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DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

CHARLES D. WALCOTT, DIRECTOR

B. M. Hall,
Supervising Engineer,
U. S. Reclamation Service,
Carlsbad, New Mexico.

REPORT

OF

PROGRESS OF STREAM MEASUREMENTS

FOR

THE CALENDAR YEAR 1904

PREPARED UNDER THE DIRECTION OF F. H. NEWELL

BY

M. R. HALL and JOHN C. HOYT

PART IV.—Santee, Savannah, Ogeechee, and Altamaha Rivers and Eastern Gulf of Mexico Drainages

WASHINGTON
GOVERNMENT PRINTING OFFICE
1905

Water-Supply Paper No. 127 Series F, Hydrographic Progress, 87

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DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
HYDROGRAPHIC BRANCH,
Washington, D. C., April 4, 1905.

SIR: I transmit herewith the manuscript of Part IV of a series of twelve papers which compose the Report of Progress of Stream Measurements for the Calendar Year 1904. Parts I to VI of this report contain the results of the data collected in the territory east of Mississippi River. Parts VII to XII are devoted to the data collected in the territory west of the Mississippi.

The larger part of the original data for this report was collected under the direction of District Hydrographer M. R. Hall, who was assisted by W. E. Hall, J. M. Giles, and B. S. Drane. The assembling of the data and its preparation for publication were done under the direction of John C. Hoyt, who has been assisted by R. H. Bolster, Robert Follansbee, Willis E. Hall, A. H. Horton, H. D. Comstock, and H. M. Morse.

I request that this manuscript be published as one of the series of Water-Supply and Irrigation Papers.

Very respectfully,

F. H. NEWELL, *Chief Engineer.*

Hon. CHARLES D. WALCOTT,
Director United States Geological Survey.

PROGRESS REPORT OF STREAM MEASUREMENTS FOR THE CALENDAR YEAR 1904.

PART IV.

By M. R. HALL and JOHN C. HOYT.

INTRODUCTION.

The hydrographic work of the United States Geological Survey includes the collection of facts concerning and the study of conditions affecting the behavior of water from the time it reaches the earth as rain or snow until it joins the oceans or great navigable rivers. These investigations became a distinct feature of the work of the Survey in the fall of 1888, when an instruction camp was established at Embudo, N. Mex. Since that date the work has been continually and gradually extended as larger funds became available. The first distinctive appropriation for gaging streams was made by the act of August 18, 1894, which contained an item of $12,500, "for gaging the streams and determining the water supply of the United States, including the investigation of underground currents and artesian wells in the arid and semiarid sections." (Digest of Appropriations for 1895, p. 270.)

Since that time a similar act has been passed each year and the appropriations have gradually increased, as shown in the following table:

Annual appropriations for hydrographic surveys.

Year ending June 30, 1895	$12,500
Year ending June 30, 1896	25,000
Year ending June 30, 1897	50,000
Year ending June 30, 1898	50,000
Year ending June 30, 1899	50,000
Year ending June 30, 1900	50,000
Year ending June 30, 1901	100,000
Year ending June 30, 1902	100,000
Year ending June 30, 1903	200,000
Year ending June 30, 1904	200,000
Year ending June 30, 1905	200,000
Year ending June 30, 1906	200,000

The chief feature of the work of the hydrographic division is the systematic study of the flow of the surface waters and the conditions

affecting the same. In this connection other information that may be of use to the engineer or others in hydrographic studies, such as river profiles, duration and extent of damage by floods, water-power data, etc., is collected. Furthermore, the work has been so directed that the information collected will be of direct value in the commercial and agricultural development of the country.

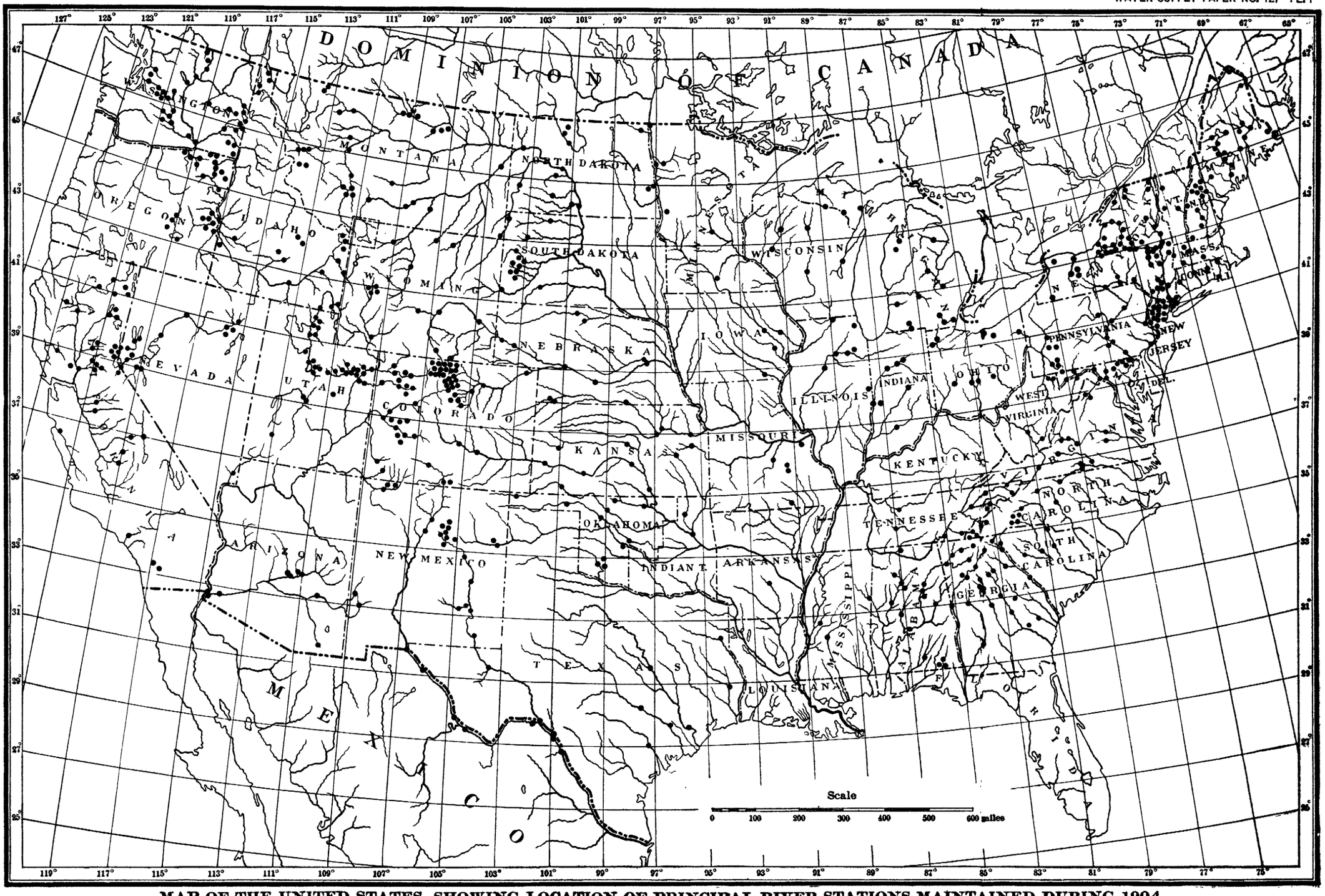
As a result of the increased appropriations since June 30, 1902, the work has been largely extended and thoroughly systemized. The various States have been grouped into districts, each of which is under the supervision of a district hydrographer who, with a corps of assistants, devotes his whole time to the study of the hydrographic resources of his district.

The methods used in the collection of these data and in their preparation for publication are given in detail in Water-Supply Paper No. 94. (Hydrographic Manual, U. S. Geol. Survey.)

The general plan of stream gaging which has been developed is to obtain eventually data in regard to the flow of all the important streams in the United States. With this in view gaging stations are established at points where the data will be of greatest commercial value. At these stations discharge measurements are taken from time to time at typical river stages, and the daily surface fluctuation is obtained by means of gage readings. From these two factors it is possible to estimate both the total flow and its distribution through the period of observation.

The selection of the site for a gaging station and the length of time the station is maintained depend largely upon the needs of each locality. If the stream is to be used for water power, special efforts are made to obtain information concerning the low-water flow. If water is to be stored, the high waters are given special attention. In all sections certain permanent stations are maintained for general statistical purposes to show the conditions which exist through long periods. They also act as primary stations, and are used in connection with short series of measurements to determine the flow in particular portions of the drainage basin.

Gaging stations are divided into two general classes: First, current-meter stations, and, second, weir stations. The former class is subdivided as to location into bridge, cable, boat, and wading stations. Fig. 1 shows a cable station with car, tag line, inclined gage, etc. In addition to the bridge, cable, or boat, the equipment of a current-meter gaging station consists in a gage for determining the daily fluctuations of the water surface, bench marks to which the zero of the gage is referred, and permanent marks on the bridge or a tagged line indicating the points of measurement. Where the current is swift some appliance, generally a secondary cable, is necessary to hold the meter below the surface.



MAP OF THE UNITED STATES, SHOWING LOCATION OF PRINCIPAL RIVER STATIONS MAINTAINED DURING 1904.

Gaging stations are generally located at bridges, if the channel conditions are satisfactory, as from them the meter can be easily manipulated and the cost of the equipment is comparatively small. The stations are located as far as possible at points where the channel is straight, both above and below the gaging section, and where there are no cross currents, backwater, or boils. The bed of the stream should be as clear as possible from large projections and of a permanent character. The banks should be high, and should overflow at high stages only. At stations with shifting beds more measurements are made, and special methods of computing daily discharges are employed. Great care is taken in the selection and equipment of gaging stations, in order that the data may have the required degree of accuracy.

