	5.3	3.8	9.2	10.2	19.5	7.7	7.4	7.6	8.7	3.2	2.3	2.6
4	5.2	3.8	8.6	9.7	20.4	8.7	7.2	8.0	5.4	2.6	2.6	2.5
5	4.9	3.8	8.5	9.2	19.8	15.4	6.4	13.8	3.8	2.1	2.6	2.5
6	4.9	3.8	8.4	9.0	17.8	19.2	6.1	21.3	3.5	2.3	3.0	2.4
7	4.7	4.9	8.3	8.8	14.2	16.5	5.6	20.7	3.3	2.6	2.8	2.6
8	6.3	6.5	8.4	9.1	11.5	14.9	5.2	16.4	3.1	2.3	2.6	3.4
9	10.8	7.6	9.5	9.5	10.0	13.3	5.6	14.6	3.0	2.2	2.4	3.9
10	9.5	7.4	13.4	10.7	9.0	10.0	9.6	12.2	3.1	3.2	2.4	3.8
11	7.2	21.6	20.2	10.5	8.4	8.3	12.8	9.3	3.0	2.1	2.6	5.6
12	6.0	27.6	28.5	9.6	11.3	7.6	12.8	8.2	3.4	2.1	2.6	7.1
13	5.6	26.5	31.1	8.9	11.9	7.2	9.4	7.3	3.2	2.3	2.3	6.3
14	5.3	20.2	31.8	8.8	9.3	6.8	9.1	6.5	3.0	2.5	2.1	5.3
15	5.2	15.0	33.7	9.3	8.1	7.6	9.7	6.5	3.6	2.3	2.3	8.0
16	5.0	19.7	35.3	9.7	7.3	7.6	9.7	7.1	3.5	2.1	2.3	9.3
17	5.1	26.1	34.4	9.2	6.9	7.8	7.9	8.7	3.1	2.5	2.3	7.5
18	5.2	27.9	30.5	8.5	7.3	7.9	7.7	7.7	3.5	4.0	2.5	7.5
19	6.5	25.9	24.6	8.0	7.9	7.6	7.8	6.8	4.4	7.5	2.3	6.5
20	8.4	20.5	16.4	7.5	8.1	7.7	7.3	6.0	4.2	6.2	2.5	5.6
21	9.0	18.2	21.6	7.4	9.0	7.1	7.0	5.4	4.4	4.5	3.0	5.1
22	7.8	16.0	31.1	7.1	9.0	8.2	6.1	4.6	4.5	3.8	2.8	5.0
23	6.5	14.3	33.5	6.9	9.3	10.2	6.5	4.2	4.2	3.4	2.5	4.9
24	5.5	16.3	30.8	7.1	9.5	11.2	7.5	3.8	4.0	3.5	2.8	4.5
25	5.3	17.6	21.8	9.0	11.3	9.8	7.2	3.7	4.4	4.5	3.3	4.2
26	5.0	17.8	15.1	14.2	12.0	8.2	7.0	3.6	5.4	4.9	4.5	4.2
27	5.0	17.0	13.6	15.1	11.5	8.0	6.1	3.4	7.9	4.1	4.8	4.6
28	4.7	13.8	13.2	16.3	10.6	7.9	5.6	3.3	8.1	3.5	4.0	5.6
29	4.6	.....	13.2	16.9	9.9	7.2	5.1	3.1	6.0	3.1	3.4	5.9
30	4.4	.....	13.2	15.8	10.4	7.9	4.8	3.0	4.2	2.7	2.9	5.0
31	4.0	.....	12.5	.....	9.3	.....	5.0	2.9	.....	2 7	.....	4.8

SOQUE RIVER NEAR DEMOREST, GA.

This station, which is located at Cannon Bridge, 2½ miles from Demorest, about 4 miles above the mouth of the river and 1½ miles below the mouth of Hazel Creek, was established July 16, 1904, principally to obtain data for water-power estimates.

Artificial control of flow caused by a power plant above has very probably affected the records to some extent, but it is difficult to say how much or in which direction. The error thus introduced is not thought to be great. The station was on this account discontinued June 30, 1909.

The datum of the vertical staff gage, which is attached to the bridge from which discharge measurements are made, remained the same during the continuance of the station.

Both banks are high, but the right bank overflows at extreme high water. Conditions of flow at this point are permanent, and a good rating has been developed for low and medium stages.

The following discharge measurement was made by M. R. Hall:

June 12, 1909: Width, 83 feet; area, 282 square feet; gage height, 2.90 feet; discharge, 525 second-feet.

Daily gage height, in feet, of Soque River near Demorest, Ga., for 1909.

[Charles Cannon, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	2.5	2.4	2.6	2.7	9.0	2.7	16	3.3	2.65	3.8	2.7	2.6	5.7
2	2.4	2.35	2.7	2.65	3.4	2.7	17	3.9	2.65	3.0	2.7	2.5	3.4
3	2.2	2.35	2.65	2.6	3.0	3.6	18	2.85	2.6	3.0	2.65	2.45	3.2
4	2.8	2.35	2.65	2.6	2.9	6.2	19	2.65	2.95	2.9	2.65	2.5	2.9
5	6.0	2.4	2.6	2.65	2.85	7.2	20	2.5	2.7	2.85	2.65	7.0	2.8
6	2.75	3.0	2.8	2.65	2.8	3.0	21	2.5	2.8	3.0	2.6	8.4	3.1
7	2.5	3.2	2.75	2.7	2.8	2.8	22	2.5	5.6	3.0	2.6	6.6	3.2
8	2.45	4.4	2.7	2.8	2.8	2.5	23	2.55	3.8	3.0	3.0	4.1	3.2
9	2.5	4.8	2.75	2.85	2.8	2.45	24	2.5	4.2	2.9	2.8	2.9	3.2
10	2.45	3.5	5.2	2.75	3.3	2.4	25	2.5	3.0	4.3	2.8	2.85	4.4
11	2.45	2.95	2.95	2.7	2.95	2.45	26	2.5	2.7	4.1	2.75	3.0	3.9
12	2.45	2.85	2.8	2.7	2.8	2.4	27	2.45	2.65	3.0	2.75	2.9	3.1
13	2.5	4.0	7.6	3.0	2.8	2.8	28	2.45	2.65	5.0	2.7	2.8	4.7
14	2.7	2.8	5.9	2.95	2.75	4.7	29	2.45	.....	3.2	2.7	2.7	3.2
15	3.0	2.75	4.2	2.8	2.75	4.2	30	2.4	.....	2.9	2.7	3.0	3.2
							31	2.4	.....	2.85	.....	2.8	.....

Daily discharge, in second-feet, of Soque River near Demorest, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	393	361	426	460	4,780	460	16	685	443	905	460	426	2,000
2	361	346	460	443	725	460	17	950	443	568	460	393	725
3	300	346	443	426	568	815	18	513	426	568	443	377	645
4	495	346	443	426	531	2,370	19	443	550	531	443	393	531
5	2,220	361	426	443	513	3,170	20	393	460	513	443	3,000	495
6	478	568	495	443	495	568	21	393	495	568	426	4,240	606
7	393	645	478	460	495	495	22	393	1,930	568	426	2,680	645
8	377	1,200	460	495	495	393	23	410	905	568	568	1,050	645
9	393	1,420	478	513	495	377	24	393	1,100	531	495	531	645
10	377	770	1,660	478	685	361	25	393	568	1,150	495	513	1,200
11	377	550	550	460	550	377	26	393	460	1,050	478	568	950
12	377	513	495	460	495	361	27	377	443	568	478	531	606
13	393	1,000	3,520	568	495	495	28	377	443	1,540	460	495	1,360
14	460	495	2,140	550	478	1,360	29	377	.....	645	460	460	645
15	568	478	1,100	495	478	1,100	30	361	.....	531	460	568	645
							31	361	.....	513	.....	495	.....

NOTE.—These discharges are based on a rating curve that is well defined below 2,220 second-feet.

Monthly discharge of Soque River near Demorest, Ga., for 1909.

[Drainage area, 158 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	2,220	300	489	3.09	3.56	B.
February	1,930	346	645	4.08	4.25	B.
March	3,520	426	803	5.08	5.86	B.
April	568	426	470	2.97	3.31	B.
May	4,780	377	935	5.92	6.82	B.
June	3,170	361	850	5.38	6.00	B.

FLINT RIVER NEAR WOODBURY, GA.

This station, which is located at the Macon and Birmingham Railroad bridge 3 miles east of Woodbury, Ga., was established March 29, 1900. The data are especially valuable for water-power

estimates. The station is below the mouth of Elkins Creek and above Cane Creek.

The gage is read twice a day to eliminate or lessen the effect of fluctuations which may be caused by the operation of power plants above.

The vertical staff gage is located 300 feet above the Macon and Birmingham Railroad bridge, from which discharge measurements are usually made. The datum of the gage, which is 660 feet above sea level, has remained the same since the establishment of the station. 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. The bed is rough and irregular, and conditions of flow are practically permanent.

Discharge measurements of Flint River near Woodbury, Ga., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 5	M. R. Hall	277	1,060	1.42	1,150
June 30	E. H. Swett	282	1,320	2.28	2,290
October 26	M. R. Hall	273	873	.62	434

Daily gage height, in feet, of Flint River near Woodbury, Ga., for 1909.

[Rosa B. Craven, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.75	0.9	1.75	1.7	4.2	1.15	1.7	0.85	0.35	0.4	0.5	0.7
2	1.55	.9	1.75	1.55	3.8	1.0	1.7	1.25	.45	.4	.75	.7
3	1.35	.9	1.85	1.5	2.85	2.3	1.5	2.95	.35	.4	.8	.65
4	1.25	.9	1.75	1.4	2.35	3.2	1.1	4.0	.3	.35	.9	.65
5	1.25	.9	1.55	1.35	2.0	2.75	.....	4.2	.3	.3	.8	.6
6	1.35	2.05	1.55	1.3	1.7	2.4	2.0	3.2	.3	.3	.75	.7
7	1.4	2.55	2.25	1.55	1.35	1.7	1.95	2.35	.25	.3	.65	.75
8	1.35	2.25	2.45	1.75	1.3	1.45	2.05	2.0	.25	.35	.6	1.05
9	1.3	1.85	2.35	1.75	1.2	1.15	3.2	1.6	.3	.4	.6	1.05
10	1.2	6.0	7.4	1.65	3.0	1.0	3.0	1.45	.3	.3	.6	.9
11	1.1	6.2	7.2	1.5	2.75	.95	2.2	1.15	.2	.4	.6	.8
12	1.05	5.2	8.2	1.4	1.85	.9	1.7	1.1	.2	.45	.6	.85
13	1.1	4.1	10.4	1.5	1.35	1.25	1.25	2.15	.2	.35	.6	1.2
14	1.1	5.9	10.3	1.7	1.2	1.35	1.05	2.35	.2	.45	.6	1.6
15	1.2	6.3	8.8	1.6	1.05	1.35	1.0	2.7	.2	.65	.6	1.5
16	1.3	8.4	6.8	1.45	1.1	1.35	.85	2.35	.3	1.1	.6	1.4
17	1.65	7.2	4.5	1.3	1.45	1.2	.8	1.55	.7	1.0	.7	1.15
18	1.7	5.9	3.0	1.25	1.35	1.05	.85	1.35	.7	.95	.75	1.0
19	1.7	4.8	2.4	1.15	1.25	.95	.8	1.1	1.05	.95	.9	1.15
20	1.55	4.2	4.4	1.1	1.7	.95	.....	.85	.95	.9	.85	1.15
21	1.5	3.4	7.0	1.05	2.1	2.05	.6	.75	.65	.75	.75	1.2
22	1.35	4.4	7.6	1.0	1.6	2.45	.....	.6	1.05	.8	.7	1.1
23	1.3	4.3	5.0	1.1	1.35	2.05	.9	.6	.85	.75	.....	1.0
24	1.15	4.0	3.7	1.3	1.15	1.9	.95	.55	1.65	.75	1.25	.9
25	1.1	3.1	3.2	1.85	1.15	1.55	.8	.5	1.45	.75	1.4	1.15
26	1.1	2.6	2.7	2.95	1.25	1.4	.7	.4	1.15	.65	1.25	1.3
27	1.05	2.3	2.25	3.3	1.6	1.35	.6	.4	.95	.65	.95	1.4
28	1.0	1.95	2.15	3.1	1.6	1.15	.55	.4	.85	.6	.9	1.35
29	1.0	.....	2.15	2.35	1.45	1.25	1.95	.3	.6	.55	.85	1.2
30	1.0	.....	2.05	1.95	1.35	2.3	1.1	.3	.5	.5	.7	1.05
31	.9	.....	1.85	.....	1.3	.....	.9	.3	.....	.5	.....	.95

Daily discharge, in second-feet, of Flint River near Woodbury, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,580	665	1,580	1,520	5,140	890	1,520	620	282	310	365	495
2	1,320	665	1,580	1,320	4,480	755	1,520	980	338	310	535	495
3	1,080	665	1,710	1,260	3,070	2,310	1,260	3,210	282	310	575	460
4	980	665	1,580	1,140	2,380	3,560	845	4,800	255	282	665	460
5	980	665	1,320	1,080	1,900	2,930	1,370	5,140	255	255	575	425
6	1,080	1,970	1,320	1,020	1,520	2,440	1,900	3,560	255	255	535	495
7	1,140	2,650	2,240	1,320	1,080	1,520	1,840	2,380	228	255	460	535
8	1,080	2,240	2,510	1,580	1,020	1,200	1,970	1,900	228	282	425	800
9	1,020	1,710	2,380	1,580	935	890	3,560	1,380	255	310	425	800
10	935	8,450	11,800	1,450	3,280	755	3,280	1,200	255	255	425	665
11	845	8,880	11,200	1,260	2,930	710	2,180	890	200	310	425	575
12	800	6,880	13,800	1,140	1,710	665	1,520	845	200	338	425	620
13	845	4,970	19,200	1,260	1,080	980	980	2,110	200	282	425	935
14	845	8,240	19,000	1,520	935	1,080	800	2,380	200	338	425	1,380
15	935	9,100	15,200	1,380	800	1,080	755	2,860	200	460	425	1,260
16	1,020	14,200	10,300	1,200	845	1,080	620	2,380	255	845	425	1,140
17	1,450	11,200	5,650	1,020	1,200	935	575	1,320	495	755	495	890
18	1,520	8,240	3,280	980	1,080	800	620	1,080	495	710	535	755
19	1,520	6,160	2,440	890	980	710	575	845	800	710	665	890
20	1,320	5,140	5,480	845	1,520	710	500	620	710	665	620	890
21	1,260	3,850	10,800	800	2,040	1,970	425	535	460	535	535	935
22	1,080	5,480	12,200	755	1,380	2,510	545	425	800	575	495	845
23	1,020	5,310	6,520	845	1,080	1,970	665	425	620	535	738	755
24	890	4,800	4,320	1,020	890	1,780	710	395	1,450	535	980	665
25	845	3,420	3,560	1,710	890	1,320	575	365	1,200	535	1,140	890
26	845	2,720	2,860	3,210	980	1,140	495	310	890	460	980	1,020
27	800	2,310	2,240	3,700	1,380	1,080	425	310	710	460	710	1,140
28	755	1,840	2,110	3,420	1,380	890	395	310	620	425	665	1,080
29	755	.....	2,110	2,380	1,200	980	1,840	255	425	395	620	935
30	755	.....	1,970	1,840	1,080	2,310	845	255	365	365	495	800
31	665	.....	1,710	.....	1,020	.....	665	255	.....	365	.....	710

NOTE.—These discharges were obtained from a rating table that is fairly well defined below 6,500 second-feet. Discharges for days having no gage record interpolated.

Monthly discharge of Flint River near Woodbury, Ga., for 1909.

[Drainage area, 990 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,580	665	1,030	1.04	1.20	A.
February	14,200	665	4,750	4.80	5.00	A.
March	19,200	1,320	5,930	5.99	6.91	A.
April	3,700	755	1,480	1.49	1.66	A.
May	5,140	800	1,650	1.67	1.92	A.
June	3,560	665	1,400	1.41	1.57	A.
July	3,560	395	1,150	1.16	1.34	A.
August	5,140	255	1,430	1.44	1.66	A.
September	1,450	200	464	.469	.52	B.
October	845	255	433	.437	.50	B.
November	1,140	365	574	.580	.65	B.
December	1,380	425	798	.806	.93	A.
The year	19,200	200	1,760	1.77	23.86	

FLINT RIVER NEAR MONTEZUMA, GA.

The station, which is located at the iron highway bridge about 1 mile west of Montezuma, was established in 1904 by the United States Weather Bureau, by whom gage heights are supplied. Discharge

measurements were made by the United States Geological Survey during 1905 and succeeding years. The station records are of value for water-power estimates and other run-off studies.

The flow is not appreciably affected by artificial control.

The chain gage is attached to the upstream side of the bridge from which measurements are made. The datum of the gage has remained the same since the establishment of the station.

The right bank will overflow for a great distance at a stage of about 12 feet. The overflowed portion is largely covered with a dense growth of brush. The left bank is not liable to overflow. The current toward the left bank becomes sluggish at low stages, and at times there is considerable back current near the bank. Conditions of flow are permanent and a fairly good rating has been developed. The 1907 and 1908 data were purposely omitted from Water-Supply Paper 242 because they were so poor, especially for low-water periods. They are, however, included in this report as it is believed that they may be of sufficient value in preliminary investigations to warrant their publication. The high-water periods are probably fairly reliable. The data should be used with caution.

Discharge measurements of Flint River near Montezuma, Ga., in 1907–1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 16	F. A. Murray	295	1,350	3.62	1,800
Do	do	295	1,350	3.64	1,830
August 22	W. E. Hall	196	1,600	4.80	2,370
1908.					
January 3	W. E. Hall	1,750	5,160	14.05	10,300
1909.					
June 28	E. H. Swett	196	2,330	4.65	2,390
June 29	do	196	2,270	4.52	2,380
October 27	M. R. Hall	189	1,800	2.60	1,320
November 24	E. H. Swett	190	1,870	3.10	1,590
November 26	do	192	1,980	3.66	2,020

Daily gage height, in feet, of Flint River near Montezuma, Ga., for 1907–1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	6.7	5.4	6.0	3.6	10.0	3.7	7.9	4.9	2.0	5.3	0.3	9.3
2	8.0	6.7	7.2	3.8	9.5	3.6	11.6	5.4	1.4	4.3	.4	10.0
3	10.0	7.7	8.0	3.7	11.0	3.6	10.2	4.6	1.1	3.8	.6	9.6
4	9.4	9.1	9.4	3.7	10.5	3.5	8.2	4.4	1.0	3.5	.8	7.0
5	8.0	10.1	10.2	3.7	9.0	3.5	7.0	4.3	1.2	3.0	1.0	6.0
6	7.2	10.9	9.6	4.0	7.7	3.5	5.5	4.0	1.5	2.7	1.2	5.0
7	6.0	10.0	9.4	4.5	7.0	3.5	4.8	3.8	1.6	2.5	1.2	4.4
8	6.5	13.0	8.8	5.4	6.7	3.4	4.3	4.4	2.0	2.2	1.0	4.4
9	6.1	13.0	7.6	5.9	6.3	3.3	4.0	4.3	2.6	2.0	1.0	4.3
10	5.5	11.3	5.6	5.8	8.0	3.3	3.9	4.1	2.4	2.0	1.1	4.6
11	5.0	9.5	5.0	5.8	9.0	3.2	3.7	4.0	2.1	2.0	1.2	8.3
12	4.6	7.4	4.8	5.7	8.0	3.3	3.6	4.1	2.0	2.0	1.4	9.6
13	4.3	6.8	4.5	5.0	7.2	3.3	3.5	4.4	2.0	1.8	2.0	9.0
14	3.8	6.4	4.2	4.5	6.4	3.2	3.5	4.7	1.9	1.7	2.5	9.5
15	3.4	6.2	4.2	4.3	6.0	3.1	3.4	9.2	1.7	1.7	3.0	10.5

Daily gage height, in feet, of Flint River near Montezuma, Ga., for 1907–1909—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
16	3.2	5.7	6.6	4.0	6.5	3.1	3.4	7.2	1.6	1.6	3.4	11.7
17	3.2	5.0	7.8	3.9	6.0	3.1	3.7	6.6	1.6	1.6	3.3	12.7
18	3.1	4.8	6.5	4.0	5.6	3.0	4.2	6.0	1.6	1.6	3.1	12.6
19	3.0	4.7	5.0	7.0	5.4	3.0	5.0	5.5	1.8	1.5	3.0	11.0
20	3.0	4.6	4.4	8.0	5.2	3.0	4.5	7.0	1.9	1.5	2.9	8.5
21	3.5	4.8	4.0	10.0	4.7	2.9	4.1	6.5	2.0	1.4	3.0	7.0
22	3.8	5.3	3.7	10.3	4.8	2.9	3.8	6.3	2.0	1.3	3.5	5.0
23	4.2	5.0	3.3	9.5	4.7	2.7	3.7	6.0	2.1	1.3	5.4	6.7
24	4.4	4.6	3.0	9.0	4.7	2.6	3.5	5.5	2.0	1.1	7.5	10.0
25	4.2	4.5	3.0	10.9	4.5	2.6	3.5	5.4	1.9	1.1	10.4	11.0
26	4.0	4.5	3.0	11.7	4.3	2.6	3.4	4.6	2.1	.9	11.5	13.4
27	4.2	4.6	3.0	11.0	4.0	2.6	3.2	4.1	2.7	.7	11.0	14.0
28	4.5	4.9	2.9	10.0	4.0	3.0	4.0	3.8	2.5	.6	10.6	13.2
29	5.3	.....	3.0	9.3	3.8	4.7	4.9	3.5	2.9	.5	8.6	11.0
30	5.0	.....	3.2	9.7	3.7	5.9	5.6	3.0	3.3	.4	8.0	9.9
31	5.3	.....	3.4	.....	3.7	.....	5.0	2.4	.....	.3	.....	9.0
1908.												
1	11.9	7.0	8.9	7.5	16.5	6.4	3.3	3.5	6.3	2.7	5.0	3.0
2	13.0	11.7	8.3	7.0	15.0	6.0	3.1	3.4	4.6	2.6	5.0	3.1
3	14.2	13.6	7.7	6.8	13.0	5.8	3.3	3.1	4.1	2.6	4.6	3.2
4	12.2	17.0	7.3	6.7	11.5	5.5	3.6	3.0	3.8	2.5	4.4	3.3
5	11.7	15.7	7.0	6.7	10.0	5.1	4.6	2.8	3.6	2.5	4.2	3.9
6	10.0	13.0	6.9	6.6	8.0	5.0	5.1	3.0	3.5	2.4	4.0	4.3
7	10.5	11.5	6.7	6.6	6.5	6.4	5.4	4.0	3.4	2.3	3.8	4.2
8	11.0	10.2	6.6	6.5	6.0	6.0	6.4	5.2	6.9	2.2	4.7	4.0
9	12.4	9.0	6.6	6.3	5.9	5.5	7.2	5.0	7.4	2.3	4.5	3.7
10	12.8	8.5	6.5	6.2	5.8	4.9	7.8	4.7	6.5	3.1	4.2	3.5
11	13.4	8.2	6.3	6.0	5.7	4.5	7.9	4.3	5.5	3.6	3.9	3.4
12	12.0	8.8	6.2	5.9	5.7	4.2	8.2	4.0	4.6	4.0	3.7	3.4
13	10.5	9.8	6.0	5.8	5.6	5.6	7.2	3.8	4.0	3.8	3.6	3.5
14	9.9	11.9	5.9	5.6	5.6	4.6	6.5	3.6	3.6	3.6	3.5	6.1
15	10.6	13.4	5.8	5.4	5.5	4.0	6.1	3.3	3.1	3.5	3.5	4.5
16	10.0	13.0	5.6	8.7	5.4	3.8	5.6	3.1	2.8	3.4	3.8	4.0
17	9.0	11.5	5.5	10.5	5.4	3.7	5.0	2.8	2.6	3.4	4.0	3.6
18	8.3	9.8	5.4	12.0	5.2	3.7	4.6	2.6	2.3	3.2	4.0	3.4
19	7.4	14.2	5.4	12.1	5.1	3.7	4.0	2.4	2.1	3.1	3.8	3.2
20	7.0	14.0	5.3	11.5	6.9	3.6	3.6	2.1	1.9	3.1	3.6	3.1
21	6.9	12.6	5.3	10.6	7.0	3.6	3.9	1.9	1.8	3.0	3.5	3.1
22	6.9	11.0	5.2	9.8	6.6	4.4	3.7	3.5	1.7	2.8	3.3	3.1
23	6.8	10.9	5.5	8.7	6.0	4.6	3.5	4.0	2.0	2.7	3.2	3.4
24	6.8	10.8	10.9	9.4	5.9	4.9	3.4	3.7	2.2	2.6	3.1	8.4
25	6.8	10.5	12.5	10.6	5.7	6.0	3.2	5.9	2.2	2.5	3.1	9.5
26	6.7	10.3	16.5	11.6	5.6	5.4	3.6	7.3	2.4	2.5	3.1	11.4
27	6.7	10.0	17.8	13.0	6.1	4.5	4.0	9.1	2.8	2.5	3.0	12.0
28	6.6	9.7	16.0	16.8	6.0	4.0	4.4	10.5	3.0	2.6	3.0	11.6
29	6.4	9.4	12.3	23.2	5.6	3.7	4.0	11.5	3.1	3.0	3.0	11.0
30	6.3	.....	10.0	21.0	5.1	3.5	3.8	12.0	2.8	3.3	3.0	9.0
31	6.5	.....	8.3	.....	6.4	.....	3.6	11.0	.....	3.4	.....	6.0
1909.												
1	5.2	3.6	9.0	8.3	10.1	5.0	4.0	7.7	2.1	3.0	2.6	3.2
2	6.0	3.6	8.0	8.0	9.5	4.5	5.4	6.4	2.3	2.8	2.4	3.4
3	5.9	3.5	7.2	7.8	10.6	4.1	5.5	4.7	2.4	2.7	2.5	3.5
4	5.7	3.5	6.8	7.7	11.8	5.3	5.0	6.7	2.4	2.7	2.4	3.3
5	5.4	3.5	6.5	7.3	11.9	7.8	4.8	8.6	2.4	2.6	2.2	3.1
6	5.6	3.6	6.2	6.8	10.7	9.2	4.6	9.4	2.4	2.4	2.1	3.0
7	5.7	4.0	6.1	6.4	9.7	9.6	4.1	10.0	2.2	2.2	2.1	3.0
8	5.5	6.5	6.6	6.1	8.2	8.4	4.8	10.6	2.2	2.0	2.0	3.2
9	5.3	6.9	7.4	7.0	7.6	6.4	5.8	9.0	2.1	2.0	2.0	3.3
10	5.0	8.0	8.2	8.1	6.1	5.0	6.8	7.3	2.1	2.0	1.9	3.5
11	4.9	10.4	9.3	8.9	5.6	4.5	7.5	6.4	2.2	1.9	1.9	3.4
12	4.8	13.3	10.0	8.0	7.4	4.3	8.6	5.6	2.2	1.9	2.0	3.6
13	4.9	16.7	16.2	7.0	8.2	4.1	7.7	5.0	2.1	1.9	2.1	3.5
14	4.7	15.6	17.6	6.3	7.4	4.0	6.6	5.3	2.0	1.9	2.2	3.6
15	4.5	13.3	18.4	6.0	6.2	4.5	5.3	6.0	2.0	2.0	2.2	3.9

NOTE.—Discrepancies between the hydrographers' and the observer's readings indicate that the gage records for 1907 and 1908 are frequently in error. The records are probably more reliable during high water than during low water. These records should be used with caution. The records for 1909 appear more reliable than those for 1907 and 1908, but they should be used with caution. The high stages are probably more reliable than the low stages.

Daily gage height, in feet, of Flint River near Montezuma, Ga., for 1907–1909—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
16	4.6	12.7	18.7	6.6	5.1	5.9	4.7	7.3	2.0	2.1	2.2	4.2
17	4.9	12.7	17.7	6.2	4.5	5.5	4.5	7.7	3.0	2.2	2.3	4.6
18	5.3	14.4	15.6	5.9	4.0	5.0	4.2	7.1	4.2	2.9	2.2	4.4
19	5.5	15.5	14.3	5.5	3.9	4.7	3.8	5.6	5.0	3.1	2.1	4.1
20	5.6	14.9	12.7	5.2	4.1	4.3	4.0	4.8	4.4	2.8	2.1	4.4
21	5.4	12.0	12.5	4.9	7.7	4.2	4.3	4.2	3.9	2.7	2.3	4.6
22	5.1	11.9	13.2	4.8	8.6	4.7	3.8	3.8	3.7	2.7	2.2	4.8
23	4.9	12.4	15.6	4.7	8.1	5.6	3.6	3.4	3.4	2.7	2.5	4.9
24	4.7	12.0	16.0	4.4	7.0	7.5	4.0	3.2	5.5	2.7	2.8	4.8
25	4.6	11.4	15.1	5.5	6.3	6.5	4.6	3.0	6.0	2.9	3.1	4.1
26	4.3	12.2	13.8	6.1	5.1	6.1	4.5	2.8	5.4	2.8	3.2	4.3
27	4.1	11.0	12.0	7.8	4.6	5.7	4.0	2.7	6.3	2.8	3.5	4.2
28	3.9	10.5	10.8	9.2	5.0	4.8	3.9	2.7	4.3	2.7	3.7	4.6
29	3.8	.....	10.0	9.9	6.0	4.6	3.6	2.5	3.5	2.7	3.5	4.5
30	3.7	.....	9.0	10.2	6.6	4.3	3.4	2.4	3.3	2.6	3.3	4.3
31	3.7	.....	8.7	.....	6.0	.....	7.4	2.3	.....	2.6	.....	4.4

Daily discharge, in second-feet, of Flint River near Montezuma, Ga., for 1907–1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3,670	2,800	3,180	1,770	6,350	1,820	4,560	2,490	1,040	2,730	407	5,720
2	4,640	3,670	4,030	1,870	5,900	1,770	7,800	2,800	800	2,140	440	6,350
3	6,350	4,400	4,460	1,820	7,250	1,770	6,530	2,310	687	1,870	508	5,990
4	5,810	5,550	5,810	1,820	6,800	1,720	4,800	2,200	650	1,720	578	3,880
5	4,640	6,440	6,530	1,820	5,460	1,720	3,880	2,140	724	1,480	650	3,180
6	4,030	7,160	5,990	1,980	4,400	1,720	2,860	1,980	839	1,340	724	2,550
7	3,180	6,350	5,810	2,260	3,880	1,720	2,430	1,870	878	1,250	724	2,200
8	3,530	9,140	5,300	2,800	3,670	1,670	2,140	2,200	1,040	1,120	650	2,200
9	3,250	9,140	3,330	3,120	3,390	1,620	1,980	2,140	1,300	1,040	650	2,140
10	2,860	7,520	2,920	3,060	4,640	1,620	1,920	2,040	1,210	1,040	687	2,310
11	2,550	5,900	2,550	3,060	5,460	1,570	1,820	1,980	1,080	1,040	724	4,880
12	2,310	4,180	2,430	2,990	4,640	1,620	1,770	2,040	1,040	1,040	800	5,990
13	2,140	3,740	2,260	2,550	4,030	1,620	1,720	2,200	1,040	958	1,040	5,460
14	1,870	3,460	2,090	2,260	3,460	1,570	1,720	2,370	999	918	1,250	5,900
15	1,670	3,320	2,090	2,140	3,180	1,520	1,670	5,640	918	918	1,480	6,800
16	1,570	2,990	3,600	1,980	3,530	1,520	1,670	4,030	878	878	1,670	7,900
17	1,570	2,550	4,480	1,920	3,180	1,520	1,820	3,600	878	878	1,620	8,850
18	1,520	2,430	3,530	1,980	2,920	1,480	2,090	3,180	878	878	1,520	8,760
19	1,480	2,370	2,550	3,880	2,800	1,480	2,550	2,860	958	839	1,480	7,250
20	1,480	2,310	2,200	4,640	2,670	1,480	2,260	3,880	999	839	1,430	5,040
21	1,720	2,430	1,980	6,350	2,370	1,430	2,040	3,530	1,040	800	1,480	3,880
22	1,870	2,730	1,820	6,620	2,430	1,430	1,870	3,390	1,040	762	1,720	2,550
23	2,090	2,550	1,620	5,900	2,370	1,340	1,820	3,180	1,080	762	2,800	3,670
24	2,200	2,310	1,480	5,460	2,370	1,300	1,720	2,860	1,040	687	4,260	6,350
25	2,090	2,260	1,480	7,160	2,260	1,300	1,720	2,800	999	687	6,710	7,250
26	1,980	2,260	1,480	7,900	2,140	1,300	1,670	2,310	1,080	614	7,710	9,520
27	2,090	2,310	1,480	7,250	1,980	1,300	1,570	2,040	1,340	543	7,250	10,100
28	2,260	2,490	1,430	6,350	1,980	1,480	1,980	1,870	1,250	508	6,890	9,320
29	2,730	.....	1,480	5,720	1,870	2,370	2,490	1,720	1,430	474	5,120	7,250
30	2,550	.....	1,570	6,080	1,820	3,120	2,920	1,480	1,620	440	4,640	6,260
31	2,730	.....	1,670	.....	1,820	.....	2,550	1,210	.....	407	.....	5,460
1908.												
1	8,090	3,880	5,380	4,260	12,700	3,460	1,620	1,720	3,390	1,340	2,550	1,480
2	9,140	7,900	4,880	3,880	11,100	3,180	1,520	1,670	2,310	1,300	2,550	1,520
3	10,300	9,720	4,400	3,740	9,140	3,060	1,620	1,520	1,980	1,300	2,310	1,570
4	8,380	13,300	4,100	3,670	7,710	2,860	1,770	1,480	1,870	1,250	2,200	1,620
5	7,900	11,900	3,880	3,670	6,350	2,610	2,310	1,380	1,770	1,250	2,090	1,920
6	6,350	9,140	3,810	3,600	4,640	2,550	2,610	1,480	1,720	1,210	1,980	2,140
7	6,800	7,710	3,670	3,600	3,530	3,460	2,800	1,980	1,670	1,160	1,870	2,090
8	7,250	6,530	3,600	3,530	3,180	3,180	3,460	2,670	3,810	1,120	2,370	1,980
9	8,560	5,460	3,600	3,390	3,120	2,860	4,030	2,550	4,180	1,160	2,260	1,820
10	8,940	5,040	3,530	3,320	3,060	2,490	4,480	2,370	3,530	1,520	2,090	1,720

Daily discharge, in second-feet, of Flint River near Montezuma, Ga., for 1907–1909— Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
11	9,520	4,800	3,390	3,180	2,990	2,260	4,560	2,140	2,860	1,770	1,920	1,670
12	8,180	5,300	3,320	3,120	2,990	2,090	4,800	1,980	2,310	1,980	1,820	1,670
13	6,800	6,170	3,180	3,060	2,920	2,920	4,030	1,870	1,980	1,870	1,770	1,720
14	6,260	8,090	3,120	2,920	2,920	2,310	3,530	1,770	1,770	1,770	1,720	3,250
15	6,890	9,520	3,060	2,800	2,860	1,980	3,250	1,620	1,520	1,720	1,720	2,260
16	6,350	9,140	2,920	5,210	2,800	1,870	2,920	1,520	1,380	1,670	1,870	1,980
17	5,460	7,710	2,860	6,800	2,800	1,820	2,550	1,380	1,300	1,670	1,980	1,770
18	4,880	6,170	2,800	8,180	2,670	1,820	2,310	1,300	1,160	1,570	1,980	1,670
19	4,180	10,300	2,800	8,280	2,610	1,820	1,980	1,210	1,080	1,520	1,870	1,570
20	3,880	10,100	2,730	7,710	3,810	1,770	1,770	1,080	999	1,520,	1,770	1,520
21	3,810	8,760	2,730	6,890	3,880	1,770	1,920	999	958	1,480	1,720	1,520
22	3,810	7,250	2,670	6,170	3,600	2,200	1,820	1,720	918	1,380	1,620	1,520
23	3,740	7,160	2,860	5,210	3,180	2,310	1,720	1,980	1,040	1,340	1,570	1,670
24	3,740	7,070	7,160	5,810	3,120	2,490	1,670	1,820	1,120	1,300	1,520	4,960
25	3,740	6,800	8,660	6,890	2,990	3,180	1,570	3,120	1,120	1,250	1,520	5,900
26	3,670	6,620	12,700	7,800	2,920	2,800	1,770	4,100	1,210	1,250	1,520	7,620
27	3,670	6,350	14,200	9,140	3,250	2,260	1,980	5,550	1,380	1,250	1,480	8,180
28	3,600	6,080	12,200	13,000	3,180	1,980	2,200	6,800	1,480	1,300	1,480	7,800
29	3,460	5,810	8,470	20,800	2,920	1,820	1,980	7,710	1,520	1,480	1,480	7,250
30	3,390	.....	6,350	18,000	2,610	1,720	1,870	8,180	1,380	1,620	1,480	5,460
31	3,530	.....	4,880	.....	3,460	.....	1,770	7,250	.....	1,670	.....	3,180
1909.												
1	2,760	1,860	5,570	4,990	6,500	2.640	2,080	4,520	1,080	1,540	1,340	1,640
2	3,270	1,860	4,750	4,750	6,000	2,350	2,880	3,550	1,180	1,440	1,240	1,740
3	3,200	1,800	4,140	4,590	6,940	2,130	2,940	2,460	1,240	1,380	1,280	1,800
4	3,080	1,800	3,840	4,520	8,020	2,820	2,640	3,760	1,240	1,380	1,240	1,690
5	2,880	1,800	3,620	4,220	8,110	4,590	2,520	5,230	1,240	1,340	1,140	1,580
6	3,010	1,860	3,410	3,840	7,030	5,740	2,400	5,910	1,240	1,240	1,080	1,540
7	3,080	2,080	3,340	3,550	6,160	6,080	2,130	6,420	1,140	1,140	1,080	1,540
8	2,940	3,620	3,690	3,340	4,910	5,070	2,520	6,940	1,140	1,040	1,040	1,640
9	2,820	3,920	4,290	3,990	4,440	3,550	3,140	5,570	1,080	1,040	1,040	1,690
10	2,640	4,750	4,910	4,830	3,340	2,640	3,840	4,220	1,080	1,040	990	1,800
11	2,580	6,760	5,820	5,480	2,990	2,350	4,360	3,550	1,140	990	990	1,740
12	2,520	9,470	6,420	4,750	4,290	2,240	5,230	3,010	1,140	990	1,040	1,860
13	2,580	13,200	12,600	3,990	4,910	2,130	4,250	2,640	1,080	990	1,080	1,800
14	2,460	11,900	14,200	3,480	4,290	2,080	3,690	2,820	1,040	990	1,140	1,860
15	2,350	9,470	15,100	3,270	3,410	2,350	2,820	3,270	1,040	1,040	1,140	2,020
16	2,400	8,870	15,500	3,690	2,700	3,200	2,460	4,220	1,040	1,080	1,140	2,180
17	2,580	8,870	14,300	3,410	2,350	2,940	2,350	4,520	1,540	1,140	1,180	2,400
18	2,820	10,600	11,900	3,200	2,080	2,640	2,180	4,060	2,180	1,480	1,140	2,300
19	2,940	11,800	10,500	2,940	2,020	2,460	1,960	3,010	2,640	1,580	1,080	2,130
20	3,010	11,200	8,870	2,760	2,130	2,240	2,080	2,520	2,300	1,440	1,080	2,300
21	2,880	8,200	8,680	2,580	4,520	2,180	2,240	2,180	2,020	1,380	1,180	2,400
22	2,700	8,110	9,370	2,520	5,230	2,460	1,960	1,960	1,910	1,380	1,140	2,520
23	2,580	8,580	11,900	2,460	4,830	3,010	1,860	1,740	1,740	1,380	1,280	2,580
24	2,460	8,200	12,400	2,300	3,990	4,360	2,080	1,640	2,940	1,380	1,440	2,520
25	2,400	7,660	11,400	2,940	3,480	3,620	2,400	1,540	3,270	1,480	1,580	2,130
26	2,240	8,390	9,990	3,340	2,700	3,340	2,350	1,440	2,880	1,440	1,640	2,240
27	2,130	7,300	8,200	4,590	2,400	3,080	2,080	1,380	3,480	1,440	1,800	2,180
28	2,020	6,850	7,120	5,740	2,640	2,520	2,020	1,380	2,240	1,380	1,910	2,400
29	1,960	.....	6,420	6,340	3,270	2,400	1,860	1,280	1,800	1,380	1,800	2,350
30	1,910	.....	5,570	6,590	3,690	2,240	1,740	1,240	1,690	1,340	1,690	2,240
31	1,910	.....	5,320	.....	3,270	.....	4,290	1,180	.....	1,340	.....	2,300

NOTE.—The daily discharges for 1907 and 1908 are based on a rating curve that is well defined between discharges 960 and 11,100 second-feet. Discrepancies between the hydrographers' and the observer's gage heights indicate that these discharges are frequently much in error and should be used with great caution. From intercomparisons with the other Flint River stations it appears that the discharges are too low the last of October and the first part of November, 1907, whereas those during the first part of October and the last of November, 1907, appear greatly in excess, so the averages for these two months are probably fair. The daily discharges for 1909 are based on a rating curve that is well defined below 11,100 second-feet and appear to be more reliable than those for 1907 and 1908, but still they are not good. They should be used with caution.

Monthly discharge of Flint River near Montezuma, Ga., for 1907–1909.

[Drainage area, 2,700 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	6,350	1,480	2,720	1.01	1.16	
February	9,140	2,260	4,100	1.52	1.58	
March	6,530	1,430	3,030	1.12	1.29	
April	7,900	1,770	3,820	1.41	1.57	
May	7,250	1,820	3,580	1.33	1.53	
June	3,120	1,300	1,630	.604	.67	
July	7,800	1,570	2,590	.959	1.11	
August	5,640	1,210	2,590	.959	1.11	
September	1,620	650	1,030	.381	.43	
October	2,730	407	1,020	.378	.44	
November	7,710	407	2,250	.833	.93	
December	10,100	2,140	5,640	2.09	2.41	
The year	10,100	407	2,830	1.05	14.23	
1908.						
January	10,300	3,390	5,940	2.20	2.54	
February	13,300	3,880	7,580	2.81	3.03	
March	14,200	2,670	4,960	1.84	2.12	
April	20,800	2,800	6,250	2.31	2.58	
May	12,700	2,610	4,160	1.54	1.78	
June	3,460	1,720	2,430	.900	1.00	
July	4,800	1,520	2,520	.933	1.08	
August	8,180	999	2,710	1.00	1.15	
September	4,180	918	1,820	.674	.75	
October	1,980	1,120	1,450	.537	.62	
November	2,550	1,480	1,870	.693	.77	
December	8,180	1,480	2,970	1.10	1.27	
The year	20,800	918	3,720	1.38	18.69	
1909.						
January	3,270	1,910	2,620	.970	1.12	B.
February	13,200	1,800	6,810	2.52	2.62	B.
March	15,500	3,340	8,170	3.03	3.49	B.
April	6,590	2,300	3,970	1.47	1.64	B.
May	8,110	2,020	4,280	1.59	1.83	B.
June	6,080	2,080	2,970	1.10	1.23	B.
July	5,230	1,740	2,700	1.00	1.15	B.
August	6,420	1,180	3,200	1.19	1.37	B.
September	3,480	1,040	1,690	.626	.70	C.
October	1,580	990	1,280	.474	.55	C.
November	1,910	990	1,260	.467	.52	C.
December	2,580	1,540	2,040	.756	.87	C.
The year	15,500	990	3,420	1.27	17.09	

NOTE.—Owing to poor gage readings the estimates for 1907 and 1908 can not be considered reliable. The annual means and some of the monthly means compare favorably with the stations at Albany and Woodbury, but for short periods the records at the last two stations are best.

Values of accuracy for 1907 and 1908 have been omitted owing to the uncertainty of the estimates. The estimates are only approximate at low stages.

FLINT RIVER AT ALBANY, GA.

The station is located at the Dougherty County bridge in Albany, about 700 feet below the Atlantic Coast Line bridge, where the discharge measurements are made. It was originally established by the United States Weather Bureau in 1893, and was maintained, with some interruptions, until the United States Geological Survey began to make discharge measurements in 1901. Since that time it has been maintained continuously, all gage heights being furnished by the United States Weather Bureau except those for a portion of 1903.

This station is about 2 miles below the mouth of Muckalee Creek. The operation of the power plant on that creek just above its mouth probably causes some fluctuations in the flow of Flint River at the station. The data obtained at this station are useful for various run-off studies, including water-power estimates.

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 railroad yard interferes with the work. The section at the Georgia Northern Railway bridge, 1 mile above at which measurements are sometimes made, is not considered satisfactory except for low stages.

The original staff gage was washed out in 1898. It was again 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 1902 gage heights, as published by the United States Weather Bureau and the United States Geological Survey, all refer to the new gage datum. The present standard chain gage, installed by the United States Geological Survey April 20, 1904, on this same bridge, has the same datum and reads in conformity with the United States Weather Bureau gage.

The river overflows both banks, but only under the approaches to the bridge. The bed is rock and very rough and the current is irregular. Conditions of flow are permanent and a very good rating has been developed.

Discharge measurements of Flint River at Albany, Ga., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 29	E. H. Swett	235	1,580	1.75	3,240
November 27	do	224	1,410	1.18	2,800
Do.[a]	do	111	2,270	1.13	2,720

[a] Measurement at Georgia Northern Railway bridge 1 mile above the regular measuring section at the Atlantic Coast Line bridge.

Daily gage height, in feet, of Flint River at Albany, Ga., for 1909.

[D. W. Brosnan, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.9	1.7	10.6	8.8	8.7	2.5	2.1	2.4	0.4	1.7	0.2	1.2
2	4.0	1.6	10.0	8.0	9.3	2.4	2.0	3.3	.3	1.5	.2	1.4
3	2.2	1.5	8.9	7.5	11.1	2.4	2.5	3.5	.2	1.4	.1	1.4
4	2.1	1.5	8.5	7.0	12.7	2.4	2.5	3.4	.2	1.4	— .1	1.2
5	2.6	1.4	6.8	6.6	11.8	2.2	2.3	2.9	.2	1.2	— .2	1.2
6	3.3	1.4	5.0	5.0	10.1	2.1	2.0	2.6	.2	.9	— .2	1.0
7	3.5	1.4	4.1	4.5	9.5	2.6	1.9	2.6	.0	.7	— .2	.9
8	4.0	1.4	3.9	4.8	9.1	3.8	1.9	3.2	— .2	.4	— .3	.9
9	3.8	1.3	3.7	5.2	8.0	4.9	2.0	4.5	— .3	.2	— .1	1.0
10	3.2	2.5	5.0	5.6	6.7	4.8	2.9	5.5	— .4	.0	.0	.9

Daily gage height, in feet, of Flint River at Albany, Ga., for 1909—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	2.8	6.0	7.2	5.9	5.8	4.5	4.6	5.8	−0.4	−0.1	0.1	0.7
12	2.7	7.6	6.7	6.6	5.2	4.1	4.8	5.6	− .4	− .2	.0	.7
13	3.0	8.2	6.2	6.4	4.1	3.5	5.2	4.5	− .4	− .2	.0	1.2
14	2.7	9.6	7.8	6.0	3.6	2.8	5.3	4.1	− .4	− .1	.0	1.7
15	2.4	11.0	11.9	5.5	3.8	2.5	4.9	3.7	− .2	− .1	− .1	1.9
16	2.2	14.4	15.1	4.9	4.2	2.0	4.0	2.8	− .1	.0	− .1	1.9
17	2.3	15.2	17.5	4.6	4.5	1.6	3.7	3.2	− .3	.2	.0	2.0
18	2.3	16.0	20.3	4.4	4.9	1.4	3.6	3.9	− .2	.2	.2	2.0
19	2.3	13.0	22.0	4.4	4.7	2.2	3.5	4.1	− .2	.1	.2	2.2
20	2.2	12.4	22.4	4.3	4.2	2.3	3.0	3.9	.6	− .1	.1	2.2
21	2.2	10.2	22.3	3.9	3.6	2.3	2.6	3.0	1.5	− .3	.0	2.3
22	2.5	10.0	21.0	3.5	3.3	2.4	2.4	2.5	1.7	− .3	.0	2.5
23	2.5	12.0	21.0	3.2	3.8	2.8	2.2	1.9	2.1	− .3	.1	2.5
24	2.4	14.1	21.6	3.0	4.4	2.8	2.2	1.6	1.9	− .2	.1	2.3
25	2.4	13.8	21.8	3.2	5.0	3.5	1.9	1.4	1.9	.0	.1	2.2
26	2.3	11.4	20.8	3.8	4.6	4.4	1.8	1.3	1.9	.0	.2	2.4
27	2.1	10.8	20.1	4.5	3.9	4.8	1.8	1.1	1.8	.2	.4	2.4
28	2.0	10.6	19.0	5.4	3.4	4.2	2.4	.9	2.1	.3	.5	2.2
29	2.0	.....	16.3	6.2	2.8	3.7	2.5	.8	2.1	.3	.9	2.0
30	1.8	.....	14.0	7.0	2.6	2.7	2.3	.7	1.9	.3	1.1	1.8
31	1.7	.....	11.2	.....	2.6	.....	2.2	.5	.....	.2	.....	1.8

NOTE.—These gage heights are not very reliable, especially during September, October, and November.

Daily discharge, in second-feet, of Flint River at Albany, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,300	3,260	13,900	11,700	11,500	4,080	3,660	3,980	2,090	3,260	1,920	2,800
2	5,780	3,160	13,200	10,700	12,300	3,980	3,560	4,980	2,000	3,080	1,920	2,980
3	3,760	3,080	11,800	10,000	14,600	3,980	4,080	5,210	1,920	2,980	1,840	2,980
4	3,660	3,080	11,300	9,420	16,700	3,980	4,080	5,100	1,920	2,980	1,670	2,800
5	4,200	2,980	9,170	8,920	15,500	3,760	3,860	4,520	1,920	2,800	1,670	2,800
6	4,980	2,980	6,940	6,940	13,300	3,660	3,560	4,200	1,920	2,540	1,590	2,620
7	5,210	2,980	5,900	6,360	12,500	4,200	3,460	4,200	1,750	2,360	1,590	2,540
8	5,780	2,980	5,670	6,700	12,000	5,560	3,460	4,860	1,590	2,090	1,510	2,540
9	5,560	2,900	5,440	7,180	10,700	6,820	3,560	6,360	1,510	1,920	1,670	2,620
10	4,860	4,080	6,940	7,670	9,040	6,710	4,520	7,540	1,430	1,750	1,750	2,540
11	4,420	8,170	9,670	8,040	7,920	6,360	6,480	7,920	1,430	1,670	1,840	2,360
12	4,300	10,200	9,040	8,920	7,180	5,900	6,700	7,670	1,430	1,590	1,750	2,360
13	4,630	10,900	8,420	8,670	5,900	5,210	7,180	6,360	1,430	1,590	1,750	2,800
14	4,300	12,700	10,400	8,170	5,320	4,420	7,300	5,900	1,430	1,670	1,750	3,260
15	3,980	14,400	15,600	7,540	5,560	4,080	6,820	5,440	1,590	1,670	1,670	3,460
16	3,760	19,200	20,300	6,820	6,020	3,560	5,780	4,420	1,670	1,750	1,670	3,460
17	3,860	20,500	24,100	6,480	6,360	3,160	5,440	4,860	1,510	1,920	1,750	3,560
18	3,860	21,700	28,800	6,240	6,820	2,980	5,320	5,670	1,590	1,920	1,920	3,560
19	3,860	17,200	31,800	6,240	6,590	3,770	5,210	5,900	1,590	1,840	1,920	3,760
20	3,760	10,300	32,500	6,130	6,020	3,860	4,640	5,670	2,260	1,670	1,840	3,760
21	3,760	13,400	32,300	5,670	5,320	3,860	4,200	4,640	3,080	1,510	1,750	3,860
22	4,080	13,200	30,000	5,210	4,980	3,980	3,980	4,080	3,260	1,510	1,750	4,080
23	4,080	15,800	30,000	4,860	5,560	4,420	3,760	3,460	3,660	1,510	1,840	4,080
24	3,980	18,800	31,100	4,640	6,240	4,420	3,760	3,160	3,460	1,590	1,840	3,860
25	3,980	18,300	31,400	4,860	6,940	5,210	3,460	2,980	3,460	1,750	1,840	3,760
26	3,860	14,900	29,700	5,560	6,480	6,240	3,360	2,900	3,460	1,750	1,920	3,980
27	3,660	14,200	28,500	6,360	5,670	6,700	3,360	2,720	3,360	1,920	2,090	3,980
28	3,560	13,900	26,600	7,420	5,100	6,020	3,980	2,540	3,660	2,000	2,180	3,760
29	3,560	.....	22,200	8,420	4,420	5,440	4,080	2,440	3,660	2,000	2,540	3,560
30	3,360	.....	18,600	9,420	4,200	4,300	3,860	2,360	3,460	2,000	2,720	3,360
31	3,260	.....	14,700	.....	4,200	.....	3,760	2,180	.....	1,920	.....	3,360

NOTE.—These discharges are based on a rating curve that is well defined above 2,600 second-feet; below 2,600 second-feet the rating is uncertain.

Owing to the possibility of gross errors in gage heights, especially during September, October, and November, the daily discharges may be much in error and should be used with caution.

Monthly discharge of Flint River at Albany, Ga., for 1909.

[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.		
January	9,300	3,260	4,350	0.870	1.00	B.
February	21,700	2,900	10,900	2.18	2.27	A.
March	32,500	5,440	18,600	3.72	4.29	A.
April	11,700	4,640	7,380	1.48	1.65	A.
May	16,700	4,200	8,090	1.62	1.87	A.
June	6,820	2,980	4,690	.938	1.05	B.
July	7,300	3,360	4,520	.904	1.04	B.
August	7,920	2,180	4,650	.930	1.07	B.
September	3,660	1,430	2,280	.456	.51	C.
October	3,260	1,510	2,020	.404	.47	C.
November	2,720	1,510	1,850	.370	.41	D.
December	4,080	2,360	3,260	.652	.75	C.
The year	32,500	1,430	6,050	1.21	16.38	

NOTE.—These monthly estimates are liable to be considerably in error owing to poor gage-height records, and should be used with caution. Hydrograph comparisons with Woodbury, Montezuma, and Bainbridge indicate that the Albany records for 1909 are too low during September, October, and November. More probably means for these months, determined from hydrograph comparisons, are 2,400, 2,250, and 2,150 second-feet, respectively. Accuracy values for these months have therefore been reduced.

FLINT RIVER AT BAINBRIDGE, GA.

The station, which is located at the county wagon bridge, one-half mile from Bainbridge and about 25 miles above the junction of the Flint with Chattahoochee River, was established in 1904 by the United States Weather Bureau. Discharge measurements at this point were begun by the United States Geological Survey June 11, 1908, the daily gage heights being furnished by the United States Weather Bureau.