On many of the larger rivers, where water power is developed by dams, estimates of flow are obtained by observing the head on the crest and using a weir formula. On the smaller streams sharp-crested weirs are in some cases erected.

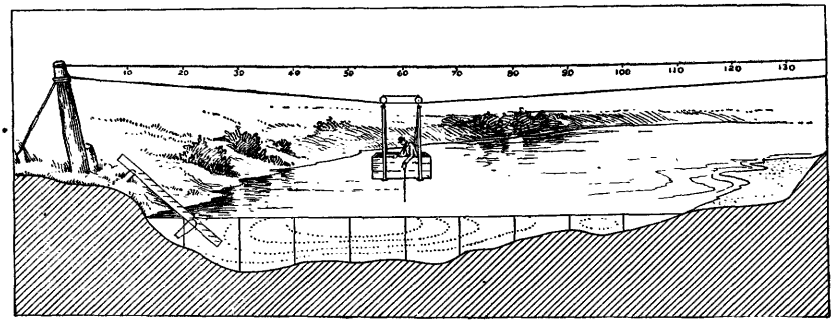


FIG. 1.—Cable station, showing section of river, car, gage, etc.

The principal instrument used in stream-measurement work is the current meter, by which the velocity of the flow of water is determined. After years of experience the Survey has adopted the Price current meter for general work. This meter, as is shown on Pl. II, is made in two sizes, known as the large and small Price. The small Price has been largely developed by the officers of the Survey, using the Price acoustic meter as a basis.

A discharge measurement is the determination of the quantity of water flowing past a certain point at a given time. This quantity is the product of two factors: (1) The mean velocity, which is the function of the cross section, surface, slope, wetted perimeter, and roughness of bed; (2) the area, which depends upon the permanency of the bed and the fluctuations of the surface, which govern the depth.

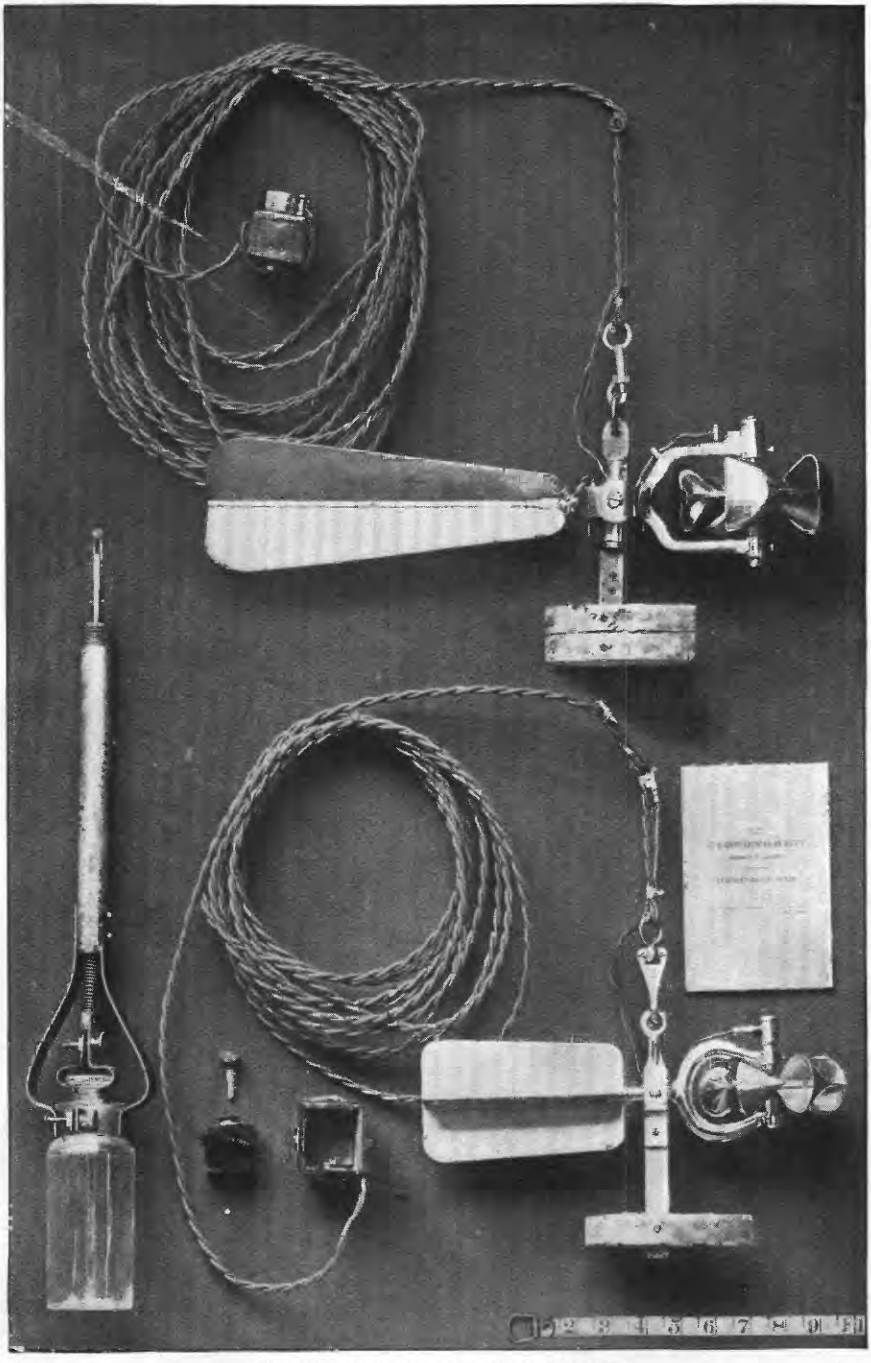
In making the measurement an arbitrary number of points are laid off perpendicular to the thread of the stream (see fig. 1). These points are usually at regular intervals varying from 2 to 20 feet, depending

upon the size and conditions of the stream. They are known as measuring points, and at them the observed data, the velocities and soundings, are taken. The perpendiculars dropped from the measuring points divide the gaging section into strips, and for each strip or pair of strips the mean velocity, area, and discharge are determined independently; thus conditions existing in one part of the stream are not distributed to parts where they do not apply.

The methods of obtaining velocity with the current meters which are in general use may be grouped into three classes: Single point, multiple point, and integration.

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. Extensive experiments by vertical velocity-curves show that the thread of mean velocity lies at from 0.5 to 0.7 of the total depth. In general practice the thread of mean velocity is considered to be at 0.6 depth, and it is at this depth that the meter is held in the majority of the measurements, this being known as the six-tenths depth method. It is found by a large number of vertical velocity-curve measurements, taken on various streams and under various conditions, that the coefficient for reducing the velocity obtained at sixth-tenths depth to mean velocity is practically unity, ranging, in a series of 910 measurements made at 39 gaging stations, between 0.94 and 1.04, with a mean for the 910 observations of 1.00. 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 action of the wind or other disturbing influences. This is known as the subsurface method. The coefficient for reducing the velocities taken at the subsurface has been found by repeated experiments with vertical velocity-curves to be from 0.85 to 0.95, depending upon the depth of the stream and velocity and channel conditions. This method is specially adapted for flood measurements or when the velocity is so great that the meter can not be kept at 0.6 depth.

The three principal multiple-point methods in general use are: The vertical velocity curve; top and bottom; and top, bottom, and mid depth. In the vertical velocity-curve method a series of velocity determinations are taken in the vertical at regular intervals, usually from 0.5 to 1 foot apart. By platting these velocities as abscissas and their depths as ordinates, and drawing a smooth curve through these points, the vertical velocity-curve is produced, which shows the change in velocity from the surface to the bottom of the stream. The mean velocity in the vertical is then obtained by dividing the depth into the area bounded by this mean velocity curve and the initial line. Owing to the length of time it takes to make these measurements, they are seldom used except for determining coefficients for purposes of comparison and for measurements under ice.



PRICE CURRENT METERS, WITH BUZZERS.

In the second multiple-point method the meter is held from 0.5 to 1 foot below the surface and about 0.5 foot above the bottom, and the mean of the velocities at these two points is taken as the mean velocity for that vertical. This method is not well adapted for general work, as the roughness of the bottom disturbs the velocity at that point. For shallow streams with comparatively smooth beds good results are obtained by this method. In the third multiple-point method the meter is held at mid depth, 0.5 foot below the surface, and 0.5 foot above the bottom, and the mean velocity is determined by dividing the sum of the top velocity, twice the mid-depth velocity, and the bottom velocity by 4.

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. The number of revolutions and the time taken in the operation is noted, and the mean velocity is found by dividing the number of revolutions by the number of seconds taken in the run. This method has the advantage in that the velocity at each point of the vertical is measured twice. It is well adapted for measurements under ice and as a check on the point methods.

The area, which is the other factor for determining the discharge of the stream, depends upon the stage of the river, which is taken on a gage, and the general contour of the bed of the stream, which is found by sounding. The soundings are usually taken at each measuring point at the time of the discharge measurement, either by using the meter and cable or by a special sounding line or rod. For stations with permanent beds standard cross sections are usually taken during low water. These sections serve to check the soundings which are taken at the time of the measurements, and from them any change which may have taken place in the bed of the stream can be detected. They are also used for obtaining the area for use in high-water measurement computations, as accurate soundings are hard to obtain at high stages.

In computing the discharge measurements from the observed velocities and depths at the various points of measurements the measuring section is divided into elementary strips, as shown in fig. 1, and the mean velocity, area, and discharge are determined separately for either a single or double strip. The total discharge and area are the sums of those for the various strips, and the mean velocity is obtained by dividing the total discharge by the total area.