The boxed chain gage is attached to the bridge. The datum has not been changed since June 11, 1908, at which time it was adjusted to its original datum. During part of the time prior to this date the chain was wrongly adjusted. Gage heights for 1908 were all corrected before publishing in Water-Supply Paper No. 242. A good low-water rating has been obtained.

Discharge measurements of Flint River at Bainbridge, Ga., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 31	E. H. Swett	307	2,470	5.13	5,200
November 29	do	289	2,390	3.57	4,030
Do	do	288	2,420	3.62	4,120

Daily gage height, in feet, of Flint River at Bainbridge, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.3	5.0	12.8	15.3	10.7	7.3	5.7	5.1	3.7	4.3	3.1	3.6
2	7.9	5.0	12.3	13.7	11.3	7.3	5.6	5.9	3.5	4.0	3.2	3.5
3	7.3	5.0	11.5	12.8	12.0	6.8	5.4	6.6	3.5	3.9	3.0	3.4
4	6.5	4.8	10.3	12.0	12.8	6.4	5.7	6.6	3.4	3.6	2.8	3.4
5	6.5	4.7	9.3	11.3	13.0	6.2	6.1	5.9	3.5	3.5	2.9	3.3
6	6.5	4.7	8.8	10.7	13.0	6.6	6.2	6.0	3.4	3.4	3.0	3.5
7	6.5	4.7	8.4	10.0	12.8	7.0	5.7	6.6	3.2	3.3	3.0	3.6
8	6.7	4.7	8.1	9.6	12.7	7.7	5.5	7.2	3.4	3.2	2.9	3.7
9	7.8	5.2	8.1	9.5	12.5	8.1	5.5	7.8	3.4	3.1	3.1	3.5
10	7.4	6.0	8.3	9.5	12.3	8.3	5.5	8.4	3.3	3.2	3.0	3.3
11	6.5	6.5	8.6	9.8	11.2	7.9	6.0	8.7	3.2	3.0	3.0	3.2
12	6.3	7.7	9.2	10.3	9.3	7.0	6.9	8.5	3.2	3.0	2.9	3.4
13	6.1	8.9	9.8	10.6	8.6	6.4	7.5	7.9	3.3	3.1	2.9	3.6
14	6.0	10.0	10.6	10.4	8.4	5.8	8.0	7.1	3.4	3.2	2.9	3.8
15	5.8	11.0	11.7	9.8	8.6	5.6	8.5	6.5	3.4	2.9	2.9	3.9
16	5.8	12.5	13.5	9.3	8.4	5.4	8.1	6.5	3.4	2.8	3.0	3.9
17	5.8	14.0	15.3	9.0	8.2	5.2	7.7	6.5	3.3	2.8	3.2	3.8
18	5.8	14.9	16.9	8.8	7.5	5.2	7.6	7.0	3.3	2.7	3.0	4.0
19	5.8	15.2	18.3	8.7	7.0	5.8	7.5	7.1	3.4	2.7	2.9	4.2
20	5.8	14.9	19.4	8.4	6.9	6.0	7.2	7.0	4.0	2.7	2.9	4.4
21	6.0	14.9	20.3	8.0	6.9	6.2	6.5	6.6	4.4	3.1	2.9	4.4
22	6.2	14.9	21.1	7.7	7.5	6.2	6.2	5.9	4.6	3.3	2.8	4.4
23	6.2	15.7	21.3	7.4	7.9	6.2	6.0	5.4	4.7	3.2	2.9	4.5
24	6.0	15.9	21.3	7.3	8.3	6.2	5.9	5.0	4.6	3.2	2.9	4.6
25	5.8	15.6	21.8	7.4	8.3	6.3	5.9	4.8	4.3	3.3	2.9	4.6
26	5.8	14.8	22.1	7.5	8.3	6.9	5.8	4.5	4.6	3.4	3.0	4.5
27	5.6	13.9	21.8	8.0	7.6	7.0	5.7	4.3	5.0	3.4	3.1	4.3
28	5.5	13.4	21.4	8.5	7.2	7.1	5.9	4.1	5.1	3.1	3.3	4.4
29	5.4	.....	20.7	9.3	7.0	6.6	5.9	4.0	5.2	3.2	3.5	4.5
30	5.3	.....	19.6	10.0	6.9	6.0	5.7	3.8	4.8	3.1	3.6	4.6
31	5.2	.....	17.7	.....	6.9	.....	5.2	3.6	.....	3.0	.....	4.6

Daily discharge, in second-feet, of Flint River at Bainbridge, Ga., for 1908–9.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	.....	.....	.....	.....	.....	9,540	6,750	6,750	.....	5,610	5,050	4,970
2	.....	.....	.....	.....	.....	9,320	6,390	6,570	.....	5,370	5,530	4,970
3	.....	.....	.....	.....	.....	9,320	6,220	6,300	.....	5,290	5,780	4,970
4	.....	.....	.....	.....	.....	9,000	6,130	6,220	8,570	5,210	5,780	4,970
5	.....	.....	.....	.....	.....	8,780	6,300	5,870	7,230	5,130	5,530	5,130
6	.....	.....	.....	.....	.....	8,680	6,480	5,960	7,030	5,290	5,530	5,210
7	.....	.....	.....	.....	.....	8,680	6,750	5,960	6,840	4,890	5,530	5,290
8	.....	.....	.....	.....	.....	8,570	7,030	5,960	6,840	4,820	5,610	5,370
9	.....	.....	.....	.....	.....	8,570	7,230	6,220	6,840	4,820	5,780	5,210
10	.....	.....	.....	.....	.....	8,680	7,530	6,390	7,030	4,820	5,870	5,050
11	.....	.....	.....	.....	.....	8,260	8,050	6,940	7,430	4,890	5,700	5,050
12	.....	.....	.....	.....	.....	8,160	8,470	7,130	7,530	4,970	5,530	5,130
13	.....	.....	.....	.....	.....	8,160	8,680	6,840	7,130	5,210	5,370	5,210
14	.....	.....	.....	.....	.....	8,050	8,780	6,480	6,750	5,450	5,290	5,290
15	.....	.....	.....	.....	.....	7,950	8,780	6,130	6,390	5,780	5,130	5,610
16	.....	.....	.....	.....	.....	7,640	8,470	5,870	6,040	5,210	4,970	5,960
17	.....	.....	.....	.....	.....	7,330	8,260	5,610	5,870	5,130	4,890	6,130
18	.....	.....	.....	.....	.....	7,030	8,160	5,450	5,610	5,050	5,050	5,960
19	.....	.....	.....	.....	.....	6,840	7,530	5,210	5,530	4,970	5,290	5,700
20	.....	.....	9,660	.....	.....	6,840	7,330	5,370	5,530	4,820	5,290	5,450
21	.....	.....	9,430	.....	.....	6,840	7,330	5,050	5,530	4,740	5,290	5,290
22	.....	.....	9,430	.....	.....	6,840	7,840	5,130	5,290	4,740	5,210	5,210
23	.....	.....	9,880	.....	.....	6,840	8,050	6,220	5,130	4,740	5,050	5,210
24	.....	.....	.....	.....	.....	6,840	8,050	6,570	5,530	4,740	5,050	5,210
25	.....	.....	.....	.....	.....	6,840	7,430	6,390	5,610	4,740	5,050	5,450
26	.....	.....	.....	.....	9,880	7,230	7,230	7,230	5,610	4,740	5,050	6,220
27	.....	.....	.....	.....	9,660	7,230	7,030	8,570	5,610	4,740	4,970	6,750
28	.....	.....	.....	.....	9,660	7,430	7,430	9,880	5,610	4,740	4,820	7,530
29	.....	.....	.....	.....	.....	7,330	7,740	.....	5,610	4,740	4,820	8,160
30	.....	.....	.....	.....	.....	7,030	7,740	.....	5,610	4,740	4,820	8,780
31	.....	.....	.....	.....	9,770	.....	7,130	.....	.....	4,820	.....	9,320

Daily discharge, in second-feet, of Flint River at Bainbridge, Ga., for 1908–9—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	9,100	5,050	.....	.....	.....	7,030	5,610	5,130	4,120	4,520	3,740	4,050
2	7,640	5,050	.....	.....	.....	7,030	5,530	5,780	3,990	4,310	3,800	3,990
3	7,030	5,050	.....	.....	.....	6,570	5,370	6,390	3,990	4,250	3,680	3,930
4	6,300	4,890	.....	.....	.....	6,220	5,610	6,390	3,930	4,050	3,560	3,930
5	6,300	4,820	9,100	.....	.....	6,040	5,960	5,780	3,990	3,990	3,620	3,860
6	6,300	4,820	8,570	.....	.....	6,390	6,040	5,870	3,930	3,930	3,680	3,990
7	6,300	4,820	8,160	9,880	.....	6,750	5,610	6,390	3,800	3,860	3,680	4,050
8	6,480	4,820	7,840	9,430	.....	7,430	5,450	6,940	3,930	3,800	3,620	4,120
9	7,530	5,210	7,840	9,320	.....	7,840	5,450	7,530	3,930	3,740	3,740	3,990
10	7,130	5,870	8,050	9,320	.....	8,050	5,450	8,160	3,860	3,800	3,680	3,860
11	6,300	6,300	8,360	9,660	.....	7,640	5,870	8,470	3,800	3,680	3,680	3,800
12	6,130	7,430	9,000	.....	9,100	6,750	6,660	8,260	3,800	3,680	3,620	3,930
13	5,960	8,680	9,660	.....	8,360	6,220	7,230	7,640	3,860	3,740	3,620	4,050
14	5,870	9,880	.....	.....	8,160	5,700	7,740	6,840	3,930	3,800	3,620	4,180
15	5,700	.....	.....	9,660	8,360	5,530	8,260	6,300	3,930	3,620	3,620	4,250
16	5,700	.....	.....	9,100	8,160	5,370	7,840	6,300	3,930	3,560	3,680	4,250
17	5,700	.....	.....	8,780	7,950	5,210	7,430	6,300	3,860	3,560	3,800	4,180
18	5,700	.....	.....	8,570	7,230	5,210	7,330	6,750	3,860	3,500	3,680	4,310
19	5,700	.....	.....	8,470	6,750	5,700	7,230	6,840	3,930	3,500	3,620	4,450
20	5,700	.....	.....	8,160	6,660	5,870	6,940	6,750	4,310	3,500	3,620	4,590
21	5,870	.....	.....	7,740	6,660	6,040	6,300	6,390	4,590	3,740	3,620	4,590
22	6,040	.....	.....	7,430	7,230	6,040	6,040	5,780	4,740	3,860	3,560	4,590
23	6,040	.....	.....	7,130	7,640	6,040	5,870	5,370	4,820	3,800	3,620	4,670
24	5,870	.....	.....	7,030	8,050	6,040	5,780	5,050	4,740	3,800	3,620	4,740
25	5,700	.....	.....	7,130	8,050	6,130	5,780	4,890	4,520	3,860	3,620	4,740
26	5,700	.....	.....	7,230	8,050	6,660	5,700	4,670	4,740	3,930	3,680	4,670
27	5,530	.....	.....	7,740	7,330	6,750	5,610	4,520	5,050	3,930	3,740	4,520
28	5,450	.....	.....	8,260	6,940	6,840	5,780	4,380	5,130	3,740	3,860	4,590
29	5,370	.....	.....	9,100	6,750	6,390	5,780	4,310	5,210	3,800	3,990	4,670
30	5,290	.....	.....	9,880	6,660	5,870	5,610	4,180	4,890	3,740	4,050	4,740
31	5,210	.....	.....	.....	6,660	.....	5,210	4,050	.....	3,680	.....	4,740

NOTE.—These discharges are based on a rating curve that is well defined between 3,800 and 9,880 second-feet. All discharges for missing days are above 9,880 second-feet.

Monthly discharge of Flint River at Bainbridge, Ga., for 1908–9.

[Drainage area, 7,410 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908.						
June	9,540	6,840	7,860	1.06	1.18	A.
July	8,780	6,130	7,490	1.01	1.16	A.
October	5,780	4,740	5,000	.675	.78	A.
November	5,870	4,820	5,290	.714	.80	A.
December	9,320	4,970	5,800	.783	.90	A.
1909.						
January	9,100	5,210	6,150	.830	.96	A.
June	8,050	5,210	6,380	.861	.96	A.
July	8,260	5,210	6,190	.835	.96	A.
August	8,470	4,050	6,080	.821	.95	A.
September	5,210	3,800	4,240	.572	.64	A.
October	4,520	3,500	3,820	.516	.59	B.
November	4,050	3,560	3,690	.498	.56	B.
December	4,740	3,800	4,290	.579	.67	A.

NOTE.—Monthly estimates for 1908–9 are published only for those months in which all the gage heights are 10.0 feet and under. When sufficient high-water measurements are obtained to develop the high-water portion of the rating curve the tables will be completed and published in a later report.

KINCHAFOONEE CREEK NEAR LEESBURG, GA.

The station, which is located at the iron highway bridge, 1 mile east of Leesburg, was established August 30, 1905, and was discontinued December 31, 1909. The records are valuable for water-power and other water-supply estimates.

The right bank is lower than the bridge and probably overflows at extreme high stages around the end of the bridge approach. The left bank does not overflow. Conditions of flow are probably permanent, and a good rating has been developed for low and medium stages.

Discharge measurements are made from the downstream side of the bridge. The original gage was a temporary vertical staff located on the right bank 150 feet above the bridge. The datum of this gage and that of the present chain gage, which is on the bridge, has remained the same since the establishment of the station.

The gage record for 1909 is not satisfactory and the monthly estimates are liable to be more or less in error.

Discharge measurements of Kinchafoonee Creek near Leesburg, Ga., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 30	E. H. Swett	103	251	1.72	327
Do	do	103	251	1.72	328
October 28	M. R. Hall	85	139	.84	202
Do	do	85	136	.82	191

Daily gage height, in feet, of Kinchafoonee Creek near Leesburg, Ga., for 1909.

[J. H. Jones, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.9	1.7	3.65	4.55	4.75	.....	1.4	.....	0.4	0.9	0.7	1.15
2	1.9	1.6	3.8	4.25	.....	2.2	1.3	2.6	.4	.8	.7	1.05
3	.....	1.6	3.55	3.95	5.5	2.2	1.3	2.55	.3	.....	.65	.95
4	1.7	1.6	3.35	.....	5.4	2.35	.....	2.6	.3	.8	.65	.9
5	2.0	1.6	3.15	3.45	5.0	2.6	.....	2.4	.....	.8	.65	.....
6	2.65	1.8	3.0	3.3	4.7	.....	1.3	2.3	.3	.7	.6	.88
7	2.95	.....	.....	3.2	4.15	2.6	1.5	2.45	.3	.7	.....	.85
8	2.7	2.0	2.75	3.6	3.95	2.5	1.7	.....	.3	.7	.6	.95
9	2.3	2.0	3.0	4.1	.....	2.4	2.05	2.9	.4	.7	.65	1.0
10	.....	3.1	3.2	4.0	3.55	2.3	2.4	3.0	.4	.....	.65	1.25
11	1.85	4.6	3.6	.....	3.3	2.25	.....	2.8	.4	.7	.7	1.3
12	1.8	5.4	4.05	3.8	3.05	2.0	3.25	2.6	.....	.7	.7	.....
13	2.05	5.1	4.4	4.05	2.75	.....	3.4	2.35	.5	.7	.7	1.5
14	2.2	.....	.....	3.95	2.5	1.75	3.3	2.0	.5	.6	.....	1.6
15	2.2	4.6	5.4	3.85	2.4	1.4	3.3	.....	.4	.6	.7	1.5
16	2.45	5.4	6.1	3.7	.....	1.3	3.7	1.8	.4	.6	.7	1.5
17	.....	6.1	5.7	3.55	2.4	1.3	4.0	1.7	.4	.....	.7	1.4
18	2.2	6.0	5.2	.....	2.2	1.3	.....	1.6	.5	.6	.7	1.4
19	2.2	6.4	4.95	3.35	2.0	1.35	3.6	1.5	.....	.6	.8	.....
20	2.15	7.4	4.6	3.2	2.15	.....	3.4	1.4	.6	.7	.8	1.6
21	2.0	.....	.....	3.1	2.6	1.85	3.2	1.3	.8	.7	.....	1.8
22	2.0	5.9	9.0	3.05	2.45	2.0	3.0	.....	1.05	.7	.85	1.8
23	1.9	5.4	12.0	3.0	.....	2.2	2.9	1.1	1.3	.7	.9	1.85
24	.....	5.2	15.0	3.2	2.1	2.4	2.9	1.0	1.4	.....	.95	1.9
25	1.8	4.9	11.4	.....	2.1	2.6	.....	1.0	1.4	.7	.95	1.9
26	1.8	4.6	9.2	4.85	2.3	2.6	2.6	.9	.....	.8	.95	.....
27	1.8	4.3	7.6	5.2	2.3	.....	2.6	.8	1.4	.8	1.0	.....
28	1.7	.....	.....	4.95	2.2	2.0	2.6	.7	1.3	.85	.....	1.7
29	1.7	.....	6.0	4.55	2.1	1.9	2.7	.....	1.1	.8	1.25	1.8
30	1.7	.....	5.6	4.25	.....	1.55	2.8	.55	1.0	.8	1.35	1.7
31	.....	.....	4.95	.....	.....	.....	2.8	.5	.....	.....	.....	1.65

Daily discharge, in second-feet, of Kinchafoonee Creek near Leesburg, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	357	325	697	918	972	404	279	500	150	209	184	243
2	357	309	731	840	1,090	408	264	481	150	196	184	229
3	341	309	675	766	1,200	408	264	472	140	196	178	216
4	325	309	632	710	1,160	435	264	481	140	196	178	209
5	374	309	590	653	1,040	481	264	444	140	196	178	208
6	490	341	559	621	958	481	264	426	140	184	172	206
7	549	358	534	600	814	481	294	453	140	184	172	202
8	500	374	510	686	766	462	325	495	140	184	172	216
9	426	374	559	802	720	444	382	539	150	184	178	222
10	388	579	600	778	675	426	344	559	150	184	178	257
11	349	931	686	754	621	417	527	519	150	184	184	264
12	341	1,160	790	731	569	374	610	481	156	184	184	279
13	382	1,070	878	790	510	354	642	435	161	184	184	294
14	408	1,000	1,020	766	462	333	621	374	161	172	184	309
15	408	931	1,160	742	444	279	621	355	150	172	184	294
16	453	1,160	1,400	708	444	264	708	341	150	172	184	294
17	430	1,400	1,260	675	444	264	778	325	150	172	184	279
18	408	1,370	1,100	654	408	264	732	309	161	172	184	279
19	408	1,520	1,030	632	374	272	686	294	166	172	196	294
20	400	1,950	931	600	400	310	642	279	172	184	196	309
21	374	1,640	1,870	579	481	349	600	264	196	184	199	341
22	374	1,330	2,800	569	453	374	559	250	229	184	202	341
23	357	1,160	4,700	559	422	408	539	236	264	184	209	349
24	349	1,100	6,850	600	391	444	539	222	279	184	216	357
25	341	1,010	4,310	800	391	481	510	222	279	184	216	357
26	341	931	2,920	1,000	426	481	481	209	279	196	216	346
27	341	852	2,050	1,100	426	428	481	196	279	196	222	335
28	325	774	1,710	1,030	408	374	481	184	264	202	240	325
29	325	.....	1,370	918	391	357	500	175	236	196	257	341
30	325	.....	1,230	840	395	302	519	166	222	196	272	325
31	325	.....	1,030	.....	400	.....	519	161	.....	190	.....	317

NOTE.—These discharges are based on a rating curve that is well defined between 220 and 2,200 second-feet. Discharges interpolated for days having no gage record. The accuracy of the daily discharges is more or less uncertain owing to poor gage heights.

Monthly discharge of Kinchafoonee Creek near Leesburg, Ga., for 1909.

[Drainage area, 480 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	549	325	383	0.798	0.92
February	1,950	309	888	1.85	1.93
March	6,850	510	1,520	3.17	3.66
April	1,100	559	747	1.56	1.74
May	1,200	374	602	1.25	1.44
June	481	264	385	.802	.89
July	778	264	495	1.03	1.19
August	559	161	350	.729	.84
September	279	140	185	.385	.43
October	209	172	186	.388	.45
November	272	172	196	.408	.46
December	357	202	285	.594	.68
The year	6,850	140	518	1.08	14.63

NOTE.—The accuracy of the monthly discharge is uncertain on account of poor gage heights.

CHOCTAWHATCHEE RIVER DRAINAGE BASIN.

DESCRIPTION.

Choctawhatchee River drains the southeastern part of Alabama and that portion of Florida lying immediately south. The main river rises in Barbour County, Ala., a short distance west of Eufaula, Ala., and flows in a southwesterly and southerly direction through Choctawhatchee Bay to the Gulf of Mexico. Pea River, the principal tributary, enters from the west at Geneva, Ala. This branch is the longer of the two above the junction, having its head in Bullock County near Union Springs, Ala.

The basin is small, lying entirely in the Coastal Plain. The land is usually well elevated above the streams, and is rolling and even hilly at places. The surface is as a rule sandy, and is underlain by sandy limestones and clays which are exposed in many places in the stream beds as solid rocks but are usually soft.

The mean annual rainfall in the area is about 55 inches. The streams are moderately swift, even at low water, and at places the fall is sufficient to make considerable shoals or rapids and offer practicable sites for water-power development.

The following gaging stations have been maintained in this river basin:

Choctawhatchee River near Newton, Ala., 1906–1908.
Choctawhatchee River near Geneva, Ala., 1904.
Double Bridges Creek at Geneva, Ala., 1904.
Pea River at Pera, Ala., 1904–1909.
Pea River at Elba, Ala., 1906.

PEA RIVER AT PERA, ALA.

This station, which is located at the Elton wagon bridge, about one-half mile west of Pera, on the Georgiana and Graceville branch of the Louisville and Nashville Railroad, was established August 27, 1904, for the purpose of obtaining run-off data for use in water-power estimates and other water-supply studies.

Power plants above the station causes daily fluctuations in the low-water flow. The gage is read twice a day to eliminate or lessen the effect of such fluctuations. Both banks are subject to overflow during extreme high water. Conditions of flow appear to be very nearly permanent and a good rating has been developed.

Discharge measurements are made from the downstream side of the bridge to which the chain gage is attached. The datum of the gage has remained the same since the establishment of the station.

Discharge measurements of Pea River at Pera, Ala., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq.ft.*	*Feet.*	*Sec.-ft.*
August 5	E. H. Swett	81	453	4.36	708
December 2	do	73	256	2.85	372
Do	do	73	256	2.85	376
Do	do	73	260	2.98	393

Daily gage height, in feet, of Pea River at Pera, Ala., for 1909.

[W. G. Early, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.6	3.4	7.1	7.2	12.0	9.8	5.5	4.1	2.6	3.2	2.4	2.75
2	4.6	3.3	6.9	6.4	14.6	9.2	5.9	4.3	2.85	3.0	2.5	2.9
3	4.3	3.35	7.2	6.2	12.0	9.4	6.3	4.5	3.1	2.9	2.65	3.25
4	4.2	3.4	6.6	5.8	11.0	13.4	7.0	4.5	2.7	2.65	2.6	3.1
5	4.2	3.35	6.2	5.8	10.0	14.0	6.6	4.3	2.8	2.7	2.45	3.05
6	4.2	4.4	5.9	5.6	9.3	14.6	5.4	4.4	3.1	2.55	2.35	3.0
7	4.1	4.8	7.5	5.6	8.2	14.8	5.1	4.5	3.2	2.6	2.4	3.7
8	3.9	4.5	11.6	6.6	7.2	14.8	4.9	5.4	2.95	2.45	2.3	4.5
9	3.9	4.6	9.9	7.8	6.6	11.3	4.5	6.2	2.9	2.5	2.35	4.2
10	3.8	9.8	12.6	7.9	6.0	8.8	4.7	6.7	2.95	2.5	2.3	4.1
11	3.8	13.4	10.8	7.4	5.6	7.6	5.0	7.0	3.0	2.45	2.4	4.1
12	3.9	11.0	9.6	7.0	5.2	6.7	5.1	6.5	2.75	2.8	2.3	4.0
13	4.1	13.6	9.4	6.8	5.0	7.2	5.4	5.8	2.5	2.4	2.35	7.0
14	4.1	18.4	9.7	9.2	4.8	6.9	9.2	5.6	2.8	2.4	2.3	6.8
15	4.0	20.2	11.7	8.2	4.6	7.4	10.7	5.2	2.8	2.35	2.25	6.0
16	4.0	21.1	12.2	7.2	4.0	9.2	9.2	4.6	2.95	2.3	2.25	5.9
17	4.4	19.0	12.0	6.4	6.0	8.8	8.3	4.5	3.6	2.3	2.45	5.1
18	4.2	18.6	12.6	6.2	5.6	9.0	6.6	4.4	4.1	2.2	2.3	4.8
19	4.1	15.4	11.6	5.8	6.4	13.2	7.1	5.0	3.75	2.25	2.35	4.7
20	3.9	17.4	10.0	5.4	7.6	12.0	6.8	4.3	3.75	2.3	2.3	5.4
21	3.8	15.7	9.8	5.0	7.8	12.2	6.3	4.1	4.0	2.7	2.5	5.4
22	3.8	13.6	12.5	4.8	8.0	13.0	5.3	3.75	7.4	2.7	2.5	5.2
23	3.85	12.8	16.8	4.7	7.4	11.0	4.9	3.35	7.3	2.55	2.75	4.6
24	3.75	11.8	20.4	4.8	6.7	9.0	5.6	3.2	6.6	2.55	2.7	4.8
25	3.7	10.6	20.7	5.3	7.0	8.0	5.6	3.1	7.1	2.4	2.7	4.7
26	3.6	9.2	15.7	8.0	9.9	7.0	4.8	2.9	5.4	2.5	2.7	5.2
27	3.65	8.1	10.4	12.4	8.6	7.4	4.3	2.8	5.1	2.4	2.8	5.0
28	3.6	7.6	9.0	15.4	8.0	7.1	4.1	2.8	4.8	2.35	2.7	4.8
29	3.55	.....	8.4	14.8	9.2	6.0	4.1	2.7	4.8	2.35	2.55	4.5
30	3.7	.....	7.6	13.1	9.6	6.0	4.3	2.6	3.55	2.4	2.7	4.3
31	3.4	.....	7.1	.....	9.2	.....	4.3	2.55	.....	2.25	.....	4.1

Daily discharge, in second-feet, of Pea River at Pera, Ala., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	741	476	1,550	1,590	3,670	2,660	995	622	326	438	295	353
2	741	457	1,470	1,290	4,870	2,400	1,120	667	372	400	310	381
3	667	466	1,590	1,220	3,670	2,490	1,260	715	419	381	335	448
4	644	476	1,360	1,090	3,210	4,310	1,510	715	344	335	326	419
5	644	466	1,220	1,090	2,750	4,590	1,360	667	362	344	302	410
6	644	691	1,120	1,030	2,440	4,870	965	691	419	318	288	400
7	622	794	1,700	1,030	1,980	4,960	878	715	438	326	295	535
8	578	715	3,490	1,360	1,590	4,960	822	965	390	302	280	715
9	578	741	2,710	1,820	1,360	3,350	715	1,220	381	310	288	644
10	556	2,660	3,950	1,860	1,160	2,230	767	1,400	390	310	280	622
11	556	4,310	3,120	1,660	1,030	1,740	850	1,510	400	302	295	622
12	578	3,210	2,570	1,510	906	1,400	878	1,320	353	362	280	600
13	622	4,410	2,490	1,430	850	1,590	965	1,090	310	295	288	1,510
14	622	6,610	2,620	2,400	794	1,470	2,400	1,030	362	295	280	1,430
15	600	7,440	3,530	1,980	741	1,660	3,070	906	362	288	273	1,160

Daily discharge, in second-feet, of Pea River at Pera, Ala., for 1909—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	600	7,860	3,760	1,590	600	2,400	2,400	741	390	280	273	1,120
17	691	6,890	3,670	1,290	1,160	2,230	2,020	715	515	280	302	878
18	644	6,710	3,950	1,220	1,030	2,310	1,360	691	622	266	280	794
19	622	5,230	3,490	1,090	1,290	4,220	1,550	850	546	273	288	767
20	578	6,150	2,750	965	1,740	3,670	1,430	667	546	280	280	965
21	556	5,370	2,660	850	1,820	3,760	1,260	622	600	344	310	965
22	556	4,410	3,900	794	1,900	4,130	935	546	1,660	344	310	906
23	567	4,040	5,880	767	1,660	3,210	822	466	1,620	318	353	741
24	546	3,580	7,530	794	1,400	2,310	1,030	438	1,360	318	344	794
25	535	3,030	7,670	935	1,510	1,900	1,030	419	1,550	295	344	767
26	515	2,400	5,370	1,900	2,710	1,510	794	381	965	310	344	906
27	525	1,940	2,930	3,850	2,140	1,660	667	362	878	295	362	850
28	515	1,740	2,310	5,230	1,900	1,550	622	362	794	288	344	794
29	505	.....	2,060	4,960	2,400	1,160	622	344	794	288	318	715
30	535	.....	1,740	4,180	2,570	1,160	667	326	505	295	344	667
31	476	.....	1,550	.....	2,400	.....	667	318	.....	273	.....	622

NOTE.—These discharges are based on a rating curve that is well defined.