The volume of water flowing in a stream is known as run-off. In expressing it various units are used, depending upon the kind of work for which the data are needed. Those used in this report are "second-feet," "acre-feet," "run-off per square mile," and "run-off in depth in inches," and may be defined as follows:

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

The "acre-foot" is the unit of capacity used in connection with storage for irrigation work, and is equivalent to 43,560 cubic feet. It is the quantity required to cover an acre to a depth of 1 foot. There is a convenient relation between the second-foot and the acre-foot; 1 second-foot flowing for twenty-four hours will deliver 86,400 cubic feet, which equals 1.9835 acre-feet, or, approximately, 2 acre-feet.

The expression "second-feet per square mile" means the average number of cubic feet of water flowing each second from every square mile of drainage area, on the assumption that the run-off is uniformly distributed.

"Depth in inches" means the depth of water in inches that would have covered the drainage area, uniformly distributed, if all the water could have accumulated on the surface. This quantity is used for comparing run-off with rainfall, which quantity is usually given in depth in inches.

It should be noticed that "acre-feet" and "depth in inches" represent the actual quantities of water which are produced during the periods in question, while "second-feet," on the contrary, is merely a rate of flow per second.

The base data for computing the daily discharge of a stream are the daily gage heights and the various discharge measurements, of which there should be sufficient number to cover the range of stage. The fundamental laws upon which these computations are based are the following:

(1) The discharge will remain constant so long as the conditions at or near the gaging station remain constant;

(2) Neglecting the change of slope due to the rise and fall of the stream, the discharge will be the same whenever the stream is at a given stage; and

(3) The discharge is both a function of, and increases gradually with, the gage heights. (2 and 3 depend on 1.)

As the beds of many streams are changeable, the problem divides itself into two classes: (1) Those of streams with permanent, or practically permanent, beds, and (2) those of streams with changeable beds. The base data and methods of obtaining them are the same for either class, and it is only in the computation of the mean daily flow that different methods are necessary.

In determining the daily discharge of streams with permanent beds the results of the discharge measurements are plotted on cross-section paper, with gage heights as ordinates and discharges as abscissas. Through these points a smooth curve is drawn, which shows the discharge for any gage height, and from which a rating table is prepared. Aside from plotting the discharge, the mean velocity and area determined for each discharge measurement are plotted. Through these points the curves of mean velocity and of area are drawn, and the rating curve is largely determined by taking the product of the mean

velocity and the area at various stages as determined by these curves. These curves of mean velocity and area are of special value to determine the location of the rating curve for stages at which actual discharge measurements are not available and for extending the discharge curve outside the limits of the measurements. In the preparation of the rating table the discharge for each tenth or half tenth on the gage is found from the curve. The first and second differences of these discharges are then taken and adjusted according to the law that they shall either be constant or increasing, never decreasing. The discharges in the table are then changed in accordance with these adjusted differences. In making up the station-rating curve the individual discharge measurements and the conditions under which they were taken are carefully studied, in order that proper weight shall be given to each measurement. Rating curves in general take the form of a parabola, and as a rule the high-water portion of the curve approaches a straight line. For stations of permanent character the results of the measurements from year to year should be within 5 per cent of the curve, with the exception of those taken during high water, when the probable error may be as high as 10 per cent.

The determination of the daily discharge of streams with changeable beds is difficult, and unless frequent discharge measurements are made the results obtained are only roughly approximate. For streams with continually shifting beds, such as Colorado River and the Rio Grande, discharge measurements are made every two or three days, and the discharges for the intervening days are obtained by interpolation, modified by the gage heights for these days. For stations with beds which shift slowly, or are only materially changed during floods, station-rating curves and tables can be prepared for the periods between changes, and satisfactory results can be obtained with two or three measurements a month, providing measurements are taken soon after the changes take place.

In determining the flow for periods when the streams are frozen, special rating curves and tables have to be prepared from measurements taken under these conditions. The methods of constructing these curves and tables are the same as for open sections. The discharge measurements, however, are either taken by integration in verticals or by the vertical velocity-curve method, as sufficient experiments have not been made on ice-covered streams to determine the laws which govern the position of the thread of mean velocity.

The Report of Progress of Stream Measurements for the Calendar Year 1904, of which this is Part IV, is published in a series of twelve Water-Supply Papers, Nos. 124–135, inclusive, under the following subtitles:

Part 1. Atlantic coast of New England drainage.

Part 2. Hudson, Passaic, Raritan, and Delaware River drainages.

Part 3. Susquehanna, Patapsco, Potomac, James, Roanoke, Cape Fear, and Yadkin River drainages.

Part 4. Santee, Savannah, Ogeechee, and Altamaha rivers and Eastern Gulf of Mexico drainage.

Part 5. Eastern Mississippi River drainage.

Part 6. Great Lakes and St. Lawrence River drainage.

Part 7. Hudson Bay, Minnesota, Wapsipinicon, Iowa, Des Moines, and Missouri River drainages.

Part 8. Platte, Kansas, Meremac, Arkansas, and Red River drainages.

Part 9. Western Gulf of Mexico drainage.

Part 10. Colorado River and Great Basin drainage.

Part 11. The Great Basin and Pacific Ocean drainage in California.

Part 12. Columbia River and Puget Sound drainage.

The territory covered by each paper is given in the subtitle, and the larger drainages are, for convenience in arrangement, subdivided into smaller ones, under which the data are arranged, as far as practicable, geographically.

These papers contain the data that have been collected at the regular gaging stations, the results of the computations based upon the observations and such other information that has been collected that has a direct bearing on these data including, as far as practicable, descriptions of the drainage areas and the streams draining them.

For each regular station are given, as far as available, the following data:

1. Description of station.
2. List of discharge measurements.
3. Gage-height table.
4. Rating table.
5. Table of estimated monthly and yearly discharges and run-off.

The descriptions of stations give, as far as possible, such general facts about the locality and equipment as would enable the reader to find the station and use the same. They also give, as far as possible, a complete history of all the changes that have occurred since the establishment of the station that would be factors in using the data collected.

The discharge-measurement table gives the results of the discharge measurements made during the year. This includes the date, the hydrographer's name, the gage height, and the discharge in second-feet.

The table of daily gage heights gives for each day the mean height of the surface of the river as found from the mean of the gage readings taken on that day. At most of the stations the gage is read in the morning and in the evening.

The rating table gives discharges in second-feet corresponding to each stage of the river as given by the gage heights.

In the table of estimated run-off the column headed "Maximum" gives the mean flow for the day when the mean gage height was the

highest, and it is the flow as given in the rating table for that mean gage height. As the gage height is the mean for the day, there might have been short periods when the water was higher and the corresponding discharge larger than given in this 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" gives the average flow for each second during the month. Upon this mean the computations for the three remaining columns which are defined on pages 11 and 12 are based.

In the computations for the tables of this report the following general and special rules have been used:

Fundamental rules for computation.

1. The highest degree of precision consistent with the rational use of time and money is imperative.

2. All items of computation should in general be expressed by at least two and by not more than four significant figures.

3. Any measurement in a vertical velocity, mean velocity, or discharge curve whose per cent of error is 5 times the average per cent error of all the other measurements should be rejected.

4. In reducing the number of significant figures, or the number of decimal places, by dropping the last figure, the following rules apply:

(a) When the figure in the place to be rejected is less than 5, drop it without changing the preceding figure. Example: 1,827.4 becomes 1,827.

(b) When the figure in the place to be rejected is greater than 5, drop it and increase the preceding figure by 1. Example: 1,827.6 becomes 1,828.

(c) When the figure in the place to be rejected is 5, and it is preceded by an even figure, drop the 5. Example: 1,828.5 becomes 1,828.

(d) When the figure in the place to be rejected is 5, and it is preceded by an odd figure, drop the 5 and increase the preceding figure by 1. Example: 1,827.5 becomes 1,828.

5. In constructing and applying rating tables a maximum limit of one-half per cent error should seldom be exceeded.

Special rules for computation.

1. Rating tables are to be constructed as close as the data upon which they are based will warrant. No decimals are to be used when the discharge is over 50 second-feet.

2. Daily discharges shall be applied directly to the gage heights as they are tabulated.

3. Monthly means are to be carried out to one decimal place when the quantities are below 100 second-feet. Between 100 and 10,000 second-feet, the last figure in the monthly mean shall be a significant figure. This also applies to the yearly mean.

4. Second-feet per square mile and depth in inches for the individual months shall be carried out at least to three significant figures, except in the case of decimals, where the first significant figure is preceded by one or more "0," when the quantity shall be carried out to two significant figures. Example: 1.25; .125; .012; .0012. The yearly means for these quantities are always to be expressed in three significant figures and at least two decimal places.

The results of the stream measurements made during previous years by the United States Geological Survey can be found in the following Survey publications. A detailed index of the reports for years previous to 1904 is given in Water-Supply Paper No. 119.

1888. Tenth Annual Report, Part II.
1889. Eleventh Annual Report, Part II.
1890. Twelfth Annual Report, Part II.
1891. Thirteenth Annual Report, Part III.
1892. Fourteenth Annual Report, Part II.
1893. Bulletin No. 131.
1894. Bulletin No. 131; Sixteenth Annual Report, Part II.
1895. Bulletin No. 140.
1896. Water-Supply Paper No. 11; Eighteenth Annual Report, Part IV.
1897. Water-Supply Papers Nos. 15 and 16; Nineteenth Annual Report, Part IV.
1898. Water-Supply Papers Nos. 27 and 28; Twentieth Annual Report, Part IV.
1899. Water-Supply Papers Nos. 35 to 39, inclusive; Twenty-first Annual Report, Part IV.
1900. Water-Supply Papers Nos. 47 to 52, inclusive; Twenty-second Annual Report, Part IV.
1901. East of Mississippi River, Water-Supply Papers Nos. 65 and 75.
West of Mississippi River, Water-Supply Papers Nos. 66 and 75.
1902. East of Mississippi River, Water-Supply Papers Nos. 82 and 83.
West of Mississippi River, Water-Supply Papers Nos. 84 and 85.
1903. East of Mississippi River, Water-Supply Papers Nos. 97 and 98.
West of Mississippi River, Water-Supply Papers Nos. 99 and 100.
1904. East of Mississippi River, Water-Supply Papers Nos. 124 to 129, inclusive.
West of Mississippi River, Water-Supply Papers Nos. 130 to 135, inclusive.