Monthly discharge of Pea River at Pera, Ala., for 1909.

[Drainage area, 1,180 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	741	476	592	0.502	0.58	A.
February	7,860	457	3,330	2.82	2.94	A.
March	7,670	1,120	3,090	2.62	3.02	A.
April	5,230	767	1,760	1.49	1.66	A.
May	4,870	600	1,910	1.62	1.87	A.
June	4,960	1,160	2,730	2.31	2.58	A.
July	3,070	622	1,180	1.00	1.15	A.
August	1,510	318	725	.614	.71	A.
September	1,660	310	632	.536	.60	A.
October	438	266	315	.267	.31	B.
November	362	273	307	.260	.29	B.
December	1,510	353	758	.642	.74	A.
The year	7,860	266	1,440	1.22	16.45	

ESCAMBIA RIVER DRAINAGE BASIN.

DESCRIPTION.

Escambia River drains the south-central portion of Alabama and discharges into the Gulf of Mexico through Escambia Bay and Pensacola Bay. Conecuh River joins the Escambia about 5 miles south of the Alabama–Florida state line, and is very much the larger of the two branches. Conecuh River rises in Bullock County, Ala., very close to the headwaters of Pea River, in the Choctawhatchee drainage basin, and flows southwestward throughout its entire course. Pigeon and Patsaliga creeks, both from the west, are the principal tributaries of Conecuh River. The Conecuh and its tributaries are swift streams, and at places there are rocky shoals and rapids.

This small basin lies directly west of the Choctawhatchee River basin, to which it is very similar in topographic, geologic, and climatic features.

The following gaging station has been maintained in this river basin:

Conecuh River at Beck, Ala., 1904–1909.

CONECUH RIVER AT BECK, ALA.

The station, which was established August 24, 1904, for the purpose of obtaining run-off data for the coastal plain region of Alabama, is located at Simmons Bridge at Beck, about 12 miles below the mouth of Patsaliga Creek. The nearest railway station is Andalusia, Ala., 8 miles east on the Central of Georgia and Louisville and Nashville railroads. The data are useful for water-power estimates and general studies.

The flow is probably not affected by artificial control, but at times may be affected by logging operations. Both banks are subject to overflow. The chain gage is attached to the upstream side of the bridge from which the measurements are made. The datum of the gage has remained the same since the establishment of the station. Conditions of flow at this station are practically permanent and an excellent rating has been developed.

Discharge measurements of Conecuh River at Beck, Ala., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 6	E. H. Swett	121	582	4.62	1,280
Do	do	121	547	4.35	1,160
December 3	do	116	306	2.04	404
Do	do	116	306	2.04	390

Daily gage height, in feet, of Conecuh River at Beck, Ala., for 1909.

[J. F. Hicks, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.2	6.4	5.9	13.0	6.7	5.5	.....	2.1	1.9	1.6	1.8
2	3.0	2.2	5.9	5.3	.....	7.1	4.8	3.9	1.9	1.9	2.0	2.0
3	.....	2.1	5.6	4.9	13.0	10.0	5.5	3.9	1.9	.....	2.9	2.1
4	2.8	2.1	5.1	.....	11.5	19.8	.....	3.9	2.1	1.7	1.9	1.8
5	2.8	2.1	4.8	4.4	10.3	22.9	.....	3.9	.....	1.6	1.7	.....
6	2.8	2.6	4.5	4.2	10.2	.....	4.8	4.9	.....	1.6	1.6	2.1
7	2.4	.....	.....	4.2	10.2	25.3	4.3	4.0	2.1	1.5	.....	2.7
8	2.4	2.3	7.1	4.6	9.0	24.3	3.9	.....	2.6	1.5	1.7	2.7
9	2.4	2.8	7.4	6.8	.....	22.5	3.6	4.0	2.2	1.5	1.6	2.7
10	.....	6.5	8.5	7.7	5.9	19.2	3.6	5.1	2.1	.....	1.6	3.1
11	2.4	7.3	8.5	.....	5.0	14.7	.....	4.8	2.1	1.7	1.5	3.0
12	2.3	7.3	9.1	6.6	4.4	10.5	3.6	4.5	.....	1.7	1.5	.....
13	2.3	8.3	9.2	7.0	4.1	.....	3.5	5.1	1.9	1.6	1.5	5.0
14	2.3	.....	.....	7.9	3.9	7.0	5.2	5.8	2.0	1.6	.....	4.0
15	2.3	.....	14.0	7.4	3.7	6.6	5.3	.....	2.0	1.6	1.6	4.1
16	2.3	19.1	15.3	6.8	.....	7.7	5.4	3.8	2.0	1.7	1.5	4.0
17	.....	17.8	14.8	6.4	3.5	8.3	5.0	3.8	2.8	.....	1.6	3.9
18	2.5	15.3	13.2	.....	3.4	8.3	.....	3.3	2.3	1.5	1.6	3.5
19	2.5	14.6	12.7	5.6	3.3	9.1	4.5	3.0	.....	1.4	1.5	.....
20	2.6	13.5	12.0	5.0	5.6	.....	4.4	3.1	2.1	1.4	1.5	3.5
21	2.5	.....	.....	4.4	4.6	9.4	4.6	3.7	2.1	1.9	.....	3.7
22	2.4	.....	9.8	4.0	5.1	10.6	4.1	.....	3.1	1.8	1.8	3.7
23	2.4	12.7	9.8	3.7	.....	10.6	3.9	2.8	3.1	1.6	1.7	3.5
24	.....	11.3	14.5	3.6	4.9	10.5	4.8	2.6	3.0	.....	1.6	3.5
25	2.3	10.4	22.4	.....	6.6	9.5	.....	2.2	3.1	1.6	.....	3.7
26	2.3	9.7	21.4	6.3	7.6	9.1	3.7	2.2	.....	1.6	1.7	.....
27	2.3	8.4	16.5	11.3	6.6	.....	3.2	2.0	3.0	1.6	1.7	3.4
28	2.3	.....	.....	10.8	6.0	6.5	3.2	2.0	2.6	1.6	.....	3.4
29	2.2	.....	9.0	10.5	8.3	6.0	3.1	.....	2.3	1.6	1.7	3.2
30	2.2	.....	7.6	9.9	.....	6.0	3.2	2.0	2.1	1.7	1.7	3.0
31	.....	.....	6.5	.....	.....	.....	3.1	2.8	.....	.....	.....	2.9

Daily discharge, in second-feet, of Conecuh River at Beck, Ala., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	727	456	2,270	2,000	5,950	2,430	1,780	884	430	380	315	357
2	694	456	2,000	1,680	5,950	2,640	1,440	1,040	380	380	404	404
3	662	430	1,830	1,490	5,950	4,250	1,780	1,040	380	358	662	430
4	630	430	1,590	1,380	5,100	9,830	1,670	1,040	430	335	380	357
5	630	430	1,440	1,260	4,420	11,600	1,550	1,040	430	315	335	394
6	630	568	1,300	1,170	4,360	12,300	1,440	1,490	430	315	315	430
7	510	525	1,970	1,170	4,360	13,000	1,210	1,080	430	295	325	598
8	510	482	2,640	1,350	3,690	12,400	1,040	1,080	568	295	335	598
9	510	630	2,810	2,480	2,840	11,400	919	1,080	456	295	315	598
10	510	2,320	3,410	2,970	2,000	9,480	919	1,590	430	315	315	728
11	510	2,750	3,410	2,670	1,540	6,920	919	1,440	430	335	295	694
12	482	2,750	3,750	2,370	1,260	4,530	919	1,300	405	335	295	1,120
13	482	3,300	3,800	2,590	1,130	3,560	879	1,590	380	315	295	1,540
14	482	5,340	5,160	3,080	1,040	2,590	1,640	1,940	404	315	305	1,080
15	482	7,390	6,520	2,810	959	2,370	1,680	1,470	404	315	315	1,130
16	482	9,430	7,260	2,480	919	2,970	1,730	1,000	404	335	295	1,080
17	510	8,690	6,980	2,270	879	3,300	1,540	1,000	630	315	315	1,040
18	538	7,260	6,060	2,050	839	3,300	1,420	801	482	295	315	879
19	538	6,860	5,780	1,830	801	3,750	1,300	694	456	277	295	879
20	568	6,240	5,380	1,540	1,830	3,830	1,260	728	430	277	295	879
21	538	6,090	4,760	1,260	1,350	3,910	1,350	959	430	380	326	959
22	510	5,940	4,140	1,080	1,590	4,590	1,130	794	728	357	357	959
23	510	5,780	4,140	959	1,540	4,590	1,040	630	728	315	335	879
24	496	4,980	6,800	919	1,490	4,530	1,440	568	694	315	315	879
25	482	4,470	11,300	1,560	2,370	3,970	1,200	456	728	315	325	959
26	482	4,080	10,700	2,210	2,910	3,750	959	456	711	315	335	899
27	482	3,350	7,940	4,980	2,370	3,040	764	404	694	315	335	839
28	482	2,810	5,820	4,700	2,050	2,320	764	404	568	315	335	839
29	456	.....	3,690	4,530	3,300	2,050	728	404	482	315	335	764
30	456	.....	2,910	4,190	3,010	2,050	764	404	430	335	335	694
31	456	.....	2,320	.....	2,720	.....	728	630	.....	325	.....	662

NOTE.—These discharges are based on a rating curve that is fairly well defined between 250 and 7,000 second-feet.

Discharges interpolated for days when gage was not read.

Monthly discharge of Conecuh River at Beck, Ala., for 1909.

[Drainage area, 1,290 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	720	456	530	0.411	0.47	B.
February	9,430	430	3,720	2.88	3.00	A.
March	11,300	1,300	4,510	3.50	4.04	A.
April	4,980	919	2,230	1.73	1.93	A.
May	5,950	801	2,600	2.02	2.33	A.
June	13,000	2,050	5,360	4.16	4.64	A.
July	1,780	728	1,220	.946	1.09	A.
August	1,940	404	950	.736	.85	B.
September	728	380	499	.387	.43	B.
October	380	295	323	.250	.29	B.
November	662	295	335	.260	.29	B.
December	1,540	357	792	.614	.71	B.
The year	13,000	295	1,920	1.49	20.07	

MOBILE RIVER DRAINAGE BASIN.

DESCRIPTION.

The waters of the Mobile basin enter the Gulf of Mexico through Mobile River, which is formed by the union of Alabama and Tombigbee rivers at a point near the coast. The system drains a triangular basin almost 300 miles wide near the headwaters in Georgia, Alabama, and Mississippi, having a total area of more than 40,000 square miles, and including about two-thirds of the State of Alabama and large areas in Georgia and Mississippi.

The main stream of the Alabama River branch, which has a somewhat greater drainage area than the Tombigbee branch, has many names. Beginning at the headwaters it is Cartecay River, which, with Ellijay River, makes the Coosawattee. This, with Conasauga River, forms Oostanaula River and at Rome, Ga., the Oostanaula and the Etowah unite to form Coosa River. Six miles above Montgomery, Ala., Tallapoosa River joins the Coosa and forms Alabama River. Hillabee Creek flows into Tallapoosa River just above Sturdevant. Talladega and Choccolocco creeks are tributaries of the Coosa.

The Coosa heads in the Appalachian Mountains of middle-north Georgia, mostly in the southwestern extremity of the Blue Ridge system. Its headwater streams, which include the Coosawattee, the Etowah, and the extreme upper portion of the Conasauga, rising at elevations of 2,000 to 3,000 feet above sea level, descend rapidly over hard beds of schistose rocks to the limestones and dolomites beginning in the northwestern part of Georgia and comprising a large portion of northern and northeastern sections of the State of Alabama. These streams drain large areas of forested lands, much of which is too steep for the ordinary agricultural use. About 30 miles above Wetumpka, Ala., the Coosa again enters an area of granitic rocks of the Piedmont Plateau, from which it passes with considerable drop to the Coastal Plain at Wetumpka.

Alabama River proper is entirely in the Coastal Plain. It flows first through an extensive bed of pure, soft limestone and afterwards through the newer limestones and sandstones extending to the coast.

Tallapoosa River is entirely in the Piedmont Plateau above Tallassee, Ala., where its greatest falls occur as it passes to the Coastal Plain.

Cahaba River heads in the coal measures of central Alabama and flows southward to Alabama River, about 10 miles below Selma, Ala.

Tombigbee River rises in the northeastern part of Mississippi and enters Alabama in Pickens County. Its principal tributary is the

Black Warrior, which is formed by the junction of Mulberry Fork and Sipsey Fork. Locust Fork enters the Black Warrior some distance below the junction.

The main stream of the Tombigbee system, which is entirely in the Coastal Plain, heads very close to Tennessee River at the northeast corner of Mississippi, where it drains a wide area of flat country lower in elevation than the upper portion of the Black Warrior River basin, and much lower than the corresponding portion of the Alabama River basin. The Tombigbee, from its headwaters, drains a region whose rocks correspond, in general, with those along the Alabama below Montgomery. The Black Warrior River basin is very largely in the coal measures of north-central Alabama, including, in fact, nearly all of this large and important area, as well as the extensive iron deposits of the same region.

The Mobile basin contains abundant and valuable deposits of such minerals as coal, iron, manganese, beauxite, barytes, marbles, and other limestones, cement materials, and clays.

The mean annual rainfall in this drainage area is about 50 inches. The basin contains a number of good reservoir sites, especially on Etowah, Coosawattee, and Conasauga rivers. Some of these have recently been surveyed by the army engineers.

Coosa and Tallapoosa rivers and their tributaries are important water-power streams and offer many exceptionally good locations for development.

The following special reports contain information regarding the hydrography of the Mobile River drainage basin:

Water powers of Alabama, with an appendix on stream measurements in Mississippi, by B. M. Hall: Water-Supply Paper U. S. Geol. Survey No. 107. Contains data on stream flow, river surveys, and water power collected in Alabama prior to 1904.

Water resources of Georgia, by B. M. and M. R. Hall: Water-Supply Paper U. S. Geol. Survey No. 197. Contains data on stream flow, water power, and river surveys collected in the Mobile basin in Georgia prior to 1906.

Sheets showing the profile of Tallapoosa River between Tallapoosa, Ga., and Matilda, Ala., may be obtained by applying to the Director, United States Geological Survey, Washington, D. C.

The following gaging stations have been maintained in this river basin:

Cartecay River near Cartecay, Ga., 1904–5, 1907.
Coosawattee River at Carters, Ga., 1896–1908.
Oostanaula River at Resaca, Ga., 1896–1909.
Coosa River at Rome, Ga., 1897–1903.
Coosa River at Lock No. 4, Ala., above Riverside, Ala., 1890–1901.
Coosa River at Riverside, Ala., 1896–1909.
Coosa River at Lock No. 5, near Childersburg, Ala., 1892–1897.
Coosa River near Wetumpka, Ala., 1896–1898.
Alabama River at Montgomery, Ala., 1899–1903.
Alabama River at Selma, Ala., 1900–1909.

Ellijay River at Ellijay, Ga., 1907.
Conasauga River at Beaverdale, Ga., 1907–8.
Etowah River near Ball Ground, Ga., 1907–1909.
Etowah River at Canton, Ga., 1892–1905.
Etowah River near Rome, Ga., 1904–1909.
Etowah River at Rome, Ga., 1903.
Amicalola River near Potts Mountain, Ga., 1907–8.
Choccolocco Creek at Jenifer, Ala., 1903–1908.
Tallapoosa River at Sturdevant, Ala., 1900–1909.
Talladega Creek at Nottingham, Ala., 1900–1904.
Tallapoosa River near Susanna, Ala., 1900–1901.
Tallapoosa River at Milstead, Ala., 1897–1903.
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., 1900–1909.
Tombigbee River at Epes, Ala., 1900–1909.
Black Warrior River near Cordova, Ala., 1900–1909.
Black Warrior River near Coal, Ala., 1908–9.
Black Warrior River at Tuscaloosa, Ala., 1889–1905.
Clear Creek near Elk, Ala., 1904–5.
Locust Fork of Black Warrior River at Palos, Ala., 1901–1905.
Village Creek near Mulga, Ala., 1909.

OOSTANAULA RIVER AT RESACA, GA.

The station, which is located at the bridge of the Western and Atlantic Railroad in the town of Resaca, 800 feet south of the depot, is 3 miles below the junction of the Conasauga and Coosawattee rivers, and 1 mile above the mouth of Camp Creek. The station was originally established by the United States Weather Bureau in 1891. In 1896 discharge measurements were made by the United States Geological Survey, and until the end of 1898 half-year gage height records were kept, completing the Weather Bureau's half-year records. From 1899 to 1904 only partial records of gage height were obtained. At present the gage heights are furnished by the United States Weather Bureau.

The data obtained are useful chiefly for general run-off studies.

Except on the smaller tributaries there are very few milldams, and these have little or no effect on the flow at the station.

The left bank is low and overflows during high water for 480 feet. Discharge measurements are usually made from the downstream side of the bridge, but at times are made from a boat at the ferry, about 200 feet above, where the section is somewhat better.

The gage is a heavy vertical staff attached to the downstream side of the pier in the middle of the river. The datum of the gage has not been changed since the establishment of the station. Conditions of flow at this station are practically permanent and a good rating has been developed for low and medium stages.

Daily gage height, in feet, of Oostanaula River at Resaca, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.4	3.8	6.3	8.6	15.5	6.0	6.4	3.8	4.8	2.4	2.2	1.6
2	4.6	3.8	8.0	7.0	20.0	6.3	6.0	6.4	4.4	2.3	2.0	1.6
3	4.2	3.8	8.6	6.4	18.0	9.4	5.5	10.0	4.1	2.4	2.0	1.6
4	4.0	3.6	6.0	5.8	10.6	19.5	5.0	8.8	3.4	2.4	2.0	1.7
5	8.2	3.6	5.6	5.6	8.0	21.6	4.8	6.8	2.8	2.2	2.0	1.7
6	10.8	4.8	5.8	5.5	6.8	22.6	4.8	4.8	2.8	2.2	2.0	1.6
7	10.2	7.8	9.0	5.8	6.4	22.0	7.0	5.7	2.8	2.0	2.0	2.2
8	7.6	4.8	7.8	8.2	6.4	18.6	7.0	5.8	3.0	1.8	2.0	10.0
9	5.6	4.6	6.0	8.2	6.4	9.0	7.4	5.4	3.0	1.8	1.9	5.8
10	5.0	14.2	16.6	7.1	7.0	7.6	6.6	4.8	2.8	1.8	1.9	4.0
11	4.6	17.2	19.6	6.0	8.0	11.5	6.2	4.6	3.2	1.8	1.9	3.6
12	4.4	12.4	17.2	5.6	6.6	12.5	6.2	4.4	3.6	1.8	1.9	2.8
13	4.6	8.3	22.2	5.4	6.4	8.0	6.2	4.2	3.2	2.0	1.9	3.8
14	5.4	11.2	29.6	9.0	6.0	5.5	6.2	6.8	2.8	2.4	1.9	7.0
15	6.0	14.8	31.7	8.0	5.6	7.3	6.6	4.8	2.8	6.6	1.8	6.0
16	11.2	18.4	28.6	7.0	5.5	8.0	6.2	4.6	3.6	6.0	1.8	5.0
17	15.4	19.0	24.6	6.2	6.5	6.2	5.6	5.6	3.4	4.4	1.8	4.6
18	15.2	15.2	19.0	5.6	6.0	6.0	4.8	4.8	3.2	3.6	2.0	4.2
19	13.2	13.0	10.8	5.4	6.4	5.8	4.2	4.4	2.8	2.8	2.0	3.4
20	8.2	10.0	9.6	5.4	7.4	5.5	4.0	4.2	2.8	2.8	1.8	3.0
21	6.4	8.4	9.0	5.2	10.5	5.6	3.8	4.2	2.6	2.6	1.8	3.0
22	5.0	13.0	8.1	5.2	9.2	7.0	3.6	4.2	2.6	2.6	1.8	2.8
23	4.8	20.5	7.0	5.8	10.0	7.2	3.6	4.0	2.6	2.6	1.8	2.8
24	4.8	21.5	6.2	11.6	11.0	6.3	5.4	3.6	3.0	2.4	1.8	2.8
25	4.6	19.0	7.4	8.6	10.5	7.6	4.8	3.0	3.2	2.4	1.7	3.4
26	4.4	15.2	11.6	7.4	8.5	8.0	4.4	3.0	3.0	2.2	1.7	5.6
27	4.4	11.0	8.6	7.6	6.1	6.4	4.0	2.8	2.8	2.2	1.7	5.0
28	4.2	8.8	12.2	8.6	6.0	11.0	3.8	2.6	2.8	2.2	1.6	4.4
29	4.0	.....	14.8	8.4	5.8	8.8	3.6	2.6	2.6	2.2	1.6	4.0
30	4.2	.....	11.8	7.6	5.6	7.2	3.6	2.6	2.6	2.2	1.6	3.6
31	3.8	.....	10.4	.....	5.6	.....	3.8	5.8	.....	2.2	.....	3.4

Daily discharge, in second-feet, of Oostanaula River at Resaca, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,080	1,670	3,610	5,850	14,900	3,340	3,700	1,670	2,380	840	740	476
2	2,230	1,670	5,250	4,250	21,600	3,610	3,340	3,700	2,080	790	644	476
3	1,940	1,670	5,850	3,700	18,600	6,720	2,930	7,420	1,870	840	644	476
4	1,800	1,540	3,340	3,170	8,140	20,800	2,530	6,060	1,410	840	644	515
5	5,450	1,540	3,010	3,010	5,250	24,000	2,380	4,060	1,060	740	644	515
6	8,390	2,380	3,170	2,930	4,060	25,500	2,380	2,380	1,060	740	644	476
7	7,660	5,050	6,280	3,170	3,700	24,600	4,250	3,090	1,060	644	644	740
8	4,850	2,380	5,050	5,450	3,700	19,500	4,250	3,170	1,170	556	644	7,420
9	3,010	2,230	3,340	5,450	3,700	6,280	4,650	2,850	1,170	556	599	3,170
10	2,530	13,000	16,500	4,350	4,250	4,850	3,880	2,380	1,060	556	599	1,800
11	2,230	17,400	21,000	3,340	5,250	9,280	3,520	2,230	1,290	556	599	1,540
12	2,080	10,500	17,400	3,010	3,880	10,600	3,520	2,080	1,540	556	599	1,060
13	2,230	5,550	24,900	2,850	3,700	5,250	3,520	1,940	1,290	644	599	1,670
14	2,850	8,900	36,000	6,280	3,340	2,930	3,520	4,060	1,060	840	599	4,250
15	3,340	13,800	39,200	5,250	3,010	4,550	3,880	2,380	1,060	3,880	556	3,340
16	8,900	19,200	34,500	4,250	2,930	5,250	3,520	2,230	1,540	3,340	556	2,530
17	14,700	20,100	28,500	3,520	3,790	3,520	3,010	3,010	1,410	2,080	556	2,230
18	14,400	14,400	20,100	3,010	3,340	3,340	2,380	2,380	1,290	1,540	644	1,940
19	11,600	11,300	8,390	2,850	3,700	3,170	1,940	2,080	1,060	1,060	644	1,410
20	5,450	7,420	6,940	2,850	4,650	2,930	1,800	1,940	1,060	1,060	556	1,170
21	3,700	5,650	6,280	2,690	8,020	3,010	1,670	1,940	945	945	556	1,170
22	2,530	11,300	5,350	2,690	6,500	4,250	1,540	1,940	945	945	556	1,060
23	2,380	22,400	4,250	3,170	7,420	4,450	1,540	1,800	945	945	556	1,060
24	2,380	23,800	3,520	9,410	8,640	3,610	2,850	1,540	1,170	840	556	1,060
25	2,230	20,100	4,650	5,850	8,020	4,850	2,380	1,170	1,290	840	515	1,410
26	2,080	14,400	9,410	4,650	5,750	5,250	2,080	1,170	1,170	740	515	3,010
27	2,080	8,640	5,850	4,850	3,430	3,700	1,800	1,060	1,060	740	515	2,530
28	1,940	6,060	10,200	5,850	3,340	8,640	1,670	945	1,060	740	476	2,080
29	1,800	.....	13,800	5,650	3,170	6,060	1,540	945	945	740	476	1,800
30	1,940	.....	9,670	4,850	3,010	4,450	1,540	945	945	740	476	1,540
31	1,670	.....	7,900	.....	3,010	.....	1,670	3,170	.....	740	.....	1,410

NOTE.—These discharges are based on a rating curve that is well defined below discharge 3,300 second-feet.

Monthly discharge of Oostanaula River at Resaca, Ga., for 1909.

[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.		
January	14,700	1,670	4,270	2.65	3.06	A.
February	23,800	1,540	9,790	6.08	6.33	B.
March	39,200	3,010	12,000	7.45	8.59	B.
April	9,410	2,690	4,270	2.65	2.96	A.
May	21,600	2,930	5,990	3.72	4.29	B.
June	25,500	2,930	7,940	4.93	5.50	B.
July	4,650	1,540	2,750	1.71	1.97	A.
August	7,420	945	2,510	1.56	1.80	A.
Septemher	2,380	945	1,250	.776	.87	A.
October	3,880	556	1,020	.634	.73	A.
November	740	476	585	.363	.40	A.
December	7,420	476	1,780	1.11	1.28	A.
The year	39,200	476	4,510	2.80	37.78	

COOSA RIVER AT RIVERSIDE, ALA.

The station, which is located at the Southern Railway bridge in the village of Riverside, Ala., was established September 25, 1896, and has been maintained continuously since that date. It is considered an important station in connection with water-power and navigation projects and general run-off studies.

The station is 1 mile above Blue Eye and about 7 miles above Choccolocco Creek. The flow is not noticeably affected by artificial control at the comparatively few dams above. Four navigation locks have been constructed above the station, the nearest of which is Lock 4, about 4 miles above.

The standard chain gage is attached to the downstream side of the railroad bridge from which discharge measurements are made, located near the right bank end. The original wire gage was located on the downstream side of the bridge near the middle of the river. The gage datum has not been changed since the station was established.

For a part of the width the current is broken by a ledge above. Both banks are high and do not overflow and the bed of the stream is rocky and permanent. A good rating has been developed.