A limited number of these are for free distribution, and as long as the supply lasts they may be obtained by application to the Director United States Geological Survey or to members of Congress. Other copies are filed with the Superintendent of Public Documents, Washington, D. C., from whom they may be had at prices slightly above cost. Copies of Government publications are, as a rule, furnished to the public libraries in our large cities, where they may be consulted by those interested.

COOPERATION AND ACKNOWLEDGMENTS.

Most of the measurements presented in this paper have been obtained through local hydrographers. Acknowledgment is extended to other persons and corporations who have assisted local hydrographers or have cooperated in any way, either by furnishing records of the height of water or by assisting in transportation.

The following list, arranged alphabetically by States, gives the names of the resident hydrographers and others who have assisted in furnishing and preparing the data contained in this report:

Alabama.—District hydrographer, M. R. Hall,[a] assisted by J. M. Giles, W. E. Hall, and B. S. Drane. Dr. E. A. Smith, State geologist, has paid the salaries of river observers at Beck, Pera, Sturdevant, Jenifer, Riverside, Nottingham, Elk, and Centerville. Gage heights were furnished by the Corps of Engineers, U. S. Army, for Palos, Cordova, and Tuscaloosa, and by the United States Weather Bureau observer, F. P. Chaffee, for Selma and Montgomery.

Georgia.—District hydrographer, M. R. Hall, assisted by J. M. Giles, W. E. Hall, B. S. Drane, F. A. Murray, and O. P. Hall. Prof. W. S. Yeates, State geologist, has paid the salaries of river observers at Tallulah Falls, Groveland, Davisboro, Reidsville, Milledgeville (part of year), Greensboro, Buckhead, Flovilla, Lithonia, Covington, Norcross, Demorest, Freemans, Cantons, Carters, and Cartecay. J. M. Youngblood has furnished, without cost, gage heights for Augusta. The following United States Weather Bureau officials have furnished gage heights for the United States Weather Bureau stations, as noted in the description of stations: D. Fisher, Augusta, Ga.; J. B. Marbury, Atlanta, Ga.; and J. R. Weeks, Macon, Ga. Transportation has been furnished by J. S. B. Thompson, general agent of the Southern Railway; by E. Berkley, superintendent of the third division of the Seaboard Air Line Railway; by Thomas K. Scott, general manager of the Georgia Railroad; by James T. Wright, vice-president and general manager of the Macon, Dublin and Savannah Railroad; by J. H. Ellis, vice-president and general manager of the Atlanta, Knoxville and Northern Railway; by C. A. Wickersham, president and general manager, Atlanta and West Point Railway and Western Railway of Alabama; by W. L. Mapother, assistant to president of Louisville Railroad. The above transportation was not confined to the State of Georgia, but was also furnished for the States of South Carolina, Alabama, Mississippi, and Tennessee.

Mississippi.—District hydrographer, M. R. Hall, assisted by J. M. Giles and W. E. Hall. Gage heights were furnished by the United States Weather Bureau officials for the stations at Yazoo City and Columbus.

North Carolina.—District hydrographer, M. R. Hall, assisted by J. M. Giles, B. S. Drane, and O. P. Hall. Dr. C. A. Schenck, director of the Biltmore School of Forestry, paid the gage readers at Davidsons River, Sitton, and Pinkbed.

South Carolina.—District hydrographer, M. R. Hall, assisted by J. M. Giles, W. E. Hall, B. S. Drane, and F. A. Murray.

SANTEE RIVER DRAINAGE BASIN.

Santee River is formed in the central part of South Carolina by the junction of Congaree and Wateree rivers, flows southeast, and enters the Atlantic Ocean about 10 miles north of Cape Romain. It has a total length of about 180 miles (following the course of the river) and drains an area of about 15,000 square miles. It is a navigable stream for its entire length, and of course offers no opportunities for the development of power.

Wateree River, the more northerly of the two parent streams, rises on the eastern slope of the Blue Ridge, in McDowell County, N. C., and flows first northeast and then east, then bends abruptly southeast and flows in this general direction across the south-central portion of North Carolina and across the north-central part of South Carolina to its junction with the Congaree, practically paralleling the course of Yadkin and Pedee rivers. This stream, throughout its course in North Carolina, and also through that part of its course in South Carolina above the mouth of Wateree Creek, is known as Catawba River.

[a] Office of district hydrographer for South Atlantic States, 409 Temple Court, Atlanta, Ga.

The total length of the stream is about 270 miles in a straight line, and about 450 miles when all the windings are followed.

The Wateree is navigable as far as Camden, but above that point the fall is so great that navigation is impracticable. In 1826 and following years the State of South Carolina spent large sums in the attempt to render the river navigable by means of locks and dams. Some large and important works were constructed at great expense, but the undertaking was abandoned before their completion.

The drainage basin resembles that of the Yadkin in many respects, the upper portion of the stream flowing between parallel ranges of mountains, from which it receives many tributaries, affording much power. The average width of the valley of the main stream in North Carolina is only from 15 to 20 miles, and the fall in the main stream is considerable. The greater part of the drainage basin is hilly, and the upper portions are mountainous. A number of the tributary streams rise and flow for almost their entire length in high mountains. About 65 per cent of the upper part of the basin is in forest. Linville and John rivers, the principal tributaries in North Carolina, flow in country of this character, and their basins are almost entirely forested.

Wateree River crosses the fall line about 5 miles above Camden, S. C., in rapids about 5 miles in length, with a total fall of about 52 feet. The Great Falls of the Catawba are some distance above. This is the largest power in South Carolina, and one of the largest in the Southern States, the available fall being 173 feet.

The average rainfall in the basin is about 50 inches, the annual total increasing as the stream is ascended. The greatest flood ever experienced on the river was in May, 1901, the gage reading at the Rockhill station being 24.15 feet, and the measured discharge nearly 151,000 second-feet, or nearly 50 second-feet per square mile from the drainage basin above the station. The greatest flood previously experienced on the stream was in 1865. This was only about 2 feet lower than the flood of May, 1901, on the lower part of the river, but the May rise exceeded all previous records on the upper portion of the river by from 8 to 15 feet.

The minimum flow recorded for the Rockhill station is 1,300 second-feet, or about 0.43 second-foot per square mile. This occurred in September, 1895 and 1896. The maximum flow is about 116 times the minimum. During 1904 the minimum flow was 810 second-feet at the Catawba station. This was due to the storing of water at the new dam near Rockhill.

The Congaree, the second and more southerly of the two streams, which by their union form the Santee, is formed by the junction of Broad and Saluda rivers between Lexington and Richland counties, S. C., whence it flows in a general southeasterly direction, but in a very

tortuous channel, for about 60 miles to its junction with the Wateree. The stream is navigable to Columbia, the capital of the State. There it crosses the fall line, giving rise to a very fine water power, the only one on the stream, which is being extensively used in the manufacturing enterprises of Columbia.

Broad River rises on the eastern slope of the Blue Ridge near Hickory Nut Gap, in the southwestern part of McDowell County and the northeastern part of Henderson County, N. C., and flows in a general southeasterly direction across a portion of south-central North Carolina and north-central South Carolina to its junction with the Saluda at Columbia. The length of the river in a straight line is about 128 miles, but it is much greater if the course of the river is followed.

In general character the drainage basin closely resembles those of the Yadkin and the Catawba. It lies entirely above the fall line, is without lakes, and is well wooded, especially in the upper portion, and the soil is generally loose and porous.

The rainfall of the basin averages about 51 inches, of which about 13 inches fall in spring, the same in summer, about 10 in autumn, and about 15 in winter. It is probable that the precipitation in the region about the headwaters is much greater than these amounts indicate.

The maximum flood recorded at the Alston station on this stream, 25 miles above Columbia, occurred in May, 1901, the estimated discharge being 131,000 second-feet, equivalent to about 28 second-feet per square mile. The minimum flow recorded at the same place is 1,250 second-feet, equivalent to 0.27 second-foot per square mile. This occurred during October, 1904. The maximum flow is therefore about 105 times the minimum.

Saluda River is formed in western South Carolina by the junction of the North, South, and Middle forks, and flows southeast to its junction with Broad River, the length of the stream being about 110 miles in a straight line. The three forks are mountain streams, and the character of the drainage basin is similar to that of Broad River.

The average rainfall over the basin of the stream is 51 inches, the amount and seasonal distribution being similar to that on the Broad. The maximum flood recorded at the Waterloo station on this stream occurred in February, 1902, the rise being 23 feet above low water, and the estimated discharge being about 18,500 second-feet, equivalent to about 18 second-feet per square mile. The minimum discharge so far recorded is 200 second-feet, or about 0.19 second-foot per square mile. This occurred during October, 1904. The maximum discharge is therefore about 108 times the minimum.

The following pages give the results of the data collected in this drainage during 1904.

CATAWBA RIVER NEAR CATAWBA, S. C.

This station was established in order to continue the records on Catawba River after the Rockhill station had been abandoned. No very favorable section was found, but this one was selected as the most available one, and a temporary gage was put in by J. M. Giles on September 11, 1903, in order to start the gage-height records.

The station is located at the bridge of the Southern Railway, 2 miles southeast of Catawba, S. C., and about 2 miles below the crossing of the Seaboard Air Line Railway. The deck bridge, from which measurements are made, is a three-span wooden-lattice structure about 520 feet long, with 250 feet of trestle approach on right bank and 160 feet on the left bank. At ordinary stages the river is about 490 feet wide; at high stages the banks, which are rather high, will overflow to some extent, but all water will pass under the bridge and its approaches. The bed is partly rock and will probably shift little. The channel is straight above and below the bridge. The current is sluggish at low water—rather too much so for accurate work. The bridge is not quite at right angles with the current and corrections are made to the widths in computing measurements.

The measurements are made from a plank footway on the lower members of the bridge. The initial point for soundings is the river edge of the capstone on the left bank pier. The gage is a vertical 1 by 4 inch timber, reading from zero to 12 feet, and consists of two 5-foot sections and a 2-foot section fastened to a 3 by 10 inch timber, which is driven into the bed of the river and spiked to a willow tree. It is located on the left bank of the river, about 85 feet above the bridge. A second section of gage is attached to a tree on bank of small branch, about 200 feet from river, and the same distance above the bridge. This section extends from 12 to 27 feet.

Bench mark No. 1 is the top of the joint plate on the upstream bottom chord, at a point 44 feet from the initial point. Its elevation is 31.70 feet above the zero of the gage. Bench mark No. 2 is a standard copper plug set in a solid rock projecting from water in river about 200 feet above the bridge, and opposite point 240 feet from initial point. Its elevation is 5.73 feet above the zero of the gage.

The observer is J. Y. Brice, who is conveniently located at the railroad pump house near by. During 1904 the gage was read twice each day.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Catawba River near Catawba, S. C., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
August 10	J. M. Giles	385	2,682	0.93	2.52	2,506
September 11	do	389	2,989	1.32	3.02	3,944
October 23	do	378	2,646	.85	2.30	2,253
December 11	do	375	2,649	.78	2.40	2,057
1904.						
March 7	J. M. Giles	392	3,641	1.76	4.00	6,421
March 8[a]	do	356	3,855	5.22	8.20	20,130
March 9[a]	do	355	3,887	4.53	7.85	17,610
March 21	do	379	3,086	.95	2.75	2,943
May 7	do	393	3,291	1.00	2.90	3,279
July 25	do	415	3,348	1.14	2.98	3,806
September 12	do	426	3,036	.33	1.65	1,016
November 21	do	436	3,345	.58	2.22	1,926

[a] Taken at Seaboard Air Line Railway bridge.

Mean daily gage height, in feet, of Catawba River near Catawba, S. C., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.40	3.00	3.50	2.75	2.50	2.50	5.50	3.35	2.90	1.80	1.85	1.95
2	2.30	3.20	3.30	2.75	2.45	5.40	3.65	4.00	3.30	[a]1.40	1.85	2.15
3	2.30	2.30	3.10	2.60	2.35	4.20	3.00	4.70	4.00	[a]1.65	1.80	2.45
4	2.30	2.30	3.30	2.65	2.45	3.70	2.65	3.70	3.25	1.85	2.15	2.55
5	2.30	2.30	3.00	2.60	2.80	3.05	2.50	3.40	4.05	1.75	3.15	2.70
6	2.20	2.30	3.00	2.65	3.35	2.85	2.35	4.60	5.40	1.65	2.45	5.05
7	2.10	2.50	4.20	2.60	2.95	3.20	2.30	4.05	3.65	1.70	2.85	4.65
8	2.20	2.90	7.30	2.60	2.80	3.70	2.35	10.05	2.80	1.75	2.45	3.65
9	2.40	3.50	7.40	2.70	2.80	2.90	2.25	6.55	2.45	1.80	2.15	3.00
10	2.40	3.30	5.00	2.80	3.35	2.65	2.35	5.40	2.65	1.95	2.05	2.70
11	2.40	3.20	4.00	3.20	4.70	2.50	2.40	4.95	3.85	1.90	2.00	2.50
12	2.30	3.00	3.60	2.95	3.85	2.65	2.35	7.50	1.70	1.85	1.90	2.60
13	2.30	2.20	3.30	2.75	3.30	2.70	2.90	5.75	2.30	1.80	3.00	2.40
14	2.20	2.50	3.30	2.65	3.00	2.45	2.70	3.75	2.15	1.75	4.90	2.25
15	2.00	2.50	3.60	2.55	3.10	2.35	2.20	3.05	2.20	1.70	4.05	2.30
16	2.10	2.90	3.20	2.60	3.30	2.25	2.10	4.70	2.15	1.70	3.05	2.20
17	2.30	2.30	2.95	2.60	2.90	2.20	2.10	5.10	2.20	1.85	2.60	2.25
18	2.20	2.30	2.95	2.55	2.75	2.20	2.35	3.00	2.10	1.80	2.30	2.35
19	2.20	2.40	2.90	2.55	2.70	2.40	2.05	2.65	2.15	1.75	2.15	2.50
20	2.40	3.40	2.75	2.45	3.15	2.55	2.05	2.55	1.95	[a]1.65	2.20	2.35
21	2.40	3.90	2.75	2.50	3.00	2.50	1.95	2.90	2.10	1.70	2.35	2.25
22	2.60	6.80	2.70	2.50	2.75	2.50	2.35	2.60	1.95	1.75	2.15	2.25
23	3.60	7.00	2.90	2.50	2.55	2.40	2.85	2.55	1.95	1.75	2.10	2.25
24	3.90	5.30	3.55	2.60	2.40	2.25	2.90	2.50	2.00	1.85	2.15	2.05
25	3.00	4.00	3.40	2.50	2.35	2.20	2.95	3.30	1.85	1.70	2.30	2.35
26	3.00	3.50	3.35	2.50	2.40	2.05	2.40	4.20	1.95	1.85	2.15	2.30
27	1.50	3.50	3.35	2.70	2.35	2.10	2.65	5.85	2.20	1.95	2.15	2.60
28	2.60	4.10	3.35	2.65	2.30	2.10	2.95	6.60	2.00	1.75	2.15	2.90
29	2.00	3.60	3.05	2.75	2.25	3.55	4.30	4.30	1.55	1.75	1.95	3.05
30	1.50	.....	2.95	2.55	2.20	6.35	4.05	2.90	1.60	1.80	1.95	3.15
31	2.40	.....	2.85	.....	2.35	.....	3.05	2.60	.....	1.85	.....	2.90

[a] Storing water at the new dam at Rock Hill, S. C., accounts for low days.

Rating table for Catawba River near Catawba, S. C., from September 11, 1903, to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.40	810	2.10	1,655	2.80	3,200	3.50	5,205
1.50	900	2.20	1,825	2.90	3,470	3.60	5,500
1.60	1,000	2.30	2,015	3.00	3,750	3.70	5,800
1.70	1,110	2.40	2,225	3.10	4,035	3.80	6,100
1.80	1,230	2.50	2,450	3.20	4,325	3.90	6,400
1.90	1,360	2.60	2,690	3.30	4,615	4.00	6,700
2.00	1,500	2.70	2,940	3.40	4,910		

The above table is based upon 12 discharge measurements made during 1903–1904. It is well defined between gage heights 1.5 feet and 4.0 feet. Above 4.0 it is only fairly determined. The table has been extended beyond these limits. Above gage height 3.60 feet the rating curve is a tangent, the difference being 300 per tenth.

Estimated monthly discharge of Catawba River near Catawba, S. C., for 1903 and 1904.

[Drainage area, 1,514 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1903.					
September 11–30	16,300	1,825	3,962	2.62	1.95
October	4,910	1,825	2,313	1.53	1.76
November	6,400	2,015	2,754	1.82	2.03
December	3,470	2,015	2,269	1.50	1.73
1904.					
January	6,400	900	2,313	1.53	1.75
February	15,700	1,825	4,783	3.16	3.41
March	16,900	2,940	5,366	3.54	4.08
April	4,325	2,337	2,808	1.85	2.06
May	8,800	1,825	3,344	2.21	2.55
June	13,750	1,578	3,599	2.38	2.66
July	11,200	1,480	3,172	2.10	2.42
August	24,850	2,450	7,629	5.04	5.81
September	10,900	950	2,883	1.90	2.12
October	1,480	810	1,198	.791	.912
November	9,400	1,230	2,451	1.62	1.81
December	9,850	1,480	2,994	1.98	2.28
The year	24,850	810	3,545	2.34	31.87

CATAWBA RIVER NEAR MORGANTON, N. C.

The original station was established June 19, 1900, in connection with the hydrographic investigation of the Southern Appalachian area, at which time a wire gage was installed on the highway bridge on the road from Morganton to Hartland. In May, 1901, the river throughout this part of its course rose from 8 to 15 feet higher than ever before known, and the bridge and gage were destroyed. The present station was established May 15, 1903, by E. W. Myers, assisted by B. S. Drane, at the bridge which was built to replace the one carried away by the flood of May, 1901. The station is 1 mile north of Morganton and about 200 yards below the mouth of Upper Creek. The standard chain gage with inclosed scale is attached to the lower chord of the downstream side of the bridge. The zero of the scale is about 94 feet from the initial point for soundings. The length of the chain from the end of the weight to the marker is 36.95 feet. The gage is read once each day by Hort Edmunson. Discharge measurements are made from the downstream side of the single-span steel highway bridge to which the gage is attached. The initial point for soundings is the left end of the downstream hand rail. Distances are laid off along this rail and are marked in white paint. The channel is straight for about 200 feet above and for about 600 feet below the station. The current is swift. The right bank is low and overflows to a slight extent on account of erosion, but all water passes beneath the approach to the bridge. The left bank is high, rocky, and wooded. The bed of the stream is rocky, with sand and gravel near the right bank.