Discharge measurements of Coosa River at Riverside, Ala., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 19	W. A. Lamb	573	8,390	9.58	32,200
August 17	E. H. Swett	526	4,380	3.36	7,840

Daily gage height, in feet, of Coosa River at Riverside, Ala., for 1909.

[W. L. Payne, L. M. Phillips, and A. L. Morris, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	2.75	12.5	7.9	11.4	4.0	6.6	4.2	3.5	1.5	1.4	1.4
2	2.9	2.65	12.0	6.2	12.0	5.0	5.5	4.9	3.4	1.7	1.4	1.4
3	2.95	2.5	10.8	5.2	12.4	5.6	4.8	7.9	2.6	1.5	1.3	1.4
4	3.15	2.45	9.2	4.8	12.2	10.8	4.2	8.1	2.6	1.4	1.4	1.5
5	4.2	2.4	7.6	4.6	11.6	12.6	3.8	8.6	2.5	1.4	1.4	1.5
6	5.8	2.45	5.6	4.8	9.2	13.6	3.4	9.4	1.9	1.35	1.4	1.5
7	7.6	3.65	6.0	4.8	7.4	13.2	3.3	10.1	1.8	1.3	1.4	1.7
8	8.4	4.2	6.5	5.1	6.4	13.0	3.9	8.8	1.9	1.3	1.4	2.1
9	7.1	4.5	7.2	6.0	5.2	12.4	6.0	5.8	1.9	1.3	1.3	4.3
10	6.2	6.1	10.2	6.1	5.2	12.0	6.0	4.4	1.8	1.3	1.3	5.6
11	4.8	7.8	12.6	5.8	5.2	10.4	7.0	4.1	1.95	1.3	1.3	4.5
12	4.1	9.6	14.2	5.2	6.4	8.0	6.1	3.8	2.0	1.3	1.3	4.0
13	3.7	10.4	17.4	4.8	6.0	7.4	4.8	3.3	1.9	1.3	1.3	3.4
14	3.8	11.8	19.6	5.4	5.2	7.0	4.4	3.2	1.9	1.2	1.3	3.4
15	4.8	13.2	19.6	5.8	4.4	6.8	4.0	3.6	1.9	1.6	1.3	4.7
16	5.1	14.1	18.6	6.2	4.2	5.4	4.2	3.6	1.9	1.7	1.3	5.0
17	7.2	13.9	17.7	5.8	5.0	5.0	4.4	3.4	1.8	4.7	1.3	4.8
18	8.8	13.6	17.8	5.0	4.8	5.0	3.6	3.1	1.7	5.2	1.3	4.0
19	9.6	13.4	17.6	4.4	4.6	4.6	3.3	3.0	1.9	3.8	1.3	3.2
20	9.4	13.2	17.6	4.2	4.6	4.2	3.3	2.7	2.0	2.4	1.3	2.8
21	8.4	12.8	18.3	4.0	5.6	4.4	3.0	2.6	2.0	2.1	1.3	2.1
22	6.8	11.2	17.7	3.8	7.5	6.0	2.8	2.3	2.0	1.9	1.3	2.1
23	5.2	10.2	16.6	5.2	7.4	6.2	2.8	2.2	2.0	1.7	1.3	2.5
24	4.4	11.2	15.0	7.0	6.6	6.8	2.7	2.1	1.9	1.7	1.35	2.5
25	4.0	13.0	11.2	8.4	6.2	7.6	2.6	2.0	2.0	1.7	1.4	3.0
26	3.8	13.2	8.8	11.2	6.2	8.2	3.1	1.9	2.2	1.6	1.4	3.2
27	3.5	13.0	8.5	11.8	6.0	7.4	3.1	1.9	2.4	1.5	1.4	3.6
28	3.3	12.7	8.3	11.5	5.8	6.4	2.7	1.9	2.0	1.5	1.4	3.5
29	3.2	.....	7.9	9.0	5.0	6.6	2.4	1.8	1.7	1.4	1.4	3.0
30	3.15	.....	8.4	8.4	4.6	6.6	2.8	1.9	1.6	1.4	1.4	2.1
31	3.0	.....	8.5	.....	4.4	.....	2.9	2.6	.....	1.4	.....	2.0

Daily discharge, in second-feet, of Coosa River at Riverside, Ala., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7,140	6,400	44,700	25,200	40,000	10,300	19,800	11,000	8,700	3,220	3,010	3,010
2	6,840	6,110	42,600	18,300	42,600	13,800	15,600	13,400	8,380	3,660	3,010	3,010
3	6,980	5,700	37,500	14,500	44,300	16,000	13,100	25,200	5,970	3,220	2,810	3,010
4	7,600	5,560	30,700	13,100	43,400	37,500	11,000	26,000	5,970	3,010	3,010	3,220
5	11,000	5,420	23,900	12,400	40,900	45,100	9,660	28,000	5,700	3,010	3,010	3,220
6	16,800	5,560	16,000	13,100	30,700	49,400	8,380	31,500	4,130	2,910	3,010	3,220
7	23,900	9,180	17,500	13,100	23,100	47,700	8,060	34,500	3,890	2,810	3,010	3,660
8	27,300	11,000	19,400	14,200	19,000	46,800	9,980	29,000	4,130	2,810	3,010	4,640
9	21,800	12,000	22,300	17,500	14,500	44,300	17,500	16,800	4,130	2,810	2,810	11,300
10	18,300	17,900	34,900	17,900	14,500	42,600	17,500	11,700	3,890	2,810	2,810	16,000
11	13,100	24,800	45,100	16,800	14,500	35,800	21,400	10,600	4,260	2,810	2,810	12,000
12	10,600	32,400	52,000	14,500	19,000	25,600	17,900	9,660	4,380	2,810	2,810	10,300
13	9,340	35,800	65,600	13,100	17,500	23,100	13,100	8,060	4,130	2,810	2,810	8,380
14	9,660	41,700	75,000	15,300	14,500	21,400	11,700	7,750	4,130	2,620	2,810	8,380
15	13,100	47,700	75,000	16,800	11,700	20,600	10,300	9,020	4,130	3,430	2,810	12,700
16	14,200	51,500	70,700	18,300	11,000	15,300	11,000	9,020	4,130	3,660	2,810	13,800
17	22,300	50,700	66,900	16,800	13,800	13,800	11,700	8,380	3,890	12,700	2,810	13,100
18	29,000	49,400	67,300	13,800	13,100	13,800	9,020	7,440	3,660	14,500	2,810	10,300
19	32,400	48,500	66,400	11,700	12,400	12,400	8,060	7,140	4,130	9,660	2,810	7,750
20	31,500	47,700	66,400	11,000	12,400	11,000	8,060	6,250	4,380	5,420	2,810	6,540
21	27,300	46,000	69,400	10,300	16,000	11,700	7,140	5,970	4,380	4,640	2,810	4,640
22	20,600	39,200	66,900	9,660	23,500	17,500	6,540	5,160	4,380	4,130	2,810	4,640
23	14,500	34,900	62,200	14,500	23,100	18,300	6,540	4,900	4,380	3,660	2,810	5,700
24	11,700	39,200	55,400	21,400	19,800	20,600	6,250	4,640	4,130	3,660	2,910	5,700
25	10,300	46,800	39,200	27,300	18,300	23,900	5,970	4,380	4,380	3,660	3,010	7,140
26	9,660	47,700	29,000	39,200	18,300	26,400	7,440	4,130	4,900	3,430	3,010	7,750
27	8,700	46,800	27,700	41,700	17,500	23,100	7,440	4,130	5,420	3,220	3,010	9,020
28	8,060	45,600	26,900	40,400	16,800	19,000	6,250	4,130	4,380	3,220	3,010	8,700
29	7,750	.....	25,200	29,800	13,800	19,800	5,420	3,890	3,660	3,010	3,010	7,140
30	7,600	.....	27,300	27,300	12,400	19,800	6,540	4,130	3,430	3,010	3,010	4,640
31	7,140	.....	27,700	.....	11,700	.....	6,840	5,970	.....	3,010	.....	4,380

NOTE.—These discharges are based on a rating curve that is well defined.

Monthly discharge of Coosa River at Riverside, Ala., for 1909.

[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.		
January	32,400	6,840	15,000	2.12	2.44	A.
February	51,500	5,420	30,800	4.36	4.54	A.
March	75,000	16,000	45,100	6.39	7.37	A.
April	41,700	9,660	19,000	2.69	3.00	A.
May	44,300	11,000	20,800	2.95	3.40	A.
June	49,400	10,300	24,900	3.53	3.94	A.
July	21,400	5,420	10,500	1.49	1.72	A.
August	34,500	3,890	11,700	1.66	1.91	A.
September	8,700	3,430	4,650	.659	.74	A.
October	14,500	2,620	4,170	.591	.68	A.
November	3,010	2,810	2,900	.411	.46	A.
December	16,000	3,010	7,320	1.04	1.20	A.
The year	75,000	2,620	16,400	2.32	31.40	

ALABAMA RIVER AT SELMA, ALA.

This station is located at the iron highway bridge in Selma, Ala. It was originally established by the United States Army Engineer Corps, but is now maintained by the United States Weather Bureau. Discharge measurements were begun by the United States Geological Survey in 1900, and the station ratings were applied to the gage heights for 1899.

The United States Weather Bureau gage formerly used was in two sections—the low-water portion, reading from −3 to +5.1 feet, being fastened to the lower side of the cofferdam on the second pier, and the upper portion, reading from 5.1 to 55 feet, being fastened to the draw pier. The present gage, which is of the standard chain type, is the property of the United States Geological Survey and was installed March 22, 1906, on the downstream side of the highway bridge, from which the measurements are made.

The datum of the gage has remained the same since the establishment of the station, but the bad condition and probable change in the low-water section of the staff gage has introduced some uncertainty in the low-water gage heights prior to the establishment of the present chain gage. The channel is deep and swift and is difficult to sound even at ordinary stages. Both banks are high, but the left is subject to overflow at extreme high water.

Conditions of flow are somewhat changeable, but a fairly good rating has been developed for recent years. Gage heights are available prior to 1899, but owing to changing conditions of flow the ratings for later years are not applicable.

The following discharge measurement was made by E. H. Swett:

August 19, 1909: Width, 413 feet; area, 5,590 square feet; gage height, 6.70 feet; discharge, 17,800 second-feet.

Daily gage height, in feet, of Alabama River at Selma, Ala., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.1	3.4	28.0	19.9	33.9	16.5	13.3	5.5	2.3	2.4	0.8	1.5
2	4.3	3.1	26.9	17.6	33.1	15.2	12.4	6.6	2.3	2.0	.8	1.4
3	3.8	2.8	25.2	16.1	33.8	14.9	11.9	7.2	3.1	1.6	.9	1.3
4	3.5	2.6	19.2	14.3	34.4	18.3	10.9	8.9	3.8	1.3	1.2	1.2
5	3.2	2.5	15.7	12.6	33.9	25.0	9.6	15.2	5.8	1.2	1.2	1.1
6	3.1	2.8	13.5	11.3	32.4	31.7	8.6	21.3	5.8	1.1	1.0	1.1
7	3.5	3.1	12.6	10.6	30.2	34.2	7.7	22.4	4.5	1.0	.9	1.0
8	5.5	5.2	11.8	10.3	27.2	34.3	7.1	21.0	3.3	.9	.8	1.2
9	8.1	6.8	12.3	11.2	23.2	33.1	6.7	20.2	2.7	.8	.7	1.9
10	10.5	8.7	23.2	12.4	18.2	30.5	6.9	18.9	2.8	.8	.6	4.4
11	11.0	16.0	32.3	13.0	14.1	27.7	7.9	15.4	3.6	.7	.5	5.4
12	9.5	20.8	40.5	12.9	12.6	25.2	9.4	11.3	3.6	.6	.5	6.9
13	7.6	22.2	45.0	12.5	12.4	23.4	11.7	8.8	2.9	.6	.5	8.3
14	6.0	21.9	48.0	12.3	11.9	21.7	11.8	7.9	2.6	.7	.5	8.1
15	5.0	23.8	50.4	13.0	11.6	19.0	10.4	7.4	2.6	.5	.5	8.8
16	4.5	29.0	51.9	13.1	10.6	17.0	10.7	6.9	2.6	.6	.5	8.8
17	6.0	32.8	52.7	12.6	9.6	15.9	10.4	6.4	2.6	.5	.5	8.1
18	8.0	38.0	52.9	12.1	9.7	14.9	9.8	6.5	2.8	.8	.6	8.1
19	9.5	38.9	52.6	11.6	10.6	13.1	9.8	6.6	2.7	1.5	.7	7.7
20	11.7	38.7	51.7	10.6	11.2	11.5	9.8	6.5	2.5	5.0	.9	6.7
21	13.4	37.4	51.2	9.6	11.7	11.0	8.2	5.6	2.2	5.8	1.1	5.7
22	13.7	35.7	50.5	8.9	11.8	13.3	7.0	5.0	2.4	4.7	1.0	5.0
23	12.8	33.9	50.6	8.5	11.2	16.9	6.3	4.4	3.2	3.3	.9	4.5
24	11.0	32.2	50.6	9.3	12.4	17.9	6.0	4.0	4.7	2.6	1.0	3.9
25	8.9	30.9	50.2	14.7	13.3	17.9	5.9	3.6	5.3	2.1	1.6	3.5
26	7.0	29.8	49.0	21.1	13.9	16.9	5.9	3.2	4.2	1.8	2.3	3.4
27	5.8	29.4	46.6	26.2	15.2	16.5	6.1	3.0	3.2	1.6	2.6	3.9
28	5.1	28.9	42.5	30.0	16.7	16.1	5.5	2.8	2.6	1.4	2.2	5.0
29	4.6	.....	36.7	32.8	19.1	15.4	5.3	2.6	2.3	1.3	1.7	5.6
30	4.1	.....	30.2	33.9	20.4	14.1	5.2	2.5	2.5	1.2	1.6	6.0
31	3.8	.....	24.1	.....	19.2	.....	5.0	2.4	.....	.9	.....	5.9

Daily discharge, in second-feet, of Alabama River at Selma, Ala., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	15,600	12,300	73,600	51,500	90,100	42,500	34,200	16,400	10,200	10,400	7,460	8,700
2	14,000	11,700	70,500	45,400	87,900	39,100	32,000	18,800	10,200	9,600	7,460	8,520
3	13,000	11,100	65,800	41,500	89,800	38,300	30,800	20,000	11,700	8,880	7,630	8,340
4	12,400	10,700	49,600	36,800	91,500	47,200	28,400	23,800	13,000	8,340	8,160	8,160
5	11,900	10,600	40,400	32,400	90,100	65,300	25,400	39,100	17,100	8,160	8,160	7,980
6	11,700	11,100	34,700	29,300	85,900	84,000	23,100	55,300	17,100	7,980	7,800	7,980
7	12,400	11,700	32,400	27,700	79,800	91,000	21,100	58,100	14,400	7,800	7,630	7,800
8	16,400	15,800	30,500	27,000	71,400	91,200	19,800	54,500	12,100	7,630	7,460	8,160
9	22,000	19,200	31,700	29,100	60,400	87,900	19,000	52,300	10,900	7,460	7,290	9,420
10	27,400	23,300	60,400	32,000	46,900	80,600	19,400	48,800	11,100	7,460	7,120	14,200
11	28,600	41,200	85,600	33,400	36,300	72,800	21,600	39,600	12,600	7,290	6,950	16,200
12	25,200	54,000	109,000	33,200	32,400	65,800	24,900	29,300	12,600	7,120	6,950	19,400
13	20,900	57,700	122,000	32,200	32,000	61,000	30,300	23,600	11,300	7,120	6,950	22,500
14	17,500	56,900	131,000	31,700	30,800	56,400	30,500	21,600	10,700	7,290	6,950	22,000
15	15,400	62,000	138,000	33,400	30,000	49,100	27,200	20,500	10,700	6,950	6,950	23,600
16	14,400	76,400	143,000	33,700	27,700	43,800	27,900	19,400	10,700	7,120	6,950	23,600
17	17,500	87,000	145,000	32,400	25,400	40,900	27,200	18,300	10,700	6,950	6,950	22,000
18	21,800	102,000	146,000	31,200	25,600	38,300	25,800	18,600	11,100	7,460	7,120	22,000
19	25,200	104,000	145,000	30,000	27,700	33,700	25,800	18,800	10,900	8,700	7,290	21,100
20	30,300	104,000	142,000	27,700	29,100	29,800	25,800	18,600	10,600	15,400	7,630	19,000
21	34,400	100,000	141,000	25,400	30,300	28,600	22,200	16,700	9,980	17,100	7,980	16,900
22	35,200	95,200	138,000	23,800	30,500	34,200	19,600	15,400	10,400	14,800	7,800	15,400
23	33,000	90,100	139,000	22,900	29,100	43,500	18,100	14,200	11,900	12,100	7,630	14,400
24	28,600	85,400	139,000	24,700	32,000	46,100	17,500	13,400	14,800	10,700	7,800	13,200
25	23,800	81,700	138,000	37,800	34,200	46,100	17,300	12,600	16,000	9,790	8,880	12,400
26	19,600	78,600	134,000	54,800	35,700	43,500	17,300	11,900	13,800	9,240	10,200	12,300
27	17,100	77,500	127,000	68,600	39,100	42,500	17,700	11,500	11,900	8,880	10,700	13,200
28	15,600	76,100	115,000	79,200	43,000	41,500	16,400	11,100	10,700	8,520	9,980	15,400
29	14,600	.....	98,000	87,000	49,400	39,600	16,000	10,700	10,200	8,340	9,060	16,700
30	13,600	.....	79,800	90,100	52,900	36,300	15,800	10,600	10,600	8,160	8,880	17,500
31	13,000	.....	62,900	.....	49,600	.....	15,400	10,400	.....	7,630	.....	17,300

NOTE.—These discharges are based on a rating curve that is well defined.

Monthly discharge of Alabama River at Selma, Ala., for 1909.

[Drainage area, 15,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimun.	Mean.	Per square mile.		
January	35,200	11,700	20,100	1.31	1.51	A.
February	104,000	10,600	56,000	3.64	3.79	A.
March	146,000	30,500	100,000	6.49	7.48	A.
April	90,100	22,900	39,500	2.56	2.86	A.
May	91,500	25,400	48,900	3.18	3.67	A.
June	91,200	28,600	52,000	3.38	3.77	A.
July	34,200	15,400	23,000	1.49	1.72	A.
August	58,100	10,400	24,300	1.58	1.82	A.
September	17,100	9,980	12,000	.779	.87	A.
October	17,100	6,950	9,040	.587	.68	A.
November	10,700	6,950	7,860	.510	.57	B.
December	23,600	7,800	15,000	.974	1.12	A.
The year	146,000	6,950	34,000	2.21	29.86	

ETOWAH RIVER NEAR BALL GROUND, GA.

This station, which is located at the iron bridge about 3 miles from Ball Ground, was established May 16, 1907, in cooperation with the Forest Service and has been continued to obtain important water-power data.

The station is one-fourth mile below the mouth of Long Swamp Creek, which is a large tributary of Etowah River. No diversions are made above the station unless by the mining ditches near the headwaters, which have at times been in operation. The operation of a number of mills above may cause slight variations in flow, and on this account the gage is read twice a day. A view of the Etowah near Cartersville, Ga., is presented in Plate V, *A*.

The vertical staff gage, located 75 feet below the bridge, was, on August 18, 1909, replaced by a standard chain gage attached to the upstream side of the bridge from which the measurements are made. The chain gage was set to read with the vertical staff at low stage and will differ only very slightly at other stages.

The left bank does not overflow, but the right bank overflows about 500 feet beyond the end of the bridge approach at high stages. The current is somewhat broken and is disturbed by rough, rocky bed and curved channel above. The rating has undergone some change due probably to silting of the bed below the station.

High-water measurements obtained in the spring of 1910 have made it possible to develop the rating curves for high stages. Monthly estimates for 1907 to 1909 are therefore published herewith.

Discharge measurements of Etowah River near Ball Ground, Ga., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 21	E. H. Swett	94	437	4.63	1,470
Do.	do	94	432	4.59	1,540
Do.	M. R. Hall	94	437	4.63	1,460
August 17	F. P. Thomas	81	341	3.36	880
August 18	M. R. Hall	81	309	3.21	725
Do.	F. P. Thomas	81	312	3.20	796
October 20	E. H. Swett	79	270	2.68	508
Do.	do	79	272	2.68	546

Daily gage height, in feet, of Etowah River near Ball Ground, Ga., for 1909.

[R. O. Ellis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.9	2.95	4.5	4.65	10.8	3.95	4.0	3.45	2.8	2.7	2.6	2.5
2	2.85	2.9	5.0	4.6	6.1	3.7	3.8	5.8	2.7	2.65	2.7	2.5
3	2.7	2.95	4.55	4.55	5.0	5.6	3.95	5.2	2.7	2.6	2.6	2.55
4	4.25	3.0	4.35	4.45	4.6	9.1	3.6	4.95	2.75	2.6	2.6	2.5
5	7.2	2.95	4.2	4.35	4.75	6.3	3.55	5.8	2.8	2.6	2.55	2.5
6	5.1	3.6	6.0	4.3	4.35	4.8	3.65	4.0	2.8	2.6	2.55	2.5
7	3.9	3.15	4.9	4.95	4.2	4.45	3.6	3.6	2.8	2.6	2.55	6.5
8	3.6	3.05	4.6	4.65	4.15	4.25	5.2	3.45	2.85	2.6	2.6	4.8
9	3.35	4.15	4.3	4.85	4.1	4.15	5.2	3.35	2.9	2.55	2.55	3.3
10	3.2	9.7	10.3	4.45	5.8	4.1	4.6	3.3	3.1	2.5	2.55	3.0
11	3.15	5.1	5.9	4.3	4.4	4.25	4.1	3.25	2.9	3.5	2.55	2.9
12	3.15	4.25	8.1	4.25	4.1	4.1	3.9	3.35	2.75	2.8	2.55	2.8
13	3.1	5.6	15.5	5.1	4.0	4.0	5.0	4.1	2.7	2.6	2.55	6.2
14	3.25	5.2	17.0	4.6	3.95	4.65	4.85	4.05	2.65	3.0	2.55	4.7
15	4.4	13.0	7.8	4.3	3.9	4.5	4.1	4.2	2.7	6.4	2.55	3.7
16	6.8	11.4	6.4	4.2	4.45	4.15	3.7	3.75	3.8	3.45	2.55	3.45
17	6.5	5.9	5.8	4.15	4.1	4.35	4.05	3.5	3.4	2.9	3.2	3.2
18	4.55	4.85	5.6	4.1	3.9	4.05	3.65	3.2	3.55	2.85	2.8	3.1
19	4.05	5.7	5.3	4.05	3.8	3.7	3.45	3.1	3.2	2.7	2.6	3.2
20	3.8	5.0	5.4	4.0	6.0	3.65	3.4	3.05	2.9	2.7	2.55	3.1
21	3.55	4.8	5.6	3.95	4.65	3.75	3.35	3.05	2.8	3.1	2.55	3.0
22	3.4	13.1	5.1	4.0	4.45	4.3	3.5	2.95	2.9	2.9	2.55	2.9
23	3.35	10.2	4.9	6.0	4.6	4.05	4.6	2.85	6.0	2.75	3.4	2.9
24	3.3	6.9	4.8	4.8	4.2	4.1	3.9	2.85	4.3	2.65	2.9	2.9
25	3.25	5.7	4.8	4.3	4.05	4.25	3.4	2.85	3.1	2.7	2.7	4.2
26	3.2	5.2	5.5	4.5	4.1	3.8	3.25	2.8	2.9	2.65	2.6	3.7
27	3.15	4.95	5.2	4.25	4.4	8.2	3.4	2.8	2.8	2.65	2.6	3.3
28	3.05	4.7	6.7	5.2	4.05	5.1	3.35	2.75	2.8	2.65	2.6	3.1
29	3.15	.....	5.4	4.5	3.85	4.7	3.25	2.75	2.7	2.6	2.55	3.05
30	3.1	.....	4.95	4.35	3.7	4.25	3.25	2.7	2.7	2.6	2.5	2.7
31	3.05	.....	4.75	.....	4.1	.....	3.3	2.9	.....	2.6	.....	2.8

Daily discharge, in second-feet, of Etowah River near Ball Ground, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	618	639	1,430	1,520	6,440	1,130	1,150	872	577	537	498	460
2	598	618	1,730	1,490	2,450	998	1,050	2,240	537	518	537	460
3	537	639	1,460	1,460	1,730	2,110	1,130	1,850	537	498	498	479
4	1,290	660	1,350	1,410	1,490	4,870	947	1,700	557	498	498	460
5	3,290	639	1,260	1,350	1,580	2,600	922	2,240	577	498	479	460
6	1,790	947	2,380	1,320	1,350	1,610	972	1,150	577	498	479	460
7	1,100	727	1,670	1,700	1,260	1,410	947	947	577	498	479	2,740
8	947	682	1,490	1,520	1,240	1,290	1,850	872	598	498	498	1,610
9	822	1,240	1,320	1,640	1,210	1,240	1,850	822	618	479	479	798
10	750	5,410	5,960	1,410	2,240	1,210	1,490	798	704	460	479	660
11	727	1,790	2,310	1,320	1,380	1,290	1,210	774	618	897	479	618
12	727	1,290	4,020	1,290	1,210	1,210	1,100	822	557	577	479	577
13	704	2,110	11,200	1,790	1,150	1,150	1,730	1,210	537	498	479	2,520
14	774	1,850	12,700	1,490	1,130	1,520	1,640	1,180	518	660	479	1,550
15	1,380	8,580	3,770	1,320	1,100	1,430	1,210	1,260	537	2,670	479	998

Daily discharge, in second-feet, of Etowah River near Ball Ground, Ga., for 1909—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	2,970	7,010	2,670	1,260	1,410	1,240	998	1,020	1,050	872	479	872
17	2,740	2,310	2,240	1,240	1,210	1,350	1,180	897	847	618	750	750
18	1,460	1,640	2,110	1,210	1,100	1,180	972	750	922	598	577	704
19	1,180	2,170	1,910	1,180	1,050	998	872	704	750	537	498	750
20	1,050	1,730	1,980	1,150	2,380	972	847	682	618	537	479	704
21	922	1,610	2,110	1,130	1,520	1,020	822	682	577	704	479	660
22	847	8,680	1,790	1,150	1,410	1,320	897	639	618	618	479	618
23	822	5,870	1,670	2,380	1,490	1,180	1,490	598	2,380	557	847	618
24	798	3,050	1,610	1,610	1,260	1,210	1,100	598	1,320	518	618	618
25	774	2,170	4,610	1,320	1,180	1,290	847	598	704	537	537	1,260
26	750	1,850	2,040	1,430	1,210	1,050	774	577	618	518	498	998
27	727	1,700	1,850	1,290	1,380	4,100	847	577	577	518	498	798
28	682	1,550	2,900	1,850	1,180	1,790	822	557	577	518	498	704
29	727	.....	1,980	1,430	1,080	1,550	774	557	537	498	479	682
30	704	.....	1,700	1,350	998	1,290	774	537	537	498	460	537
31	682	.....	1,580	.....	1,210	.....	798	618	.....	498	.....	577

NOTE.—These discharges are based on a rating curve that is fairly well defined below 7,600 second-feet. The rating curve above 6 feet is defined by measurements made during the high water in the spring of 1910. The high-water extension for 1908 parallels the 1909 rating curve above gage height 6 feet.

Monthly discharge of Etowah River near Ball Ground, Ga., for 1907–1909.

[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.		
1907.						
May 16-31	1,360	850	1,060	2.27	1.35	A.
June	2,530	708	936	2.01	2.24	A.
July	1,480	555	691	1.48	1.71	A.
August	1,540	400	643	1.38	1.59	A.
September	2,530	330	674	1.45	1.62	A.
October	685	365	463	.994	1.15	A.
November	5,110	382	1,030	2.21	2.47	A.
December	9,730	595	1,560	3.35	3.86	B.
1908.						
January	3,920	1,020	1,520	3.26	3.76	A.
February	6,970	1,110	2,170	4.66	5.03	B.
March	10,800	1,140	1,940	4.16	4.80	B.
April	10,800	1,190	2,050	4.40	4.91	B.
May	3,200	1,110	1,530	3.28	3.78	A.
June	1,360	752	999	2.14	2.39	A.
July	1,980	535	830	1.78	2.05	A.
August	1,600	495	742	1.59	1.83	A.
September	1,540	365	495	1.06	1.18	B.
October	1,220	330	513	1.10	1.27	B.
November	1,220	382	491	1.05	1.17	B.
December	7,540	435	1,170	2.51	2.89	B.
The year	10,800	330	1,200	2.58	35.06	
1909.						
January	3,290	537	1,090	2.34	2.70	A.
February	8,580	618	2,470	5.30	5.52	A.
March	12,700	1,260	2,860	6.14	7.08	B.
April	2,380	1,130	1,430	3.07	3.42	A.
May	6,440	998	1,550	3.33	3.84	A.
June	4,870	972	1,550	3.33	3.72	A.
July	1,850	774	1,100	2.36	2.72	A.
August	2,240	537	946	2.03	2.34	A.
September	2,380	518	709	1.52	1.70	B.
October	2,670	460	627	1.35	1.56	B.
November	847	460	516	1.11	1.24	B.
December	2,740	460	861	1.85	2.13	B.
The year	12,700	460	1,310	2.81	37.97	

ETOWAH RIVER NEAR ROME, GA.

The station, which is located at Freemans Ferry, about 5 miles above Rome and 1 mile below Dikes Creek, was established August 17, 1904, to take the place of the station maintained at Rome about 5 miles below the present station. The original station at Rome was maintained from July 1 to December 31, 1903. Records from this station are valuable for water power estimates as well as for general run-off studies.

The few milldams above will seldom affect the flow, but to provide for possible daily fluctuations the gage is read twice a day. The vertical gage in three sections is located on the left bank about 250 feet below the measuring section at the ferry. No change has occurred in the datum of the gage. Discharge measurements are made from a boat attached to the ferry cable.

Both banks are subject to overflow during high water. Conditions of flow are probably permanent, and an excellent rating has been developed for low stages. The rating curve above gage height 4 feet is only approximate.

The following discharge measurement was made by M. R. Hall:

May 27, 1909: Width, 290 feet; area, 1,210 square feet; gage height, 3.59 feet; discharge, 3,390 second-feet.

Daily gage height, in feet, of Etowah River near Rome, Ga., for 1909.

[R. M. Pattillo, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.5	2.4	3.85	3.95	14.1	4.1	3.2	3.4	3.35	2.4	2.2	2.1
2	2.4	2.4	4.4	3.8	13.0	3.65	3.2	3.9	2.65	2.35	2.2	2.1
3	2.3	2.4	3.9	3.7	6.0	6.8	3.1	5.6	2.45	2.25	2.2	2.1
4	2.5	2.35	3.55	3.7	4.6	11.8	3.05	10.4	2.4	2.2	2.2	2.1
5	4.7	2.5	3.5	3.65	4.4	10.6	3.0	15.0	2.4	2.15	2.15	2.1
6	6.1	3.35	4.0	3.5	4.1	6.8	3.0	5.5	2.6	2.1	2.15	2.1
7	4.2	3.2	5.6	4.0	3.9	4.8	3.0	4.2	3.6	2.1	2.15	2.95
8	3.35	2.75	4.4	4.4	3.75	4.1	3.1	3.75	2.8	2.1	2.15	6.0
9	2.95	2.65	3.95	4.4	3.65	3.85	4.6	3.95	2.7	2.1	2.1	3.9
10	2.8	10.6	13.3	4.3	6.2	3.65	4.2	3.5	2.6	2.1	2.1	3.0
11	2.8	9.4	12.0	3.75	4.8	4.4	3.6	3.2	2.55	2.4	2.1	2.6
12	2.7	4.8	9.0	3.5	3.85	3.7	3.2	4.4	2.5	2.6	2.1	2.5
13	2.7	7.0	19.0	4.0	3.55	3.55	3.1	4.8	2.4	2.35	2.1	3.7
14	2.65	9.0	22.2	5.0	3.5	3.8	4.6	4.2	2.3	2.35	2.1	4.7
15	2.95	7.8	20.2	4.2	3.45	3.8	4.1	3.9	2.3	6.9	2.1	3.6
16	4.8	13.6	16.0	3.65	4.2	3.4	3.15	3.4	2.4	5.6	2.1	3.0
17	6.8	11.5	14.1	3.5	4.2	3.4	3.65	3.15	2.75	3.0	2.2	2.8
18	5.0	5.8	11.6	3.5	3.5	3.4	3.25	3.0	2.75	2.6	2.3	2.7
19	3.9	4.8	8.8	3.45	3.4	3.25	2.95	2.8	3.1	2.45	2.2	2.6
20	3.45	5.4	5.8	3.4	4.0	3.1	2.8	2.7	2.65	2.3	2.15	2.55
21	3.15	4.3	8.5	3.4	4.5	4.4	2.75	2.65	2.5	2.3	2.1	2.5
22	3.0	6.9	6.0	3.4	4.1	4.6	2.75	2.6	2.4	2.55	2.1	2.5
23	2.9	13.4	4.7	5.1	3.7	4.8	3.45	2.6	2.7	2.35	2.2	2.5
24	2.85	10.0	4.4	6.2	3.5	5.4	3.65	2.5	3.6	2.2	2.15	2.55
25	2.8	8.4	6.8	4.5	3.5	3.9	2.95	2.5	3.4	2.15	2.2	2.65
26	2.7	5.4	6.8	5.2	3.5	4.0	2.8	2.45	2.75	2.2	2.2	3.8
27	2.65	4.5	4.8	4.6	3.55	5.1	2.7	2.4	2.4	2.25	2.15	3.2
28	2.6	4.2	5.4	6.6	3.75	4.6	2.8	2.4	2.3	2.25	2.1	2.9
29	2.6	.....	5.4	5.2	3.6	4.0	2.7	2.35	2.3	2.2	2.1	2.65
30	2.6	.....	4.6	4.4	3.25	3.5	3.0	2.6	2.2	2.25	2.1	2.5
31	2.5	.....	4.2	.....	3.8	.....	3.3	5.7	.....	2.25	.....	2.4

Daily discharge, in second-feet, of Etowah River near Rome, Ga., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,660	1,540	3,730	3,910	22,200	4,180	2,640	2,960	2,880	1,540	1,300	1,200
2	1,540	1,540	4,720	3,640	20,200	3,380	2,640	3,820	1,860	1,480	1,300	1,200
3	1,420	1,540	3,820	3,470	7,600	9,040	2,490	6,880	1,600	1,360	1,300	1,200
4	1,660	1,480	3,220	3,470	5,080	18,000	2,420	15,500	1,540	1,300	1,300	1,200
5	5,260	1,660	3,130	3,380	4,720	15,900	2,340	23,800	1,540	1,250	1,250	1,200
6	7,780	2,880	4,000	3,130	4,180	9,040	2,340	6,700	1,790	1,200	1,250	1,200
7	4,360	2,640	6,880	4,000	3,820	5,440	2,340	4,360	3,300	1,200	1,250	2,270
8	2,880	1,990	4,720	4,720	3,560	4,180	2,490	3,560	2,060	1,200	1,250	7,600
9	2,270	1,860	3,910	4,720	3,380	3,730	5,080	3,910	1,920	1,200	1,200	3,820
10	2,060	15,900	20,700	4,540	7,960	3,380	4,360	3,130	1,790	1,200	1,200	2,340
11	2,060	13,700	18,400	3,560	5,440	4,720	3,300	2,640	1,730	1,540	1,200	1,790
12	1,920	5,440	13,000	3,130	3,730	3,470	2,640	4,720	1,660	1,790	1,200	1,660
13	1,920	9,400	31,000	4,000	3,220	3,220	2,490	5,440	1,540	1,480	1,200	3,470
14	1,860	13,000	36,800	5,800	3,130	3,640	5,080	4,360	1,420	1,480	1,200	5,260
15	2,270	10,800	33,200	4,360	3,050	3,640	4,180	3,820	1,420	9,220	1,200	3,300
16	5,440	21,300	25,600	3,380	4,360	2,960	2,570	2,960	1,540	6,888	1,200	2,340
17	9,040	17,500	22,200	3,130	4,360	2,960	3,380	2,570	1,990	2,340	1,300	2,060
18	5,800	7,240	17,700	3,130	3,130	2,960	2,720	2,340	1,990	1,790	1,420	1,920
19	3,820	5,440	12,600	3,050	2,960	2,720	2,270	2,060	2,490	1,600	1,300	1,790
20	3,050	6,520	7,240	2,960	4,000	2,490	2,060	1,920	1,860	1,420	1,250	1,730
21	2,570	4,540	12,100	2,960	4,900	4,720	1,990	1,860	1,660	1,420	1,200	1,660
22	2,340	9,220	7,600	2,960	4,180	5,080	1,990	1,790	1,540	1,730	1,200	1,660
23	2,200	20,900	5,260	5,980	3,470	5,440	3,050	1,790	1,920	1,480	1,300	1,660
24	2,120	14,800	4,720	7,960	3,130	6,520	3,380	1,660	3,300	1,300	1,250	1,730
25	2,060	11,900	9,040	4,900	3,130	3,820	2,270	1,660	2,960	1,250	1,300	1,860
26	1,920	6,520	9,040	6,160	3,130	4,000	2,060	1,600	1,990	1,300	1,300	3,640
27	1,860	4,900	5,440	5,080	3,220	5,980	1,920	1,540	1,540	1,360	1,250	2,640
28	1,790	4,360	6,520	8,680	3,560	5,080	2,060	1,540	1,420	1,360	1,200	2,200
29	1,790	.....	6,520	6,160	3,300	4,000	1,920	1,480	1,420	1,300	1,200	1,860
30	1,790	.....	5,080	4,720	2,720	3,130	2,340	1,790	1,300	1,360	1,200	1,660
31	1,660	.....	4,360	.....	3,640	.....	2,800	7,060	.....	1,360	.....	1,540

NOTE.—These discharges are based on a rating curve that is well defined below 4,000 second-feet. Above 10,200 second-feet the curve is only approximate.

Monthly discharge of Etowah River near Rome, Ga., for 1909.

[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.		
January	9,040	1,420	2,910	1.62	1.87	A.
February	21,300	1,480	7,880	4.38	4.56	B.
March	36,800	3,130	11,400	6.33	7.30	C.
April	8,680	2,960	4,370	2.43	2.71	A.
May	22,200	2,720	5,110	2.84	3.27	A.
June	18,000	2,490	5,230	2.91	3.25	A.
July	5,080	1,920	2,760	1.53	1.76	A.
August	23,800	1,480	4,230	2.35	2.71	A.
September	3,300	1,300	1,900	1.06	1.18	A.
October	9,220	1,200	1,860	1.03	1.19	A.
November	1,420	1,200	1,250	.694	.77	A.
December	7,600	1,200	2,280	1.27	1.46	A.
The year	36,800	1,200	4,270	2.37	32.03	

TALLAPOOSA RIVER AT STURDEVANT, ALA.

This station, which is located at the Central of Georgia Railroad bridge, one-fourth mile west of Sturdevant, 6 miles east of Alexander City, and about 5 miles below the mouth of Hillabee Creek, was established July 19, 1900, mainly to obtain data for water-power estimates

and to take the place of the Milstead, Ala., station, which was to be abandoned when the great water-power plants immediately above were put in operation.

The flow is under no artificial control except at a number of small mills a great distance upstream.

Prior to 1906 a standard chain gage was attached to the bridge. During 1906 the bridge was replaced by a new one and the present vertical staff gage was located at Stowe's boat landing, about 2,000 feet upstream. All gage readings on the new gage are reduced to conform to the standard gage readings at the bridge.

At low stage the current in a portion of the channel becomes very sluggish, making measurements inaccurate at such stages, and for this reason some of the low-water measurements have been made from a boat at swifter sections near by. Both banks overflow for about 200 feet at extreme high stages. Conditions of flow appear to be somewhat changeable, but a fairly good rating curve has been developed.

The following discharge measurement was made by E. H. Swett:

June 4, 1909: Width, 394 feet; area, 3,940 square feet; gage height, 5.92 feet; discharge, 9,050 second-feet.

Daily gage height, in feet, of Tallapoosa River at Sturdevant, Ala., for 1909.

[C. J. Stowe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.15	1.75	3.5	3.9	8.4	3.5	3.25	5.3	3.05	1.6	1.4	1.7
2	2.1	1.75	3.3	3.8	7.9	4.0	3.25	4.1	3.9	1.6	1.5	1.7
3	2.05	1.8	3.3	3.7	7.3	4.8	3.05	12.3	4.0	1.5	1.75	1.6
4	1.95	1.75	3.65	3.6	5.4	5.8	2.8	11.7	2.95	1.45	1.55	1.6
5	2.05	1.7	3.3	3.5	4.9	5.6	2.6	7.8	2.15	1.4	1.45	1.6
6	2.95	4.1	3.15	3.5	4.3	5.1	2.5	6.5	2.0	1.35	1.45	1.6
7	3.05	4.6	3.95	3.6	4.0	4.8	2.4	6.1	2.0	1.35	1.45	3.1
8	3.3	3.7	7.6	4.1	3.85	4.2	2.4	5.4	2.4	1.35	1.45	5.4
9	2.95	3.05	5.6	4.5	3.7	3.4	4.1	4.2	2.6	1.35	1.4	4.5
10	2.4	10.5	17.3	4.1	4.6	3.3	5.1	3.7	2.0	1.35	1.45	3.9
11	2.15	8.7	13.1	3.9	4.2	4.1	4.8	3.6	2.0	1.3	1.45	3.05
12	2.05	6.0	12.1	3.6	4.1	4.3	4.1	3.35	2.45	1.4	1.45	2.8
13	2.05	4.7	19.0	4.1	3.6	3.8	4.6	4.1	2.15	1.3	1.45	5.4
14	2.2	7.8	14.7	4.6	3.4	3.6	5.4	3.55	1.9	1.25	1.45	5.2
15	2.35	7.6	12.5	4.4	3.3	3.4	4.4	3.2	1.85	1.35	1.4	4.5
16	2.5	9.9	10.3	4.0	3.25	4.1	4.7	3.2	1.9	2.8	1.45	3.85
17	2.95	7.9	7.5	3.7	3.6	3.7	4.6	3.85	2.5	2.9	1.9	3.2
18	3.15	5.9	5.2	3.4	3.4	3.4	3.7	3.4	2.25	2.3	2.25	2.75
19	3.4	5.0	4.9	3.3	3.4	3.3	3.8	2.8	2.1	1.95	1.9	2.7
20	2.8	4.7	5.2	3.25	4.6	3.6	4.4	2.55	1.9	1.7	1.8	2.75
21	2.55	4.3	13.3	3.15	4.0	4.2	3.7	2.4	2.1	1.6	1.7	2.65
22	2.35	7.8	9.4	3.05	4.0	5.6	2.85	2.3	3.45	1.95	1.6	2.55
23	2.25	6.0	7.0	5.0	3.8	4.8	2.8	2.15	3.25	2.4	3.3	2.4
24	2.15	6.8	5.7	7.5	3.4	4.4	4.6	2.05	2.8	2.15	3.75	2.35
25	2.15	5.8	5.4	7.0	3.9	4.5	3.5	2.05	2.7	1.95	3.1	3.3
26	2.1	5.0	5.2	8.2	4.1	3.9	2.8	1.95	2.25	1.8	2.4	3.35
27	2.05	4.2	5.0	8.4	5.1	4.7	2.4	1.9	2.0	1.6	2.15	3.55
28	1.95	3.8	4.6	8.6	6.7	4.1	2.35	1.9	1.9	1.5	1.85	3.25
29	1.95	.....	5.2	6.6	4.4	3.5	2.25	1.8	1.75	1.5	1.7	2.8
30	1.9	.....	4.5	5.3	3.8	3.5	3.25	2.0	1.55	1.5	1.7	2.5
31	1.8	.....	4.1	.....	4.0	.....	3.7	3.1	.....	1.45	.....	2.35

Daily discharge, in second-feet, of Tallapoosa River, at Sturdevant, Ala., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,720	1,320	3,600	4,320	16,800	3,600	3,190	7,540	2,880	1,180	1,020	1,270
2	1,670	1,320	3,270	4,130	15,200	4,510	3,190	4,710	4,320	1,180	1,100	1,270
3	1,620	1,360	3,270	3,950	13,300	6,250	2,880	29,300	4,510	1,100	1,320	1,180
4	1,510	1,320	3,860	3,770	7,800	8,880	2,530	27,400	2,740	1,060	1,140	1,180
5	1,620	1,270	3,270	3,600	6,500	8,330	2,270	14,900	1,720	1,020	1,060	1,180
6	2,740	4,710	3,040	3,600	5,120	7,020	2,140	10,800	1,560	985	1,060	1,180
7	2,880	5,770	4,420	3,770	4,510	6,250	2,020	9,720	1,560	985	1,060	2,960
8	3,270	3,950	14,300	4,710	4,220	4,910	2,020	7,800	2,020	985	1,060	7,800
9	2,740	2,880	8,330	5,550	3,950	3,430	4,710	4,910	2,270	985	1,020	5,550
10	2,020	23,600	45,300	4,710	5,770	3,270	7,020	3,950	1,560	985	1,060	4,320
11	1,720	17,800	31,900	4,320	4,910	4,710	6,250	3,770	1,560	950	1,060	2,880
12	1,620	9,440	28,700	3,770	4,710	5,120	4,710	3,350	2,080	1,020	1,060	2,530
13	1,620	6,010	50,800	4,710	3,770	4,130	5,770	4,710	1,720	950	1,060	7,800
14	1,780	14,900	37,000	5,770	3,430	3,770	7,800	3,680	1,460	915	1,060	7,280
15	1,960	14,300	30,000	5,330	3,270	3,430	5,330	3,110	1,410	985	1,020	5,550
16	2,140	21,600	22,900	4,510	3,190	4,710	6,010	3,110	1,460	2,530	1,060	4,220
17	2,740	15,200	14,000	3,950	3,770	3,950	5,770	4,220	2,140	2,670	1,460	3,110
18	3,040	9,160	7,280	3,430	3,430	3,430	3,950	3,430	1,840	1,900	1,840	2,460
19	3,430	6,760	6,500	3,270	3,430	3,270	4,130	2,530	1,670	1,510	1,460	2,400
20	2,530	6,010	7,280	3,190	5,770	3,770	5,330	2,200	1,460	1,270	1,360	2,460
21	2,200	5,120	32,500	3,040	4,510	4,910	3,950	2,020	1,670	1,180	1,270	2,340
22	1,960	14,900	20,000	2,880	4,510	8,330	2,600	1,900	3,520	1,510	1,180	2,200
23	1,840	9,440	12,400	6,760	4,130	6,250	2,530	1,720	3,190	2,020	3,270	2,020
24	1,720	11,700	8,600	14,000	3,430	5,330	5,770	1,620	2,530	1,720	4,040	1,960
25	1,720	8,880	7,800	12,400	4,320	5,550	3,600	1,620	2,400	1,510	2,960	3,270
26	1,670	6,760	7,280	16,200	4,710	4,320	2,530	1,510	1,840	1,360	2,020	3,350
27	1,620	4,910	6,760	16,800	7,020	6,010	2,020	1,460	1,560	1,180	1,720	3,680
28	1,510	4,130	5,770	17,500	11,400	4,710	1,960	1,460	1,460	1,100	1,410	3,190
29	1,510	.....	7,280	11,100	5,330	3,600	1,840	1,360	1,320	1,100	1,270	2,530
30	1,460	.....	5,550	7,540	4,130	3,600	3,190	1,560	1,140	1,100	1,270	2,140
31	1,360	.....	4,710	.....	4,510	.....	3,950	2,960	.....	1,060	.....	1,960

NOTE.—These discharges are based on a rating curve that is well defined.

Monthly discharge of Tallapoosa River at Sturdevant, Ala., for 1909.

[Drainage area, 2,500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	3,430	1,360	2,030	0.812	0.94	A.
February	23,600	1,270	8,380	3.35	3.49	A.
March	50,800	3,040	14,400	5.76	6.64	A.
April	17,500	2,880	6,420	2.57	2.87	A.
May	16,800	3,190	5,830	2.33	2.69	A.
June	8,880	3,270	4,980	1.99	2.22	A.
July	7,800	1,840	3,900	1.56	1.80	A.
August	29,300	1,360	5,620	2.25	2.59	A.
September	4,510	1,140	2,090	.836	.93	A.
October	2,670	915	1,290	.516	.59	A.
November	4,040	1,020	1,460	.584	.65	A.
December	7,800	1,180	3,140	1.26	1.45	A.
The year	50,800	915	4,960	1.98	26.86	

TOMBIGBEE RIVER AT COLUMBUS, MISS.

The station is located at the county highway bridge at the south end of Main street in the city of Columbus, Miss. Gage heights from 1900 to 1904 have been furnished by the United States Weather

Bureau, and estimates of discharge are based thereon. On July 13, 1905, the present chain gage was installed by the United States Geological Survey at the highway bridge 1,000 feet above the gage of the United States Weather Bureau. The new gage was set to read the same as the United States Weather Bureau gage at low water, which makes it practically on the same datum as the low-water surface is almost level. Discharge measurements are made from the bridge.

The right bank is high and seldom overflows. The left bank overflows only under the bridge approach at a gage height of about 20 feet. The bed of the stream is of soft limestone or chalk, and conditions of flow are somewhat changeable at low stages.

The following discharge measurement was made by E. H. Swett:

August 21, 1909: Width, 83 feet; area, 941 square feet; gage height, —2.93 feet; discharge, 646 second-feet.

Daily gage height, in feet, of Tombigbee River at Columbus, Miss., for 1909.

[C. R. Shackelford, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.2	−1.1	21.9	2.8	12.9	16.3	3.1	−2.4	−3.5	−3.7	−3.7	−3.2
2	.4	−1.3	20.7	2.1	11.0	17.6	3.4	− .6	−3.5	−3.7	−3.7	−3.2
3	.4	−1.4	18.9	1.4	8.3	20.0	3.1	.0	−3.5	−3.7	−3.7	−3.2
4	.1	−1.5	16.6	1.1	7.5	20.6	2.5	− .5	−3.6	−3.7	−3.7	−3.2
5	.3	−1.6	13.9	.9	7.2	20.1	2.1	−1.1	−3.6	−3.8	−3.7	−3.2
6	1.1	−1.4	12.1	.6	6.4	18.8	1.2	−1.6	−3.6	−3.8	−3.7	−3.1
7	1.6	.6	9.8	.9	4.9	16.6	.3	−1.6	−3.6	−3.8	−3.7	−2.9
8	1.8	2.0	10.8	6.2	3.6	12.9	− .3	−1.7	−2.7	−3.8	−3.7	−2.7
9	1.4	2.5	11.1	7.6	2.2	9.0	− .3	−1.8	−2.6	−3.8	−3.7	−2.0
10	.8	10.3	11.9	8.3	1.2	8.4	4.3	−1.8	−2.9	−3.8	−3.7	−1.3
11	.1	12.0	11.5	8.4	.8	6.1	3.1	−1.9	−2.9	−3.8	−3.6	−1.0
12	− .3	12.4	13.1	6.9	.4	6.0	3.1	−2.0	−2.8	−3.9	−3.6	−1.2
13	− .5	14.0	19.1	5.5	.2	5.7	3.0	−2.1	−3.0	−3.9	−3.5	−1.4
14	− .7	15.7	26.6	8.4	− .2	6.7	1.9	−2.2	−2.9	−3.9	−3.5	−1.6
15	.5	16.4	28.5	8.9	− .5	9.6	4.1	−2.3	−2.6	−3.9	−3.5	−1.4
16	2.5	16.7	27.6	9.3	− .7	7.8	3.6	−2.2	−2.7	−3.9	−3.5	−1.0
17	3.6	17.0	26.5	10.6	−1.0	6.4	3.6	−2.4	−3.0	−3.9	−3.4	−1.2
18	4.3	19.5	24.5	10.2	− .4	6.0	3.7	−2.6	−3.3	−3.7	−3.3	−1.3
19	4.5	21.0	22.1	8.1	.2	4.5	1.9	−2.8	−3.3	−3.5	−3.3	−1.5
20	4.1	21.3	20.1	5.1	1.1	2.4	− .1	−2.9	−3.3	−3.5	−3.1	−2.1
21	3.2	20.9	20.6	3.4	1.4	2.4	− .8	−2.9	−3.3	−3.3	−2.9	−2.3
22	2.1	19.9	19.8	2.9	1.2	9.0	−1.2	−2.9	−3.4	−3.4	−2.9	−2.4
23	1.3	18.9	18.5	3.2	1.1	11.5	−1.5	−3.0	−3.5	−3.5	−2.9	−2.5
24	.8	18.6	17.7	8.4	.2	11.6	−1.7	−3.1	−3.6	−3.5	−3.0	−2.5
25	.3	19.4	16.2	8.6	1.2	9.6	−1.5	−3.2	−3.6	−3.6	−3.1	−2.5
26	.1	19.8	13.0	11.5	4.6	8.0	−1.6	−3.4	−3.6	−3.7	−3.1	−1.4
27	− .3	21.0	8.4	12.9	9.6	6.6	−1.8	−3.4	−3.7	−3.7	−2.7	− .0
28	− .5	22.2	5.5	15.2	11.1	5.1	−2.1	−3.5	−3.7	−3.7	−2.7	.9
29	− .9	.....	4.4	15.3	12.1	4.1	−2.3	−3.5	−3.7	−3.7	−2.7	.4
30	−1.0	.....	3.7	14.3	12.2	3.1	−2.5	−3.5	−3.7	−3.7	−3.0	.1
31	−1.0	.....	3.2	.....	12.8	.....	−2.6	−3.5	.....	−3.7	.....	− .5

Daily discharge, in second-feet, of Tombigbee River at Columbus, Miss., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,760	1,730	35,600	5,450	20,300	26,100	5,800	895	380	310	310	500
2	2,940	1,590	33,600	4,650	17,200	28,300	6,160	2,090	380	310	310	500
3	2,940	1,520	30,500	3,900	13,000	32,400	5,800	2,580	380	310	310	500
4	2,660	1,460	26,600	3,600	11,800	33,400	5,100	2,170	345	310	310	500
5	2,840	1,390	22,000	3,400	11,400	32,600	4,650	1,730	345	280	310	500

Daily discharge, in second-feet, of Tombigbee River at Columbus, Miss., for 1909—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
6	3,600	1,520	19,000	3,120	10,200	30,400	3,700	1,390	345	280	310	545
7	4,110	3,120	15,300	3,400	8,100	26,600	2,840	1,390	345	280	310	635
8	4,320	4,540	16,800	9,900	6,410	20,300	2,330	1,320	735	280	310	735
9	3,900	5,100	17,300	11,900	4,760	14,000	2,330	1,260	785	280	310	1,130
10	3,300	16,100	18,600	13,000	3,700	13,100	7,310	1,260	635	280	310	1,590
11	2,660	18,800	18,000	13,100	3,300	9,760	5,800	1,200	635	280	345	1,800
12	2,330	19,500	20,700	10,900	2,940	9,620	5,800	1,130	685	250	345	1,660
13	2,170	22,200	30,900	8,920	2,760	9,200	5,680	1,070	590	250	380	1,520
14	2,020	25,100	43,600	13,100	2,410	10,600	4,430	1,010	635	250	380	1,390
15	3,020	26,300	46,800	13,900	2,170	15,000	7,050	950	785	250	380	1,520
16	5,100	26,800	45,300	14,500	2,020	12,200	6,410	1,010	735	250	380	1,800
17	6,410	27,300	43,400	16,500	1,800	10,200	6,410	895	590	250	420	1,660
18	7,310	31,600	40,000	15,900	2,250	9,620	6,540	785	460	310	460	1,590
19	7,570	34,100	36,000	12,700	2,760	7,570	4,430	685	460	380	460	1,460
20	7,050	34,600	32,600	8,380	3,600	4,990	2,500	635	460	380	545	1,070
21	5,920	33,900	33,400	6,160	3,900	4,990	1,940	635	460	460	635	950
22	4,650	32,200	32,100	5,560	3,700	14,000	1,660	635	420	420	635	895
23	3,800	30,500	29,800	5,920	3,600	18,000	1,460	590	380	380	635	840
24	3,300	30,000	28,500	13,100	2,760	18,100	1,320	545	345	380	590	840
25	2,840	31,400	25,900	13,400	3,700	15,000	1,460	500	345	345	545	840
26	2,660	32,100	20,500	18,000	7,700	12,500	1,390	420	345	310	545	1,520
27	2,330	34,100	13,100	20,300	15,000	10,500	1,260	420	310	310	735	2,580
28	2,170	36,100	8,920	24,200	17,300	8,380	1,070	380	310	310	735	3,400
29	1,870	.....	7,440	24,400	19,000	7,050	950	380	310	310	735	2,940
30	1,800	.....	6,540	22,700	19,100	5,800	840	380	310	310	590	2,660
31	1,800	.....	5,920	.....	20,200	.....	785	380	.....	310	.....	2,170

NOTE.—These discharges are based on a rating curve that is well defined.