Bench mark No. 1 is the left side of the upper surface of the sixth floor beam at the downstream side of the bridge, 13 feet to the right of the zero of the gage. The point is indicated by a spot of white paint and the letters B. M. When the gage reads zero the water surface is 34.77 feet below this point. Bench mark No. 2 is a copper plug set in cement in a rock on the left bank 24.3 feet back of the initial point for soundings, and is 3 feet downstream from the line of the downstream truss. It is about 1½ feet above the road and is inclosed in a circle of white paint and marked "B. M." Its elevation is 37.37 feet above datum of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Catawba River near Morganton, N. C., in 1903 and 1904.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
February 13	E. W. Myers	850	3.36	2.77	2,861
May 5	do	726	2.28	2.04	1,656
May 5	do	726	2.33	2.05	1,698
June 25	do	611	2.09	1.93	1,276
June 25	do	611	2.10	1.95	1,282
August 21	B. S. Drane	552	2.14	1.77	1,181
August 21	do	554	2.15	1.76	1,193
October 28	do	458	1.15	1.16	528
October 28	do	462	1.21	1.18	559
December 11	do	439	1.09	1.19	480
December 11	do	440	1.12	1.22	493
1904.					
February 17	B. S. Drane	435	1.24	1.23	539
March 18	do	622	1.31	1.56	816
March 18	do	615	1.37	1.56	843
May 5	do	641	2.04	2.08	1,305
May 27	do	458	1.68	1.48	770
July 21	do	415	1.08	1.01	447
August 19	do	427	1.49	1.28	637
September 29	do	356	1.10	1.04	391
September 29	do	356	1.11	1.01	395
December 15	do	394	1.15	1.15	454
December 16	do	405	1.23	1.18	500

Main daily gage height, in feet, of Catawba River near Morganton, N. C., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.25	1.30	1.80	1.55	1.35	4.45	1.95	3.10	1.70	0.95	1.00	1.10
2	1.25	1.30	1.65	1.50	1.35	3.25	1.70	2.35	2.20	.95	1.00	1.15
3	1.25	1.25	1.60	1.45	3.30	2.40	1.50	1.90	1.55	.95	1.10	1.25
4	1.20	1.25	1.55	1.40	2.60	2.10	1.35	1.70	1.90	.90	1.75	1.40
5	1.20	1.25	1.50	1.40	2.15	1.90	1.50	1.95	2.20	.95	1.50	1.70
6	1.20	1.25	1.50	1.40	1.80	1.75	1.35	2.30	1.50	.95	1.30	2.05
7	1.50	1.35	9.20	1.50	1.70	1.95	1.30	2.45	1.40	1.10	1.15	1.55
8	1.30	1.90	4.30	1.55	3.50	2.00	1.30	2.00	1.30	1.00	1.10	1.40
9	1.20	1.70	2.80	2.65	4.10	1.65	1.35	1.70	1.30	1.05	1.10	1.35
10	1.20	1.65	2.30	1.70	3.05	1.60	1.30	2.10	1.30	1.00	1.05	1.35
11	1.20	1.50	2.10	1.60	2.40	1.70	1.30	2.05	1.35	.95	1.00	1.35
12	1.20	1.40	1.90	1.60	2.10	1.55	1.35	2.40	1.30	.95	1.00	1.25
13	1.20	1.40	1.80	1.60	2.00	1.45	1.30	1.85	1.25	.90	1.80	1.25
14	1.20	1.35	1.80	1.55	1.95	1.45	1.25	1.65	1.20	.90	1.50	1.20
15	1.20	1.35	1.75	1.50	1.90	1.40	1.25	1.50	1.15	.95	1.35	1.15
16	1.20	1.35	1.65	1.45	1.70	1.45	1.20	1.50	1.10	.90	1.25	1.15
17	1.15	1.30	1.60	1.55	1.65	1.65	1.15	1.40	1.05	.85	1.20	1.20
18	1.15	1.30	1.60	1.45	2.30	1.60	1.10	1.35	1.05	.95	1.20	1.25
19	1.15	1.30	1.55	1.40	2.90	2.05	1.10	1.30	1.10	.90	1.10	1.20
20	1.15	1.30	1.50	1.35	1.80	1.80	1.05	1.40	1.10	.90	1.00	1.15
21	1.20	1.30	1.50	1.40	1.60	1.55	1.10	1.35	1.10	.90	1.05	1.15
22	1.25	2.80	1.60	1.40	1.60	1.45	1.10	1.40	1.05	.90	1.05	1.10
23	2.40	2.40	1.60	1.45	1.55	1.40	1.20	2.40	1.05	.90	1.05	1.05
24	1.65	1.85	1.90	1.35	1.60	1.35	1.15	2.40	1.05	.90	1.10	1.05
25	1.50	1.70	2.00	1.35	1.60	1.30	2.40	1.60	1.05	.95	1.00	1.25
26	1.40	1.60	1.90	1.60	1.70	1.30	1.70	1.50	1.05	1.00	1.05	1.30
27	1.40	1.80	1.85	1.60	1.45	1.40	1.30	2.00	1.05	.95	1.05	1.75
28	1.35	1.80	1.80	1.45	1.50	1.65	1.65	1.65	1.00	.95	1.05	2.05
29	1.35	1.80	1.70	1.40	1.55	1.85	1.50	1.40	1.00	1.00	1.10	1.55
30	1.35	.....	1.60	1.35	1.65	2.50	1.40	1.30	.95	.95	1.10	1.50
31	1.30	.....	1.55	.....	5.25	.....	1.35	1.40	.....	1.00	.....	1.45

Rating table for Catawba River near Morganton, N. C., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.80	252	1.40	702	2.00	1,460	2.60	2,610
.90	307	1.50	800	2.10	1,640	2.70	2,805
1.00	372	1.60	908	2.20	1,830	2.80	3,000
1.10	447	1.70	1,026	2.30	2,025	2.90	3,195
1.20	527	1.80	1,156	2.40	2,220	3.00	3,390
1.30	612	1.90	1,300	2.50	2,415		

The above table is based upon discharge measurements made during 1903 and 1904. It is well defined between gage heights 1 foot and 2 feet. Above 2 feet the direction of the tangent is determined by one measurement at 2.77 feet. The table has been extended beyond these limits. Above gage height 2.2 feet the rating curve is a tangent, the difference being 195 per tenth. Above 2 feet the estimates can be considered a very rough approximation. This table is the same as the 1903 table, with the exception of a very slight change below 1.3 feet gage.

Estimated monthly discharge of Catawba River near Morganton, N. C., for 1904.

[Drainage area, 758 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	2,220	487	643	0.848	0.978
February	3,000	569	915	1.21	1.30
March	15,480	800	1,759	2.32	2.68
April	2,708	657	846	1.12	1.25
May	7,777	657	1,878	2.48	2.86
June	6,217	612	1,333	1.76	1.96
July	2,220	410	711	.938	1.08
August	3,585	612	1,293	1.71	1.97
September	1,830	339	639	.843	.940
October	447	280	338	.446	.514
November	1,156	372	515	.679	.758
December	1,550	410	679	.896	1.03
The year	15,480	280	962	1.27	17.32

JOHN RIVER NEAR MORGANTON, N. C.

This station was established as a bench-mark station. It is located at the iron highway bridge on the Lenoir road, about 3 miles from Morganton, N. C. Discharge measurements are made from the downstream side of the single-span bridge. The initial point for soundings is the left end of the main span, downstream side, over the middle of the left pier. The channel is curved for about 300 feet above and straight for 500 feet below the station. The current is swift. Both banks are high, wooded, and not liable to overflow. The bed of the stream is rocky along the left bank, which is composed of rock, and sandy along the right bank. There is but one channel at all stages.

The bench mark is the upper edge of the end of a bar extending from the floor beam to a brace at the downstream end of the second floor beam from the left pier, 32 feet from the initial point for soundings. Its elevation is 30.00 feet above datum.

Discharge measurements of John River near Morganton, N. C., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
May 27	B. S. Drane	64	172	1.72	1.66	295
July 21	do	61	163	1.26	1.44	205
August 19	do	62	170	1.40	1.53	238
September 29	do	61	135	1.13	1.31	153
December 16	do	61	146	1.00	1.27	146

WATEREE RIVER NEAR CAMDEN, S. C.

Camden, S. C., is on the Wateree River, 45 miles above its mouth, and about 5 miles below the fall line. The drainage area above the station is 2,635 square miles.

A station has been maintained here by the United States Weather Bureau since 1891. The gage is at the toll bridge about 2 miles west of Camden. Measurements are made from this bridge, which consists of two iron spans, about 180 feet each, supported by tubular iron piers, and has short wooden approaches with brick abutments on both banks. The bridge keeper is also the river observer. The Weather Bureau gage is in three sections, the lower section being a timber fastened to a log near the right bank and about 15 feet above the bridge, and reading from 0 to 8 feet. The second is a timber fastened to an ash tree on right bank about 25 feet above the bridge, and reading up to 15 feet. The third section, 15 to 32 feet, is painted on the upstream cylindrical pier on right bank. Only the third section, painted on the iron pier, is in good condition. On August 12, 1904, a new chain gage was put in by M. R. Hall, set to accord with the pier gage. The gage is a 24-inch iron top box, with outside scale. It is located at the upstream end of a floor beam, 40 feet from the right bank pier, and is fastened to a short vertical timber resting on the floor beam, and clamped to the double rod hanger. The bottom of the box is about 3 feet above the bridge floor, and is 41.53 feet above gage datum. The length of the chain is 43.53 feet.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is the edge of the right bank brick abutment. Both banks are high, but are liable to overflow at time of floods. Both are open and cultivated except along the bank where there are trees. The channel is 270 feet wide at low water, and is broken by one pier. The current is smooth and moderately swift, except at lowest stages. The bed is sand and is probably changing. The river below has a very small slope, which is unfavorable for good rating at high stages, as the position of flood crest will affect the slope largely.