Monthly discharge of Tombigbee River at Columbus, Miss., for 1909.

[Drainage area, 4,440 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	7,570	1,800	3,620	0.815	0.94	A.
February	36,100	1,390	20,200	4.55	4.74	A.
March	46,800	5,920	26,000	5.86	6.76	A.
April	24,400	3,120	11,500	2.59	2.89	A.
May	20,300	1,800	8,030	1.81	2.09	A.
June	33,400	4,990	15,700	3.54	3.95	A.
July	7,310	785	3,720	.838	.97	A.
August	2,580	380	991	.223	.26	B.
September	785	310	475	.107	.12	B.
October	460	250	310	.070	.08	C.
November	735	310	452	.102	.11	B.
December	3,400	500	1,360	.306	.35	B.
The year	46,800	250	7,700	1.73	23.26	

TOMBIGBEE RIVER AT EPES, ALA.

This station is located at the bridge of the Alabama Great Southern Railroad, one-half mile from Epes, Ala.

A record of approximate gage heights, based on a gage painted on one of the bridge piers, has been kept by the Alabama Great Southern Railroad for a number of years. During 1900 and 1901 discharge measurements were made by the United States Geological Survey and a rating was developed for these years. November 29, 1904,

the station was reestablished by the United States Geological Survey. The records are valuable chiefly as general run-off data, the stream being navigable for small boats at and for a long distance above the station.

Discharge measurements are made from the downstream side of the railroad bridge.

The datum of the chain gage, which is attached to the railroad bridge, is practically the same as that of the old gage and has not been changed since its installation. The right bank is high and is not subject to overflow. The left bank will not overflow until the river reaches a stage of 38 feet. During floods it overflows for seven-eighths of a mile under the trestle approach to the bridge.

Conditions of flow at this point are practically permanent and a good rating has been developed.

Discharge measurements of Tombigbee River at Epes, Ala., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 20	E. H. Swett	142	838	2.22	1,440
September 17	M. R. Hall	110	758	1.75	1,290

Daily gage height, in feet, of Tombigbee River at Epes, Ala., for 1909.

[J. C. Horton, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.7	3.95	40.6	31.2	44.0	35.4	18.0	3.7	1.1	0.9	0.8	1.6
2	6.4	3.75	40.6	25.2	44.0	37.2	14.8	2.75	1.1	.9	.8	1.5
3	6.4	3.55	40.6	19.4	43.6	39.9	13.2	3.95	1.1	.8	.8	1.45
4	6.4	3.5	40.3	15.8	42.5	42.3	11.8	5.6	1.1	.8	.8	1.4
5	6.2	3.5	40.0	11.6	40.6	43.8	10.3	5.6	1.0	.75	.8	1.45
6	7.0	3.85	39.5	9.2	37.4	44.5	9.4	4.9	1.0	.7	.8	1.65
7	7.6	4.25	38.1	10.0	33.2	44.8	8.4	4.35	.95	.7	.8	1.9
8	8.0	5.0	36.0	13.2	27.1	44.8	7.2	4.2	.95	.65	.8	2.35
9	8.2	7.2	34.6	15.2	21.6	44.7	6.5	4.05	1.2	.6	.8	2.55
10	7.8	14.6	33.8	16.0	16.8	44.0	7.6	3.6	1.55	.6	.8	2.75
11	7.0	18.6	32.5	16.2	12.3	43.0	10.5	3.35	1.45	.6	.8	3.0
12	6.3	21.4	37.2	16.4	8.8	40.4	11.1	3.4	1.25	.6	.8	3.5
13	5.8	22.8	40.9	18.2	7.3	37.2	10.5	2.95	1.1	.6	.8	3.9
14	5.8	26.1	42.4	19.8	6.5	34.4	9.8	2.9	1.25	.55	.9	3.75
15	6.6	28.5	43.4	20.5	6.0	30.2	8.4	2.85	1.1	.5	1.0	3.85
16	7.6	30.4	44.4	20.5	5.6	27.8	9.0	2.65	1.25	.5	1.0	3.9
17	9.6	31.5	45.4	19.8	5.3	25.8	9.3	2.45	1.6	.5	1.0	3.75
18	10.7	32.2	47.2	19.8	5.2	23.0	9.0	2.3	1.45	.5	1.0	3.55
19	11.1	33.5	48.5	19.8	8.0	20.0	8.9	2.2	1.4	.5	1.1	3.35
20	11.2	34.4	49.5	19.7	10.6	17.0	7.6	2.1	1.3	.75	1.2	3.15
21	10.9	35.4	49.7	18.2	14.0	16.1	5.7	1.85	1.3	1.2	1.35	2.95
22	9.4	36.4	49.5	14.6	12.0	27.5	4.7	1.7	1.3	1.85	1.55	2.65
23	8.6	37.4	49.0	19.6	8.8	34.4	4.2	1.7	1.2	1.85	1.75	2.65
24	7.6	38.6	48.5	27.6	8.0	36.3	3.8	1.6	1.15	1.8	1.75	2.5
25	7.1	39.2	47.8	33.2	12.5	36.2	3.35	1.5	1.2	1.65	1.6	2.65
26	6.6	40.1	47.1	40.2	19.0	35.2	3.2	1.4	1.05	1.5	1.6	2.9
27	6.2	40.4	46.4	41.6	26.9	33.4	3.2	1.3	1.0	1.4	1.6	3.55
28	5.8	40.6	45.4	42.6	30.0	30.6	3.2	1.2	.9	1.25	1.75	4.3
29	5.4	.....	43.9	43.2	33.0	26.9	3.2	1.2	.9	1.15	1.85	5.2
30	4.7	.....	41.4	43.6	33.2	22.4	3.95	1.2	.9	1.0	1.75	5.6
31	4.3	.....	37.2	.....	33.6	.....	4.4	1.2	.....	.9	.....	5.2

Daily discharge, in second-feet, of Tombigbee River at Epes, Ala., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,790	3,020	41,000	31,300	44,600	35,600	17,500	2,790	832	730	682	1,120
2	5,480	2,840	41,000	25,000	44,600	37,500	14,200	1,950	832	730	682	1,060
3	5,480	2,660	41,000	19,000	44,200	40,300	12,500	3,020	832	682	682	1,030
4	5,480	2,610	40,700	15,300	43,000	42,800	11,100	4,650	832	682	682	997
5	5,270	2,610	40,400	10,900	41,000	44,400	9,530	4,650	780	659	682	1,030
6	6,100	2,930	39,900	8,390	37,700	45,100	8,600	3,960	780	636	682	1,140
7	6,720	3,310	38,400	9,220	33,300	45,400	7,560	3,410	755	636	682	1,300
8	7,140	4,060	36,300	12,500	27,000	45,400	6,310	3,260	755	614	682	1,620
9	7,350	6,310	34,800	14,600	21,300	45,300	5,580	3,120	886	592	682	1,780
10	6,930	14,000	34,000	15,500	16,300	44,600	6,720	2,700	1,080	592	682	1,950
11	6,100	18,200	32,600	15,700	11,600	43,500	9,740	2,480	1,030	592	682	2,160
12	5,370	21,100	37,500	15,900	7,970	40,800	10,400	2,520	914	592	682	2,610
13	4,860	22,500	41,400	17,700	6,410	37,500	9,740	2,120	832	592	682	2,980
14	4,860	26,000	42,900	19,400	5,580	34,600	9,010	2,080	914	571	730	2,840
15	5,680	28,500	44,000	20,100	5,060	30,200	7,560	2,030	832	550	780	2,930
16	6,720	30,400	45,000	20,100	4,650	27,700	8,180	1,870	914	550	780	2,980
17	8,800	31,600	46,000	19,400	4,350	25,700	8,490	1,700	1,120	550	780	2,840
18	9,950	32,300	47,900	19,400	4,250	22,700	8,180	1,580	1,030	550	780	2,660
19	10,400	33,700	49,300	19,400	7,140	19,600	8,080	1,510	997	550	832	2,480
20	10,500	34,600	50,300	19,300	9,840	16,500	6,720	1,440	941	659	886	2,300
21	10,200	35,600	50,500	17,700	13,400	15,600	4,750	1,270	941	886	969	2,120
22	8,600	36,700	50,300	14,000	11,300	27,400	3,760	1,180	941	1,270	1,080	1,870
23	7,760	37,700	49,800	19,200	7,970	34,600	3,260	1,180	886	1,270	1,210	1,870
24	6,720	39,000	49,300	27,500	7,140	36,600	2,890	1,120	859	1,240	1,210	1,740
25	6,200	39,600	48,500	33,300	11,800	36,500	2,480	1,060	886	1,140	1,120	1,870
26	5,680	40,500	47,800	40,600	18,600	35,400	2,340	997	806	1,060	1,120	2,080
27	5,270	40,800	47,100	42,100	26,800	33,600	2,340	941	780	997	1,120	2,660
28	4,860	41,000	46,000	43,100	30,000	30,600	2,340	886	730	914	1,210	3,360
29	4,450	.....	44,500	43,700	33,100	26,800	2,340	886	730	859	1,270	4,250
30	3,760	.....	41,900	44,200	33,300	22,100	3,020	886	730	780	1,210	4,650
31	3,360	.....	37,500	.....	33,800	.....	3,460	886	.....	730	.....	4,250

NOTE.—These discharges are based on a rating curve that is well defined between discharges 1,300 and 15,000 second-feet.

Monthly discharge of Tombigbee River at Epes, Ala., for 1909.

[Drainage area, 8,830 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	10,500	3,360	6,510	0.737	0.85	A.
February	41,000	2,610	22,600	2.56	2.67	A.
March	50,500	32,600	43,100	4.88	5.63	A.
April	44,200	8,390	22,500	2.55	2.84	A.
May	44,600	4,250	20,900	2.37	2.73	A.
June	45,400	15,600	34,100	3.86	4.31	A.
July	17,500	2,340	7,050	.798	.92	A.
August	4,650	886	2,070	.234	.27	A.
September	1,120	730	873	.099	.11	B.
October	1,270	550	757	.086	.10	B.
November	1,270	682	865	.098	.11	B.
December	4,650	997	2,280	.258	.30	A.
The year	50,500	550	13,600	1.54	20.84	

BLACK WARRIOR RIVER NEAR CORDOVA, ALA.

The station is located at the Kansas City, Memphis and Birmingham Railroad bridge which crosses the river below the mouth of Cane Creek, 1 mile east of Cordova. It is 12 miles below the junction of Mulberry and Sipsey forks and 6 miles below Blackwater Creek.

On May 21, 1900, discharge measurements were begun by the United States Geological Survey and the gage which had formerly been used by the United States Weather Bureau was repaired and read daily. Since 1904 the United States Army Engineer Corps has maintained the gage and furnished readings to the United States Geological Survey. The records are valuable chiefly as general run-off data, but are also of interest in connection with industrial water supply for the Birmingham district.

The portion of the gage below 12 feet has been changed a number of times and also its location. Although the datum has been supposed to remain the same it is probable that the readings have been affected by these changes. The portion from 12 to 55 feet is a vertical timber fastened to the bridge pier on the left bank of the river.

Discharge measurements are made at the railroad bridge when possible to get good results. At extreme low water the current becomes too sluggish for accurate measurement and the lowest measurements are made by wading or from a boat at swifter sections near by. The minimum flow is especially low per square mile of drainage area, and the rating at this stage is liable to considerable change. The right bank will not overflow. The left bank overflows only under the second span of the bridge.

No discharge measurements were made during 1909. Owing to an indication of a change in the gaging conditions, monthly estimates for 1909 have not been computed.

Daily gage height, in feet, of Black Warrior River near Cordova, Ala., for 1909.

[D. M. Smith, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.1	0.85	6.2	2.5	7.9	1.8	3.8	2.0	−0.35	−0.6	−0.7	−0.5
2	.9	.75	5.4	2.25	9.2	4.6	3.0	1.4	− .35	− .6	− .7	− .25
3	.7	.7	6.2	2.0	6.5	5.3	2.3	1.9	− .4	− .6	− .7	− .35
4	.5	.6	6.0	1.8	5.3	21.5	1.9	2.15	− .4	− .6	− .7	− .45
5	4.0	.6	5.2	1.6	3.9	21.0	1.5	1.8	− .45	− .65	− .75	− .5
6	9.3	1.5	4.6	1.5	2.9	12.6	1.1	1.9	− .45	− .65	− .75	.2
7	7.8	2.5	5.3	2.5	2.0	8.0	.8	2.1	− .5	− .65	− .75	1.1
8	4.8	2.5	7.0	5.8	2.4	5.7	1.0	2.1	− .55	− .7	− .75	2.0
9	3.85	1.5	17.5	7.0	1.8	3.7	1.5	1.4	− .55	− .7	− .75	2.0
10	2.9	12.8	19.6	3.8	1.5	8.2	2.0	.9	− .6	− .75	− .75	1.2
11	2.4	14.5	16.3	2.9	1.3	6.5	1.5	.7	− .6	− .75	− .75	1.4
12	2.1	10.3	15.4	2.4	1.15	5.3	1.1	.5	− .6	− .75	− .75	.0
13	1.85	8.1	29.0	3.0	1.05	4.7	.9	.3	− .6	− .75	− .75	− .4
14	1.7	17.3	41.5	9.5	.9	4.5	.7	.2	− .6	− .75	− .75	.0
15	5.2	21.5	41.0	7.6	.8	5.0	.6	.1	− .65	.1	− .75	.5
16	7.2	22.0	34.6	4.9	.8	4.8	.5	.05	− .65	− .1	− .7	.3
17	10.5	17.1	28.0	4.0	1.8	3.8	.5	.05	− .65	− .2	− .1	.1
18	8.5	13.6	20.5	3.3	2.0	3.1	.8	.0	− .7	− .3	− .3	.0
19	6.5	10.4	13.5	2.8	1.9	2.4	.7	− .1	− .7	− .4	− .4	.0
20	4.6	8.3	8.1	2.4	2.5	1.8	.6	− .15	− .7	− .5	− .5	− .1
21	3.8	7.2	13.0	2.1	1.4	2.2	.5	− .2	− .6	− .1	− .5	− .2
22	3.2	6.1	14.2	2.0	1.9	21.0	.45	− .25	.1	− .3	− .55	− .3
23	2.9	14.0	9.1	2.8	1.6	19.5	.4	− .3	.0	− .5	− .1	− .4
24	2.65	18.3	7.8	14.5	.9	13.6	.4	− .3	.4	− .5	− .2	− .45
25	2.3	21.0	6.5	8.9	1.2	8.0	.3	− .35	.0	− .5	− .3	− .2
26	1.85	16.6	5.5	11.0	2.6	6.2	.2	− .35	− .3	− .55	− .35	.0
27	1.6	11.2	4.8	10.9	2.5	5.7	.1	− .4	− .4	− .55	− .4	.0
28	1.4	8.5	4.3	10.0	1.9	5.3	.0	− .4	− .45	− .6	− .4	0
29	1.25	.....	3.7	7.9	1.7	4.8	.0	− .4	− .5	− .65	− .45	− .05
30	1.05	.....	3.2	6.1	1.5	4.4	.7	− .4	− .55	− .7	− .45	− .05
31	.95	.....	2.8	.....	1.0	.....	1.6	− .4	.....	− .7	.....	− .05

BLACK WARRIOR RIVER NEAR COAL, ALA.

The station, which was established September 2, 1908, is located one-fourth mile below the mouth of Locust Fork of Black Warrior River, near the foot of the rapids known as Fork Shoals. It is one-half mile above Taylors Ferry, which is 3 miles from Coal and 20 miles from Bessemer, Ala., the nearest railroad station. The gage heights and discharge measurements have been furnished by the Tennessee Coal, Iron and Railroad Company.

The vertical staff gage is located at Taylors Ferry one-half mile below the measuring section. The left bank is high and does not overflow. The right bank overflows for about 200 feet at high stages. An excellent rating has been developed.

Discharge measurements of Black Warrior River near Coal, Ala., in 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 5	H. G. Stokes	570	3,370	6.65	13,100
January 6	do	620	4,670	9.00	22,100
August 25	do	540	746	1.05	444
November 17	do	520	584	.97	329

Daily gage height, in feet, of Black Warrior River near Coal, Ala., for 1909.

[A. P. Waldrop, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.95	2.6	6.3	4.1	9.4	4.3	4.4	2.6	1.2	1.05	0.95	1.0
2	2.7	2.4	6.0	3.9	9.5	5.3	4.1	2.6	1.35	.95	.95	1.0
3	2.5	2.3	7.8	3.7	7.2	12.2	3.5	2.8	1.3	.95	.95	1.0
4	2.8	2.3	6.6	3.6	5.0	20.1	2.9	3.7	1.2	.95	.95	1.0
5	4.6	2.3	5.7	3.3	4.9	18.4	1.7	3.4	1.1	.95	.95	1.0
6	8.0	3.3	5.2	3.1	4.9	13.6	1.5	3.2	1.05	.95	.95	1.0
7	8.5	4.0	6.5	4.5	4.2	8.1	1.5	3.0	1.05	.95	.95	1.85
8	6.0	3.6	8.5	7.4	3.9	6.1	1.4	3.0	1.05	.95	.95	3.0
9	5.0	3.6	8.6	6.9	3.5	5.3	2.4	2.4	1.05	.95	.95	3.2
10	4.6	11.4	18.0	5.3	3.4	6.0	3.0	1.95	1.15	.95	.95	2.4
11	4.2	12.1	16.4	4.6	3.4	7.2	2.5	1.75	1.15	.95	.95	2.0
12	3.8	8.5	16.0	5.0	3.4	6.6	1.9	1.6	1.15	.95	.95	1.75
13	3.6	9.2	24.6	7.1	3.4	5.8	1.9	1.6	1.15	.95	.95	1.95
14	6.8	14.0	30.2	9.1	3.4	5.6	2.3	1.5	1.05	.95	.95	2.2
15	7.6	16.6	29.0	7.5	3.0	5.9	1.8	1.4	1.05	.95	.95	2.0
16	9.2	16.5	22.0	6.2	2.6	5.3	1.7	1.3	1.05	.95	.95	2.0
17	8.6	14.0	12.8	5.3	3.1	4.6	1.9	1.2	1.05	1.05	.95	1.9
18	6.8	10.5	9.0	4.7	3.6	3.9	1.6	1.2	1.05	1.25	1.0	1.75
19	5.9	9.0	8.0	4.2	3.1	3.6	1.4	1.15	1.1	1.2	1.0	1.5
20	5.2	9.0	7.5	3.9	3.3	3.5	1.3	1.1	1.05	1.15	1.0	1.5
21	4.7	7.4	7.0	3.6	3.0	4.5	1.3	1.1	1.25	1.15	1.0	1.4
22	4.4	8.0	7.0	4.3	3.0	14.6	.9	1.1	1.2	1.35	1.0	1.4
23	4.0	13.5	7.0	7.6	2.8	15.8	.9	1.1	1.25	1.15	1.1	1.3
24	3.8	14.2	6.5	10.8	3.0	11.6	1.2	1.05	1.85	1.1	1.0	1.3
25	3.8	14.6	6.0	11.0	3.0	8.5	.8	1.05	1.45	1.05	1.0	1.75
26	3.4	11.6	5.6	13.5	4.2	7.6	.8	1.05	1.25	1.05	1.1	2.4
27	3.1	9.2	5.3	11.4	4.8	6.1	.75	1.05	1.2	1.05	1.1	2.8
28	3.0	7.6	5.0	10.4	4.4	5.8	.7	1.05	1.05	.95	1.1	2.6
29	2.8	.....	4.7	9.1	4.0	5.9	.7	1.05	1.05	.95	1.1	2.4
30	2.6	.....	4.4	7.4	3.6	5.4	1.0	1.05	1.05	.95	1.1	2.3
31	2.6	.....	4.2	.....	3.4	.....	1.2	1.05	.....	.95	.....	2.0

Daily discharge, in second-feet, of Black Warrior River near Coal, Ala., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,400	2,750	11,800	5,860	23,700	6,330	6,570	2,750	640	462	350	405
2	2,930	2,400	10,900	5,400	24,100	8,870	5,860	2,750	830	350	350	405
3	2,570	2,230	17,300	4,960	15,100	34,900	4,530	3,120	765	350	350	405
4	3,120	2,230	12,900	4,740	8,070	66,500	3,310	4,960	640	350	350	405
5	7,060	2,230	10,000	4,110	7,810	59,700	1,310	4,320	520	350	350	405
6	18,100	4,110	8,600	3,700	7,810	40,500	1,030	3,900	462	350	350	405
7	20,100	5,630	12,600	6,810	6,090	18,500	1,030	3,500	462	350	350	1,520
8	10,900	4,740	20,100	15,800	5,400	11,200	895	3,500	462	350	350	3,500
9	8,070	4,740	20,500	14,000	4,530	8,870	2,400	2,400	462	350	350	3,900
10	7,060	31,700	58,100	8,870	4,320	10,900	3,500	1,680	580	350	350	2,400
11	6,090	34,500	51,700	7,060	4,320	15,100	2,570	1,380	580	350	350	1,750
12	5,180	20,100	50,100	8,070	4,320	12,900	1,600	1,170	580	350	350	1,380
13	4,740	22,900	84,500	14,700	4,320	10,300	1,600	1,170	580	350	350	1,680
14	13,600	42,100	107,000	22,500	4,320	9,700	2,230	1,030	462	350	350	2,070
15	16,600	52,500	102,000	16,200	3,500	10,600	1,450	895	462	350	350	1,750
16	22,900	52,100	74,100	11,500	2,750	8,870	1,310	765	462	350	350	1,750
17	20,500	42,100	37,300	8,870	3,700	7,060	1,600	640	462	462	350	1,600
18	13,600	28,100	22,100	7,310	4,740	5,400	1,170	640	462	702	405	1,380
19	10,600	22,100	18,100	6,090	3,700	4,740	895	580	520	640	405	1,030
20	8,600	22,100	16,200	5,400	4,110	4,530	765	520	462	580	405	1,030
21	7,310	15,800	14,300	4,740	3,500	6,810	765	520	702	580	405	895
22	6,570	18,100	14,300	6,330	3,500	44,500	295	520	640	830	405	895
23	5,630	40,100	14,300	16,600	3,120	49,300	295	520	702	580	520	765
24	5,180	42,900	12,600	29,300	3,500	32,500	640	462	1,520	520	405	765
25	5,180	44,500	10,900	30,100	3,500	20,100	190	462	962	462	405	1,380
26	4,320	32,500	9,700	40,100	6,090	16,600	190	462	702	462	520	2,400
27	3,700	22,900	8,870	31,700	7,560	11,200	140	462	640	462	520	3,120
28	3,500	16,600	8,070	27,700	6,570	10,300	90	462	462	350	520	2,750
29	3,120	.....	7,310	22,500	5,630	10,600	90	462	462	350	520	2,400
30	2,750	.....	6,570	15,800	4,740	9,140	405	462	462	350	520	2,230
31	2,750	.....	6,090	.....	4,320	.....	640	462	.....	350	.....	1,750

NOTE.—These discharges are based on a rating curve that is well defined below 26,100 second-feet. Above 18,100 second-feet the rating curve is a tangent.

Monthly discharge of Black Warrior River near Coal, Ala., for 1909.

[Drainage area, 3,560 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	22,900	2,750	8,250	2.32	2.68	A.
February	52,500	2,230	22,700	6.38	6.64	A.
March	107,000	6,090	27,700	7.78	8.97	B.
April	40,100	3,700	13,600	3.82	4.26	A.
May	24,100	2,750	6,410	1.80	2.08	A.
June	66,500	4,530	18,900	5.31	5.92	A.
July	6,570	90	1,590	.447	.52	A.
August	4,960	462	1,510	.424	.49	A.
September	1,520	462	604	.170	.19	A.
October	830	350	432	.121	.14	B.
November	520	350	397	.112	.12	B.
December	3,900	405	1,570	.441	.51	A.
The year	107,000	90	8,640	2.43	32.52	

VILLAGE CREEK NEAR MULGA, ALA.

This station, which was established by the Tennessee Coal, Iron and Railroad Company, is located on Village Creek about one-fourth mile below the mouth of Venison Branch, in sec. 7, R. 4 W., T. 17 S., near Mulga, Ala.

The gage consists of a 16-foot rod located on the left bank of the creek. About 200 feet below this point is a runway suspended from a cable across the creek, from which discharge measurements are made.

Discharge measurements and gage heights have been furnished by the Tennessee Coal, Iron and Railroad Company.

Discharge measurements of Village Creek near Mulga, Ala., in 1908–9.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1908.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
December 22	H. G. Stokes	66	237	4.50	1,110
1909.					
January 4	do	60	143	3.10	574
January 9	do	47	53.4	1.70	124
January 28	do	43	36.4	1.30	56
February 24	do	62	175	3.65	780
April 22	do	67	244	4.65	1,260
April 23	do	82	395	6.30	2,030
November 16[a]	do	11	.....	.80	3.4
Do.[b]	do	8	.....	.80	4.1

[a] Made one-half mile below dam.

[b] Made at dam site.