Bench mark No. 1 is the top of the upstream end of the floor beam about 40 feet from right bank pier, at a point directly under the gage. Its elevation is 36.85 feet above the gage datum. Bench mark No. 2 is two large wire nails driven horizontally into a sycamore tree on right bank of river, and upstream side of the road, 110 feet from the pier. Its elevation is 31.27 feet above gage datum.

Discharge measurements of Wateree River near Camden, S. C., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
July 23	J. M. Giles	264	3,249	1.47	7.10	4,760
August 11	M. R. Hall	324	6,627	1.97	17.80	13,060
August 12	do	324	7,345	2.68	20.20	19,660
September 13	J. M. Giles	270	2,215	.63	3.60	1,406
September 14	do	271	2,538	.91	4.60	2,318
November 19	do	274	2,538	.99	4.52	2,501

Mean daily gage height, in feet, of Wateree River near Camden, S. C., for 1904.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1		3.00	3.20	3.70	17	4.60			4.50
2		3.00	4.20	3.80	18	4.60			5.20
3		3.30	4.00	4.90	19	4.00			5.10
4		3.00	4.20	7.10	20	4.00			5.20
5		3.30	5.80	5.50	21	4.00			4.20
6		3.40	7.40	10.00	22	4.50			4.60
7		3.40	5.10	14.10	23	3.90	3.50		4.50
8		3.20	6.20	11.10	24	4.00	3.40		4.30
9		3.30	5.20	8.10	25	4.10	3.00		4.30
10		3.50	4.70	6.50	26	3.90	3.50		4.20
11	5.40	3.50	4.50	5.50	27	3.50	4.50	4.00	4.90
12	8.90	3.90	4.30	5.50	28	4.10	4.00	3.70	7.40
13	4.80	3.80		5.00	29	4.20	4.00	3.70	8.90
14	4.80	3.80		4.60	30	3.80	3.90	3.80	7.00
15	4.80	3.60		4.50	31		3.60		6.40
16	4.80			4.60					

BROAD RIVER (OF THE CAROLINAS) AT ALSTON, S. C.

This station was established July 3, 1896, by E. W. Myers at the Southern Railroad bridge at Alston, S. C., about 27 miles above Columbia. The standard chain gage is located in the second span from the left end of the bridge. The zero of the scale is 74 feet from the initial point for soundings. The length of the chain from the end of the weight to the marker is 39.22 feet. The observer is G. M. Heron, a farmer of Alston, S. C., who reads the gage once each day. Discharge measurements are made from the downstream side of the steel through

6-span railway bridge to which the gage is attached. The initial point for soundings is the end of the second span nearest the left bank over the center of the pier. At flood stages some water passes behind this point. The channel above the station is straight, but the current is interrupted by a large island and passes under the bridge at an angle. Below the bridge the channel is straight for about one-half mile. Both banks are high and all water passes beneath the bridge. The bed of the stream is of sand and silt and is slightly shifting. There is but one channel at all stages.

Bench mark No. 1 is a point on the right side of the downstream end of the fifth floor beam from the left end of the second span from the left end of the bridge. It is marked in white paint and is indicated by the letters B. M. When the gage reads zero the water surface is 36.44 feet below this point. Bench mark No. 2 is a standard copper bolt set in rock on the left bank on the hillside 50 yards from the river and 52 feet downstream from the center line of the trestle approach to the bridge and is 21.2 feet from the corner of the pump house. The rock is white and the bench mark is under a small china tree. This bench mark is 9.85 feet below the bench mark on the bridge, making its elevation 26.59 feet above the gage datum.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Broad River (of the Carolinas) at Alston, S. C., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 23	E. W. Myers		12,300	5.78	19.85	71,140
April 17	E. C. Murphy		3,764	3.48	7.74	15,060
June 24	B. S. Drane		3,376	3.14	6.20	10,590
August 6	J. M. Giles		2,904	2.84	5.58	8,259
August 6	M. R. Hall		2,904	2.74	5.58	7,954
September 10	J. M. Giles		2,635	2.74	4.86	7,218
October 22	do		1,341	2.40	3.45	3,219
December 10	do		1,572	2.19	3.75	3,437
1904.						
January 27	W. E. Hall	519	1,809	2.28	4.10	4,128
March 3	J. M. Giles	528	1,835	2.61	4.50	4,786
May 6	do	521	1,757	2.20	4.18	3,861
July 22	do	521	1,847	2.42	4.10	4,465
September 15	do	429	1,255	1.65	2.95	2,065
November 18	do	489	1,524	1.85	3.55	2,817

Mean daily gage height, in feet, of Broad River (of the Carolinas) at Alston, S. C., 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.70	3.80	4.50	4.25	3.85	3.50	5.70	3.55	4.10	2.55	2.40	3.00
2	3.60	3.60	4.50	4.25	3.80	5.30	6.60	6.75	4.00	2.60	2.60	3.35
3	3.60	3.80	4.50	4.20	3.40	4.80	4.50	7.00	4.30	2.55	2.50	4.95
4	3.60	3.70	4.50	4.05	4.10	4.30	3.85	6.60	4.00	2.35	2.65	4.25
5	3.30	3.70	4.40	3.75	4.45	3.90	3.20	5.00	4.20	2.20	3.90	3.70
6	3.30	3.70	4.30	4.05	4.20	3.60	3.00	5.50	5.20	2.45	4.00	8.70
7	3.40	3.70	5.50	4.05	4.10	3.20	3.10	5.20	4.40	2.65	3.60	8.00
8	3.50	4.40	9.95	4.30	3.90	4.70	3.30	12.45	3.80	2.50	3.15	5.70
9	3.60	4.70	8.35	4.25	3.95	4.40	3.05	13.00	3.40	2.70	3.15	4.65
10	3.60	4.90	6.35	4.60	4.45	3.80	3.05	11.50	3.30	2.70	3.10	4.35
11	3.50	4.60	5.50	4.65	4.70	3.50	3.25	9.30	3.20	2.40	3.00	3.95
12	3.40	4.40	5.10	4.05	4.20	3.40	3.30	8.70	3.10	2.55	3.00	3.35
13	3.60	4.20	4.90	4.10	3.95	4.40	4.10	7.30	2.80	2.55	3.50	3.60
14	3.60	4.10	4.90	4.10	3.85	3.50	3.30	5.20	2.85	2.65	6.10	3.70
15	3.60	3.90	4.70	4.00	3.80	3.45	3.05	4.55	3.00	2.65	5.60	3.70
16	3.50	3.80	5.00	3.95	4.05	3.20	2.75	7.50	2.85	2.40	4.45	3.75
17	3.60	4.00	4.55	4.00	4.00	3.20	3.40	5.90	2.65	2.50	3.80	3.70
18	3.50	3.90	4.40	4.05	3.85	3.20	3.20	4.70	2.60	2.20	3.55	3.70
19	3.60	3.90	4.35	3.80	3.65	3.10	3.05	3.85	2.80	2.45	3.45	3.65
20	3.60	6.40	4.30	4.05	3.70	5.00	2.75	3.90	2.45	2.65	3.35	3.35
21	3.60	6.60	4.20	3.95	3.50	5.10	2.70	4.50	2.95	2.55	3.25	3.60
22	3.60	11.25	3.90	3.95	3.45	4.45	3.75	3.85	2.80	2.60	2.75	3.50
23	6.50	11.30	4.30	3.95	3.35	3.90	4.95	3.30	2.75	2.60	3.10	3.40
24	5.30	8.20	4.90	3.90	3.10	3.40	6.95	3.50	2.65	2.45	3.35	3.40
25	4.80	6.10	5.50	3.85	3.10	3.40	4.25	3.70	2.50	2.25	3.20	3.50
26	4.20	5.30	5.40	3.95	3.10	3.20	3.25	3.85	2.60	2.50	3.05	3.35
27	4.20	4.40	5.60	4.10	2.95	2.90	3.50	11.10	2.45	2.90	3.00	3.25
28	3.90	4.80	4.95	4.45	3.20	2.75	3.30	10.70	2.60	2.80	3.00	4.00
29	3.80	4.70	4.50	4.15	3.15	2.95	5.85	14.00	2.80	2.65	2.65	5.25
30	3.90	.....	4.50	3.95	3.40	4.20	5.05	5.70	2.70	2.70	2.90	4.55
31	3.90	.....	4.30	.....	3.20	.....	3.90	4.50	.....	2.60	.....	4.20

Rating table for Broad River (of the Carolinas) at Alston, S. C., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
2.20	1,250	3.20	2,590	4.20	4,750	6.00	9,600
2.30	1,340	3.30	2,770	4.40	5,250	6.50	11,100
2.40	1,440	3.40	2,960	4.60	5,750	7.00	12,600
2.50	1,550	3.50	3,150	4.80	6,300	7.50	14,100
2.60	1,670	3.60	3,350	5.00	6,850	8.00	15,650
2.70	1,800	3.70	3,560	5.20	7,400	8.50	17,275
2.80	1,940	3.80	3,780	5.40	7,950	9.00	18,900
2.90	2,090	3.90	4,010	5.60	8,500	9.50	20,525
3.00	2,250	4.00	4,250	5.80	9,050	10.00	22,150
3.10	2,420						

The above table is based upon 21 discharge measurements made during 1901 to 1904. It is well defined between gage heights 3.0 feet and 10.0 feet.