Daily gage height, in feet, of Village Creek near Mulga, Ala., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.3	1.2	1.85	1.45	5.3	1.65	1.7	1.3	1.1	0.9	0.8	0.8
2	1.3	1.2	1.9	1.5	2.5	1.65	1.65	1.2	1.1	.85	.8	1.0
3	1.3	1.15	1.8	1.5	2.2	7.0	1.55	1.25	1.0	.8	.8	1.05
4	3.0	1.1	1.7	1.5	2.0	4.4	1.55	1.75	.95	.8	.8	1.0
5	3.0	1.2	1.65	1.4	1.9	2.7	1.5	1.4	.9	.8	.8	1.0
6	2.6	1.85	1.65	1.4	1.9	2.2	1.5	1.4	.9	.8	.8	1.1
7	2.0	1.4	1.65	4.0	1.85	2.0	1.4	2.2	.9	.8	.8	2.4
8	1.75	1.35	2.6	2.2	1.8	1.85	1.6	1.4	1.6	.8	.8	1.85
9	1.7	2.3	5.1	2.0	1.75	1.8	1.7	1.4	1.05	.8	.8	1.75
10	1.55	2.6	5.2	1.85	1.7	1.75	1.6	1.35	1.1	.8	.8	1.65
11	1.5	1.85	2.9	1.7	1.5	1.7	1.35	1.3	1.0	.8	.8	1.45
12	1.5	1.7	8.2	1.65	1.5	1.65	1.3	1.3	1.0	.8	.8	1.7
13	1.5	3.7	8.8	3.5	1.5	1.55	1.9	1.3	1.0	.8	.8	1.85
14	2.2	4.4	5.0	2.1	1.5	2.0	3.4	1.2	.9	.8	.8	1.7
15	2.4	5.0	3.4	1.85	1.5	2.3	1.85	1.2	.9	.8	.8	1.55
16	2.0	4.0	2.8	1.75	2.3	1.95	1.75	1.2	.9	.9	.8	1.4
17	1.85	2.8	2.6	1.7	1.6	1.85	1.65	1.15	.9	.9	.8	1.4
18	1.65	2.4	2.3	1.65	1.5	1.75	1.45	1.05	.9	.9	.8	1.4
19	1.6	3.0	2.0	1.6	1.5	1.65	1.35	1.15	.9	1.0	.8	1.5
20	1.55	2.2	5.4	1.55	1.55	2.8	1.3	1.05	.9	1.0	.8	1.6
21	1.5	2.0	3.2	1.5	1.55	3.0	1.25	1.0	1.2	1.55	.8	1.6
22	1.45	5.0	2.6	5.2	1.5	3.6	1.2	1.0	1.0	1.25	.8	1.05
23	1.4	2.8	2.4	6.2	1.4	3.4	1.75	.9	1.0	1.15	.9	1.1
24	1.4	3.6	2.2	2.8	1.4	2.6	1.45	.9	1.0	2.0	.9	1.3
25	1.35	2.6	2.6	2.6	2.2	2.7	1.4	.9	1.0	.9	.8	1.35
26	1.3	2.2	2.0	4.2	2.6	2.2	1.35	.9	1.0	.8	.8	1.35
27	1.3	1.95	1.9	3.8	2.1	1.9	1.3	.9	.9	.8	.8	1.3
28	1.3	1.9	1.95	3.2	2.1	1.9	1.3	.9	.9	.8	.8	1.2
29	1.3	.....	1.7	2.4	1.8	1.8	1.2	.9	.9	.8	.8	1.2
30	1.3	.....	1.55	2.4	1.8	1.7	1.25	.9	.9	.8	.8	1.1
31	1.3	.....	1.45	.....	1.85	.....	1.3	.9	.....	.8	.....	1.0

Daily discharge, in second-feet, of Village Creek near Mulga, Ala., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	55	41	161	80	1,550	117	127	55	29	11	4	4
2	55	41	173	89	358	117	117	41	29	7.5	4	19
3	55	35	149	89	258	2,360	98	48	19	4	4	24
4	540	29	127	89	200	1,140	98	138	15	4	4	19
5	540	41	117	71	173	428	89	71	11	4	4	19
6	392	161	117	71	173	258	89	71	11	4	4	29
7	200	71	117	960	161	200	71	258	11	4	4	324
8	138	63	392	258	149	161	107	71	107	4	4	161
9	127	290	1,460	200	138	149	127	71	24	4	4	138
10	98	392	1,500	161	127	138	107	63	29	4	4	117
11	89	161	502	127	89	127	63	55	19	4	4	80
12	89	127	2,960	117	89	117	55	55	19	4	4	127
13	89	828	3,260	744	89	98	173	55	19	4	4	161
14	258	1,140	1,410	228	89	200	702	41	11	4	4	127
15	324	1,410	702	161	89	290	161	41	11	4	4	98
16	200	960	464	138	290	186	138	41	11	11	4	71
17	161	464	392	127	107	161	117	35	11	11	4	71
18	117	324	290	117	89	138	80	24	11	11	4	71
19	107	540	200	107	89	117	63	35	11	19	4	89
20	98	258	1,590	98	98	464	55	24	11	19	4	107
21	89	200	620	89	98	540	48	19	41	98	4	107
22	80	1,410	392	1,500	89	786	41	19	19	48	4	24
23	71	464	324	1,980	71	702	138	11	19	35	11	29
24	71	786	258	464	71	392	80	11	19	200	11	55
25	63	392	392	392	258	428	71	11	19	11	4	63
26	55	258	200	1,050	392	258	63	11	19	4	4	63
27	55	186	173	872	228	173	55	11	11	4	4	55
28	55	173	186	620	228	173	55	11	11	4	4	41
29	55	.....	127	324	149	149	41	11	11	4	4	41
30	55	.....	98	324	149	127	48	11	11	4	4	29
31	55	.....	80	.....	161	.....	55	11	.....	4	.....	19

NOTE.—These discharges are based on a rating curve that is well defined below 2,400 second-feet.

Monthly discharge of Village Creek near Mulga, Ala., for 1909.

[Drainage area, 72.6 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	540	55	143	1.97	2.27	A.
February	1,410	29	402	5.54	5.77	A.
March	3,260	80	611	8.42	9.71	A.
April	1,980	71	388	5.34	5.96	A.
May	1,550	71	203	2.80	3.23	A.
June	2,360	98	356	4.90	5.47	A.
July	702	41	107	1.47	1.70	A.
August	258	11	46.1	.635	.73	B.
September	107	11	20.0	.275	.31	C.
October	200	4	18.0	.248	.29	C.
November	11	4	4.5	.062	.07	C.
December	324	4	76.8	1.06	1.22	B.
The year	3,260	4	198	2.73	36.73	

CAMP BRANCH NEAR ENSLEY, ALA.

Camp Branch is tributary to Village Creek in sec. 16, R. 4 W., T. 17 S., about 5 miles northwest of Ensley, Ala.

The station, established by the Tennessee Coal, Iron and Railroad Company, is located at the weir, about 1,000 feet above the steel

bridge on the Mulga road, at the mouth of Camp Branch. The weir is built of timbers grouted into the bed rock of the branch. It is a triangular section with 90-degree angle up to 1.5 feet and rectangular section 5 feet long up to 2 feet. The hook gage is on the right bank about 25 feet from the opening of weir and about 8 feet from the end of dam. The weir opening is about 6 feet from the left end of dam. In order that discharge measurements can be made when water is over the weir a 14-foot gage rod is located above the weir at a point near a foot log, from which meter discharge measurements are made during high water.

The data for this station were furnished by the Tennessee Coal, Iron and Railroad Company.

Discharge measurements of Camp Branch near Ensley, Ala., in 1908–9.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1908.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
December 1	H. G. Stokes	26	63.4	2.02	[a] 13.4
December 22	do	29	101	3.10	116
1909.					
January 4 [b]	do	28	86.3	2.70	50.0
February 24	do	28	89	2.80	65.8
April 23	do	29	119	3.70	219

[a] Weir discharge=12.75 second-feet. [b] Water on top of weir dam 0.15 foot.

Monthly discharge of Camp Branch near Ensley, Ala., for 1909.

[Drainage area 7.43 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	66.60	2.88	13.69	1.83	2.11
February	120	2.83	34.80	4.68	4.87
March	390	6.57	57.15	7.69	8.87
April	215.5	4.14	45.69	6.15	6.86
May	60.25	1.96	10.81	1.45	1.67
June	511	4.82	37.29	5.02	5.60
July	293	1.73	20.98	2.69	3.10
August	9.43	.21	2.31	.311	.368
September	132.75	.31	6.72	.905	1.50
October	4.68	.08	.42	.057	.066
November	1.00	.14	.33	.042	.048
December	54.06	.28	5.20	.700	.81
The year	511	.08	19.62	2.627	35.852

VENISON BRANCH NEAR MULGA.

Venison Branch is tributary to Village Creek about 2½ miles below the junction of Camp Branch, near Mulga, Ala. The station, which was established by the Tennessee Coal, Iron and Railroad Company, is located at the weir about 1,000 feet above the mouth of the stream.

The weir is built of timbers grouted into the bed rock of the branch. It is a triangular section with 90-degree angle up to 1.5 feet and rectangular section 5 feet long up to 2.0 feet. The hook gage is on the right bank of branch about 25 feet from the opening of weir and about 8 feet from the end of dam. The weir opening is about 6 feet from the left end of dam. In order that discharge measurements can be made when water is over the weir, an automatic gage is located above the weir about 30 feet below a foot log from which meter discharge measurements are made during high water. This high-water gage consists of a section detachable from the main gage and has small cups fastened in a vertical position every tenth of a foot in elevation, so that the water as it rises fills these cups, thus recording the highest water.

The data for this station were furnished by the Tennessee Coal, Iron and Railroad Company.

Discharge measurements of Venison Branch near Ensley, Ala., in 1908–9.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1908.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
December 22 [a]	H. G. Stokes	18	23.3	1.75	35.5
1909.					
April 25	do	18	20.5	1.74	30.5

[a] About 1 foot of water over top of dam.

Monthly discharge of Venison Branch near Mulga, Ala., for 1909.

[Drainage area, 3.87 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	19.00	1.973	8.418	2.12	2.51
February	134.0	1.43	19.42	5.02	5.26
March	128.0	4.77	25.66	6.63	7.64
April	125.0	3.80	18.68	4.83	5.39
May	49.58	1.94	7.98	2.06	3.00
June	207.0	3.46	18.79	4.86	5.42
July	14.59	.95	4.28	1.11	1.28
August	2.37	.11	.736	.190	.219
September	15.59	.07	.903	.23	.26
October	1.535	.01	.141	.036	.042
November	1.292	.074	.229	.060	.067
December	8.698	.205	1.90	.491	.56
The year	207.0	.01	8.928	2.303	31.648

PEARL RIVER DRAINAGE BASIN.

DESCRIPTION.

Pearl River drains the south central part of Mississippi. It rises near the center of the State and flows south into Lake Borgne, an arm of the Gulf of Mexico. The basin is about 200 miles long and comprises an area of 8,000 square miles.

Although lying in a low portion of the Coastal Plain, the lands of this basin are generally well elevated above the stream beds. The surface is largely rolling and hilly, with sandy soils underlain with heavy clays, which at many places show in the stream beds. Much of the area was originally covered with the best class of southern forest pine, known as long-leaf, yellow-heart pine. Although these forests have been rapidly cut for ten to fifteen years, they are by no means exhausted.

Pearl River has been for many years a logging stream of first importance among southern rivers, although the railroads and tramways now deliver the bulk of the timber directly to the mills.

The following gaging stations have been maintained in this river basin:

Pearl River at Jackson, Miss., 1901–1909.
Bogue Chitto at Warnerton, La., 1906.

PEARL RIVER AT JACKSON, MISS.

The station, which is located at the county highway bridge at Jackson, Miss., one-eighth mile above the Alabama and Vicksburg Railway bridge and two blocks east from the end of the South State street car line, was established June 24, 1901, for the purpose of obtaining data for general run-off studies.

Richland Creek enters the river from the east side about 5 miles below the station. The flow is subject to little or no artificial control above or near the station.

The chain gage is attached to the downstream lower chord of the bridge. Its datum has remained the same since the station was established. The gage height records for 1909 were furnished by the United States Weather Bureau.

The channel is somewhat obstructed by old piles and the bed is shifting, causing slight changes in the rating. The right bank is high and does not overflow. The left bank is of cleared ground and overflows for several hundred feet at a stage of about 20 feet.

No discharge measurements were made during 1909.

This station was last inspected July 27, 1908. The accuracy of the daily and monthly discharges given below therefore depends on the permanency of conditions of flow and of the elevation of the gage since that date.

Daily gage height, in feet, of Pearl River at Jackson, Miss., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.8	2.5	25.1	20.8	20.8	34.0	11.6	2.8	1.1	1.1	1.0	1.1
2	4.6	2.2	24.8	19.1	25.5	34.5	11.8	3.1	1.0	1.0	1.1	1.1
3	4.0	2.1	24.3	17.9	27.0	34.3	11.8	2.8	.9	.9	1.0	1.1
4	3.9	2.0	23.8	14.1	28.3	33.8	11.5	3.0	.9	.9	.9	1.0
5	4.0	1.9	23.0	11.8	28.8	33.6	11.0	4.3	1.0	.9	.9	1.0
6	4.5	2.2	22.0	9.8	28.8	33.3	10.0	5.1	1.1	.8	.8	1.0
7	4.4	2.4	20.8	8.5	28.1	32.8	8.9	6.8	1.1	.8	.8	1.0
8	4.2	2.3	19.6	7.8	27.3	32.3	7.6	6.9	1.1	.8	.8	1.0
9	3.9	3.0	17.6	7.8	26.6	31.7	6.7	5.9	1.1	.8	.8	1.0
10	3.7	12.2	15.4	8.1	24.8	31.1	5.4	5.6	1.0	.8	.8	1.0
11	3.5	11.3	12.6	8.0	23.1	30.1	5.4	5.3	1.0	.7	.7	1.0
12	3.5	11.5	11.3	8.4	21.0	29.3	4.8	5.4	1.0	.7	.7	1.1
13	3.2	12.0	12.8	9.0	17.8	28.1	4.0	3.5	1.1	.7	.7	1.5
14	3.0	13.8	15.4	10.4	13.8	27.0	3.8	3.3	1.1	.6	.7	1.6
15	3.0	15.7	17.0	11.0	9.7	25.7	3.4	3.1	1.1	.6	.6	1.5
16	2.9	17.7	18.6	11.5	7.8	24.2	3.3	3.0	1.1	.6	.6	1.6
17	2.8	18.4	19.7	11.4	6.3	22.5	3.2	2.8	1.0	.6	.6	1.6
18	2.8	19.3	21.2	11.4	5.8	20.5	3.1	2.4	1.0	.6	.7	2.3
19	2.8	20.6	23.3	11.3	9.6	18.5	3.0	2.5	1.0	.6	.7	2.5
20	3.0	21.8	26.3	11.3	14.3	16.8	2.9	2.3	1.0	.6	.7	2.6
21	3.0	22.8	28.2	11.2	14.6	15.9	2.8	2.0	1.5	.6	.7	2.3
22	3.0	23.3	29.0	10.6	14.7	16.7	2.7	1.9	2.2	.6	.7	2.1
23	2.9	23.8	29.3	9.9	12.3	15.7	2.7	1.8	1.5	.6	.9	2.0
24	2.8	24.5	28.6	8.9	11.1	15.4	2.6	1.7	1.2	.6	.9	1.8
25	2.8	24.7	28.1	10.8	12.6	14.9	2.5	1.5	1.2	.6	.9	2.0
26	2.7	25.1	27.6	15.6	18.3	14.3	2.4	1.4	1.2	.6	.8	2.0
27	2.7	25.3	26.9	18.6	26.5	14.4	2.3	1.3	1.2	.7	.8	1.9
28	2.6	25.2	25.9	20.7	30.8	13.8	2.2	1.2	1.1	.9	.9	1.9
29	2.6	.....	24.5	21.8	34.6	12.8	2.0	1.3	1.1	1.0	1.0	2.4
30	2.6	.....	23.8	22.8	35.3	11.7	1.9	1.2	1.1	1.1	1.1	2.9
31	2.6	.....	22.4	.....	34.8	.....	2.1	1.1	.....	1.0	.....	3.0

Daily discharge, in second-feet, of Pearl River at Jackson, Miss., for 1909.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,670	670	17,600	12,700	12,700	34,000	5,680	790	220	220	200	220
2	1,580	555	17,200	11,200	18,200	35,000	5,800	910	200	200	220	220
3	1,320	520	16,600	10,200	20,700	34,600	5,800	790	180	180	200	220
4	1,270	485	16,000	7,370	23,200	33,600	5,610	870	180	180	180	200
5	1,320	450	15,000	5,800	24,100	33,200	5,280	1,450	200	180	180	200
6	1,540	555	13,900	4,520	24,100	32,700	4,640	1,820	220	160	160	200
7	1,500	630	12,700	3,740	22,800	31,700	3,980	2,750	220	160	160	200
8	1,400	590	11,600	3,320	21,300	30,800	3,200	2,800	220	160	160	200
9	1,270	870	9,980	3,320	20,000	29,600	2,700	2,260	220	160	160	200
10	1,180	6,060	8,280	3,500	17,200	28,500	1,980	2,090	200	160	160	200
11	1,090	5,480	6,320	3,440	15,100	26,600	1,980	1,920	200	145	145	200
12	1,090	5,610	5,480	3,680	12,900	25,100	1,680	1,980	200	145	145	220
13	955	5,940	6,460	4,040	10,100	22,800	1,320	1,090	220	145	145	320
14	870	7,160	8,280	4,900	7,160	20,700	1,220	1,000	220	130	145	350
15	870	8,490	9,500	5,280	4,460	18,600	1,040	910	220	130	130	320
16	830	10,100	10,800	5,610	3,320	16,500	1,000	870	220	130	130	350
17	790	10,600	11,700	5,540	2,480	14,400	955	790	200	130	130	350
18	790	11,400	13,100	5,540	2,200	11,400	910	630	200	130	145	590
19	790	12,500	15,400	5,480	4,400	10,700	870	670	200	130	145	670
20	870	13,700	19,500	5,480	7,510	9,340	830	590	200	130	145	710
21	870	14,800	23,000	5,420	7,720	8,630	790	485	320	130	145	590
22	870	15,400	24,500	5,020	7,790	9,260	750	450	555	130	145	520
23	830	16,000	25,100	4,580	6,130	8,490	750	415	320	130	180	485
24	790	16,800	23,700	3,980	5,350	8,280	710	380	240	130	180	415
25	790	17,100	22,800	5,160	6,320	7,930	670	320	240	130	180	485
26	750	17,600	21,800	8,420	10,500	7,510	630	290	240	130	160	485
27	750	18,000	20,500	10,800	19,800	7,580	590	265	240	145	160	450
28	710	17,800	18,800	12,600	27,900	7,160	555	240	220	180	180	450
29	710	.....	16,800	13,700	35,100	6,460	485	265	220	200	200	630
30	710	.....	16,000	14,800	36,500	5,740	450	240	220	220	220	830
31	710	.....	14,300	.....	35,500	.....	520	220	.....	200	.....	870

NOTE.—These discharges are based on a rating curve that is fairly well defined.

Monthly discharge of Pearl River at Jackson, Miss., for 1909.

[Drainage area, 3,120 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,670	710	1,020	0.327	0.38	B.
February	18,000	450	8,420	2.70	2.81	B.
March	25,100	5,480	15,200	4.87	5.62	B.
April	14,800	3,320	6,640	2.13	2.38	B.
May	36,500	2,200	15,200	4.87	5.62	B.
June	35,000	5,740	19,200	6.15	6.86	B.
July	5,800	450	2,040	.654	.75	B.
August	2,800	220	985	.316	.36	B.
September	555	180	232	.074	.08	C.
October	220	130	156	.050	.06	C.
November	220	130	164	.053	.06	C.
December	870	200	398	.128	.15	C.
The year	36,500	130	5,800	1.86	25.13	

MISCELLANEOUS MEASUREMENTS IN SOUTH ATLANTIC COAST AND EASTERN GULF OF MEXICO DRAINAGES.

The following miscellaneous discharge measurements were made in the South Atlantic coast and eastern Gulf of Mexico drainages during 1909:

Miscellaneous measurements in South Atlantic coast and eastern Gulf of Mexico basins in 1909.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
September 11	Roanoke River		At railroad bridge five-eighths mile southwest of Randolph, Va.	[a] 5.37	2,200
February 27	Savannah River		At discontinued gaging station at Augusta, Ga.	15.20	17,700
January 26	Apalachee River	Oconee River	At discontinued gaging station, near Buckhead, Ga.	2.76	473
August 13	do	do	do	3.19	581
August 4	Choctawhatchee River.	Gulf of Mexico	At former gaging station, near Newton, Ala.	[b] 2.91	371
September 16	Sipsey River	Tombigbee River	At wagon bridge about 1½ miles east of Elrod, Ala.	[c] 14.70	154

[a] By measuring to water surface from bench mark on bridge.
[b] Gage height determined from bench mark, the chain having been stolen.
[c] Water surface 14.70 feet below the top of upstream end of third-floor beam from right bank.

SUMMARIES OF DISCHARGE PER SQUARE MILE.

The following tables of summaries of discharge per square mile are given to allow of ready comparison of relative rates of run-off from different areas in the South Atlantic coast and Eastern Gulf of Mexico drainages.

They show in a general way the seasonal distribution of run-off and the effect of snow, ground, surface, and artificial storage. But

the most important fact worth noting is the almost entire lack of uniformity or agreement between any two stations. It indicates that the discharge of each stream is a law unto itself, and that all projects dependent upon stream flow, if they are to be developed along the safest and most economical lines, must be based on records of stream flow collected with great care over a long series of years as near the location of the project under consideration as possible.

Summary of discharge, in second-feet, per square mile of South Atlantic coast and eastern Gulf of Mexico drainages for 1909.

Gaging station.	Drainage area (square miles).	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
James River at Buchanan, Va.	2,060	2.73	2.34	2.04	2.50	2.76	1.24	.597	.354	.395	.375	.287	.519	1.34
James River at Cartersville, Va.	6,230	2.49	2.25	1.85	1.88	1.91	1.67	.587	.395	.332	.339	.284	.560	1.21
Roanoke River at Roanoke, Va.	388	2.16	1.37	1.40	1.90	3.12	1.06	.541	.639	.330	.407	.265	.278	1.12
Yadkin River at North Wilkesboro, N. C.	500	2.64	2.84	3.10	2.42	4.60	5.26	.....	.....	.....	.....	.....	.....	.....
Yadkin River near Salisbury, N. C.	3,400	1.73	1.66	1.85	1.65	3.00	3.59	1.51	1.77	.882	.809	.759	.941	1.68
Catawba River near Morganton, N. C.	758	2.73	2.86	3.21	2.55	5.69	4.75	.....	.....	.....	.....	.....	.....	.....
Wateree River near Camden, S. C.	4,500	1.40	1.88	1.83	1.14	2.62	3.40	1.55	1.80	1.46	1.03	.716	.758	1.63
Green River at Saluda, N. C.	51	4.16	4.80	5.37	3.71	5.61	9.55	.....	.....	.....	.....	.....	.....	.....
Tugaloo River near Madison, S. C.	593	3.36	5.50	7.62	4.18	7.86	8.28	3.88	2.93	2.61	1.84	1.36	3.14	4.38
Savannah River at Woodlawn, S. C.	6,600	1.95	3.18	3.38	1.50	2.50	2.89	1.98	1.71	1.25	1.03	.705	1.06	1.92
Tallulah River at Tallulah Falls, Ga.	191	3.39	5.92	8.12	5.50	8.95	8.69	4.08	2.67	2.26	1.82	1.35	2.86	4.63
Broad River (of Georgia) near Carlton, Ga.	762	2.19	4.11	4.09	1.71	3.19	3.00	1.89	1.93	1.56	1.38	.965	1.64	2.30
Ocmulgee River near Jackson, Ga.	1,400	1.17	3.21	4.30	1.76	1.59	1.59	1.11	1.82	.779	.900	.681	.921	1.66
Ocmulgee River at Macon, Ga.	2,420	.905	3.74	4.88	1.48	1.34	1.32	.959	1.39	.736	.649	.488	.640	1.54
Oconee River near Greensboro, Ga.	1,100	1.12	3.38	3.62	1.42	1.83	1.67	1.48	1.67	1.10	1.14	.692	1.09	1.68
Oconee River at Fraleys Ferry near Milledgeville, Ga.	2,840	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.651	.789	.....
Oconee River at Dublin, Ga.	4,180	.988	2.68	3.76	1.20	1.35	1.19	1.20	1.31	.675	.617	.500	.701	1.35
Chattahoochee River near Norcross, Ga.	1,170	2.37	3.68	4.75	2.50	3.90	3.26	2.25	1.80	1.62	1.44	1.09	1.75	2.53
Chattahoochee River at West Point, Ga.	3,300	1.60	4.27	5.52	2.35	2.82	2.40	1.65	2.34	1.09	1.00	.870	1.54	2.29
Soque River near Demorest, Ga.	158	3.09	4.08	5.08	2.97	5.92	5.38	.....	.....	.....	.....	.....	.....	.....
Flint River near Woodbury, Ga.	990	1.04	4.80	5.99	1.49	1.67	1.41	1.16	1.44	.469	.437	.580	.806	1.77
Flint River near Montezuma, Ga.	2,700	.970	2.52	3.03	1.47	1.59	1.10	1.00	1.19	.626	.474	.467	.756	1.27
Flint River at Albany, Ga.	5,000	.870	2.18	3.72	1.48	1.62	.938	.904	.930	.456	.404	.370	.652	1.21
Flint River at Bainbridge, Ga.	7,410	.830	.....	.....	.....	.....	.861	.835	.821	.572	.516	.498	.579	.....
Kinchafoonee Creek near Leesburg, Ga.	480	.798	1.85	3.17	1.56	1.25	.802	1.03	.729	.385	.388	.408	.594	1.08
Pea River at Pera, Ala.	1,180	.502	2.82	2.62	1.49	1.62	2.31	1.00	.614	.536	.267	.260	.642	1.22
Conecuh River at Beck, Ala.	1,290	.411	2.88	3.50	1.73	2.02	4.16	.946	.736	.387	.250	.260	.614	1.49
Oostanaula River at Resaca, Ga.	1,610	2.65	6.08	7.45	2.65	3.72	4.93	1.71	1.56	.776	.634	.363	1.11	2.80
Coosa River at Riverside, Ala.	7,060	2.12	4.36	6.39	2.69	2.95	3.53	1.49	1.66	.659	.591	.411	1.04	2.32
Alabama River at Selma, Ala.	15,400	1.31	3.64	6.49	2.56	3.18	3.38	1.49	1.58	.779	.587	.510	.974	2.21
Etowah River near Ball Ground, Ga.	466	2.34	5.30	6.14	3.07	3.33	3.33	2.36	2.03	1.52	1.35	1.11	1.85	2.81
Etowah River near Rome, Ga.	1,800	1.62	4.38	6.33	2.43	2.84	2.91	1.53	2.35	1.06	1.03	.694	1.27	2.37
Tallapoosa River at Sturdevant, Ala.	2,500	.812	3.35	5.76	2.57	2.33	1.99	1.56	2.25	.836	.516	.584	1.26	1.98
Tombigbee River at Columbus, Miss.	4,440	.815	4.55	5.86	2.59	1.81	3.54	.838	.223	.107	.070	.102	.306	1.73
Tombigbee River at Epes, Ala.	8,830	.737	2.56	4.88	2.55	2.37	3.86	.798	.234	.099	.086	.098	.258	1.54
Black Warrior River near Coal, Ala.	3,560	2.32	6.38	7.78	3.82	1.80	5.31	.447	.424	.170	.121	.112	.441	2.43
Village Creek near Mulga, Ala.	72.6	1.97	5.54	8.42	5.34	2.80	4.90	1.47	.635	.275	.248	.062	1.06	2.73
Camp Branch near Ensley, Ala.	7.43	1.83	4.68	7.69	6.15	1.45	5.02	2.69	.311	.905	.057	.042	.70	2.63
Venison Branch near Mulga, Ala.	3.87	2.12	5.02	6.63	4.83	2.06	4.86	1.11	.190	.23	.036	.060	.491	2.30
Pearl River at Jackson, Miss.	3,120	.327	2.70	4.87	2.13	4.87	6.15	.654	.316	.074	.050	.053	.128	1.86

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