Estimated monthly discharge of Broad River (of the Carolinas) at Alston, S. C., for 1904.

[Drainage area, 4,609 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	11,100	2,770	3,921	0.851	0.981
February	26,550	3,350	7,237	1.57	1.69
March	21,990	4,010	7,097	1.54	1.78
April	5,888	3,670	4,480	.972	1.08
May	6,025	2,170	3,695	.802	.925
June	7,675	1,870	3,921	.851	.950
July	12,450	1,800	4,169	.905	1.04
August	36,800	2,770	12,200	2.65	3.06
September	7,400	1,495	2,761	.599	.668
October	2,090	1,250	1,614	.350	.404
November	9,900	1,440	3,096	.672	.750
December	17,920	2,250	4,886	1.06	1.22
The year	36,800	1,250	4,923	1.07	14.55

TIGER RIVER AT DELTA, S. C.

This station was established as a bench-mark station. It is located at the Seaboard Air Line Railway bridge, one-third mile east of the depot at Delta, S. C. It is best reached by driving from Whitmire, 4 miles west. Discharge measurements are made from the downstream side of the single-span, steel, through bridge, 202.5 feet long, having trestle approaches at each end. The initial point for soundings is the right end of the bridge, downstream side. Sounding points are marked on the guard rail. The channel is straight for about 1,000 feet above and below the station. The current is swift. Both banks are low, partly wooded, and subject to overflow during high water. The bed of the stream is composed of sand. There is but one channel, divided during high water by the piers of the bridge and trestle supports. The bridge crosses the river at a slight angle. The bench mark is the top of the downstream end of the second floor beam from the right bank. Its elevation is 36.00 feet above gage datum.

Discharge measurements of Tiger River at Delta, S. C., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 22	J. M. Giles	108	409	1.40	1.85	573
May 9	do	109	324	2.09	2.35	678
Septmeber 10	do	106	314	1.18	1.67	369

ENOREE RIVER NEAR WHITMIRE, S. C.

This station was established as a bench-mark station. It is located at the Seaboard Air Line Railway bridge, 1¼ miles east of Whitmire, S. C. There is a highway bridge one-third mile below, and a grist-mill three-fourths mile below has a dam with 2-foot fall. Discharge measurements are made from the downstream side of the single-span deck bridge, 151 feet long. There are 15 bents of trestle approach at the left and 22 bents at the right bank. The initial point for soundings is the right end of the bridge downstream side. Sounding points are marked on the guard rail. The channel is straight for about 300 feet above and one-fourth mile below the station. The current is swift. Both banks are low, clean, and subject to overflow under the trestle approaches. The bed of the stream is composed of gravel and sand. There is but one channel at low and ordinary stages, broken during high water by the piers and trestle work of the bridge. The operation of the mill below will affect the flow of the stream. The bench mark is the top of stringer on the downstream side of the bridge, 50 feet from the initial point for soundings. Its elevation is 56.00 feet above gage datum.

Discharge measurements of Enoree River near Whitmire, S. C., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 23	J. M. Giles	90	237	1.96	1.90	464
May 10	do	100	186	1.65	1.60	307
September 10	do	101	193	1.86	1.20	359

SALUDA RIVER NEAR WATERLOO, S. C.

This station was established by E. W. Myers, August 30, 1896. It is located at the Charleston and Western Carolina Railroad bridge between Coronaca and Waterloo, 3 miles from Waterloo and 9 miles from Greenwood. It is 1 mile below the mouth of Reedy River. The standard chain gage is on the downstream side of the bridge, on the span next the left bank. The length of the chain from the end of the weight to the marker is 45.73 feet. The gage is read once each day by R. N. Cunningham. Discharge measurements are made from the railway bridge and its approaches. The bridge is a steel through bridge of two spans about 125 feet each, with wooden trestles 600 feet long on the left bank and 200 feet on the right bank. The initial point for soundings is the end of the guard rail of the trestle on the left bank. The channel is straight for about 600 feet above and below the station. Both banks are low and wooded and are subject to overflow, but all

water passes beneath the bridge and its approaches. The bed of the stream is sandy and muddy and is slightly shifting. There is but one channel at all stages. Its width at low water is 250 feet, the channel is broken by one pier, and the velocity is moderate.

Bench mark No. 1 is a point on the top surface of the downstream end of the first floor beam to the left of the center pier. Its elevation is 44.64 feet above the gage datum. Bench mark No. 2 is a copper bolt set in a granite bowlder on the right bank of the stream 470 feet from the end of the trestle (measured along the railroad track) and 50 feet upstream from the center of the track. Its elevation is 61.44 feet above gage datum. The rock is near two small persimmon trees.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Saluda River near Waterloo, S. C., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 23	E. W. Myers		4,384	2.96	17.40	12,970
April 18	E. C. Murphy		1,213	2.87	9.40	3,481
April 18	B. S. Drane		1,230	3.04	9.60	3,739
April 21	E. W. Myers		1,243	3.01	9.20	3,747
June 25	B. S. Drane		795	1.73	6.76	1,375
June 25	do		829	1.84	7.03	1,527
August 5	J. M. Giles		695	2.22	6.88	1,542
August 5	M. R. Hall		695	2.10	6.88	1,458
September 9	J. M. Giles		628	1.98	6.38	1,245
October 21	do		615	1.91	6.28	1,176
December 9	do		504	1.75	5.90	883
1904.						
January 26	W. E. Hall	160	371	1.29	4.98	479
March 2	J. M. Giles	192	671	2.16	6.85	1,450
March 19	do	191	654	2.02	6.74	1,322
May 5	do	183	540	1.64	5.86	887
July 21	do	163	334	1.73	5.02	578
July 26	do	182	460	1.67	5.57	769
November 16	do	182	593	1.62	6.03	963

Mean daily gage height, in feet, of Saluda River near Waterloo, S. C., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.75	5.60	6.05	6.20	5.65	5.80	6.40	4.70	6.45	5.20	5.05	5.30
2	5.70	5.65	6.15	5.95	5.55	7.75	6.05	7.10	5.85	5.05	5.20	5.75
3	5.50	6.50	6.40	6.45	5.95	5.90	5.15	9.30	6.45	4.20	5.05	6.05
4	5.10	5.45	5.95	6.10	6.00	6.45	4.40	7.20	5.85	5.15	5.70	5.40
5	5.65	5.70	6.10	6.15	5.85	6.05	4.25	6.20	6.45	4.75	5.55	6.95
6	5.95	5.65	5.60	6.65	5.95	4.95	5.45	6.45	6.25	4.75	5.40	8.85
7	5.45	5.65	9.75	6.00	6.05	5.40	5.40	6.65	5.65	4.45	4.45	7.25
8	5.95	6.40	10.60	6.50	5.50	5.75	5.60	19.00	5.75	5.30	5.95	6.20
9	5.80	6.75	8.20	6.85	5.30	6.40	6.65	19.10	5.60	4.65	5.40	5.90
10	5.60	6.65	6.90	7.15	6.10	5.25	5.20	12.75	5.65	4.25	5.35	5.85
11	4.85	6.10	5.90	6.70	5.75	6.15	4.35	9.80	5.65	5.20	5.35	5.80
12	5.65	6.10	6.10	6.00	6.40	5.20	5.15	7.60	5.00	5.15	6.05	5.00
13	5.70	6.55	7.00	5.60	5.20	4.55	5.40	7.60	5.65	4.20	6.05	5.75
14	5.65	6.40	7.30	6.60	6.70	5.35	5.00	7.30	5.50	5.15	5.45	5.55
15	5.60	6.90	6.25	6.40	5.40	5.40	5.45	6.40	5.35	5.00	6.50	5.60
16	5.60	5.60	6.10	6.75	5.25	5.35	4.45	6.45	4.15	5.05	5.50	5.60
17	5.65	6.45	5.70	6.40	6.40	5.45	5.00	6.20	5.05	5.00	5.55	6.10
18	5.20	6.00	5.90	5.80	6.10	6.55	4.30	5.90	5.35	5.15	5.40	5.50
19	5.40	6.50	6.10	6.45	7.10	4.70	5.20	6.15	4.65	5.15	6.00	4.80
20	5.60	6.80	6.60	5.25	6.15	5.70	4.05	6.25	5.40	4.95	5.05	5.60
21	5.70	9.10	5.75	6.35	6.10	5.85	5.00	6.85	5.55	4.70	4.35	5.80
22	7.10	11.10	5.95	6.30	5.40	5.95	5.85	5.60	5.05	4.30	5.30	5.85
23	6.90	11.00	6.00	5.85	4.65	5.30	4.80	5.90	5.55	4.00	5.35	5.60
24	7.10	6.90	7.15	6.30	5.55	5.35	5.70	5.70	6.00	3.95	5.45	5.85
25	6.40	5.80	7.30	5.35	5.65	5.35	5.00	5.70	5.25	3.90	5.25	5.35
26	4.80	5.60	6.40	6.50	5.75	5.95	5.75	10.10	4.30	5.20	5.35	4.80
27	5.60	5.55	7.00	6.05	5.45	4.50	5.55	11.45	5.20	5.00	5.05	5.35
28	5.90	7.05	6.75	6.85	3.95	4.30	7.60	16.90	5.80	5.10	4.35	6.85
29	5.70	6.20	6.00	5.85	5.40	5.30	7.10	7.90	4.55	5.00	5.10	6.20
30	5.85	.....	5.55	6.15	4.80	5.45	6.40	6.80	4.95	4.75	5.35	5.90
31	5.60	.....	5.95	.....	5.95	.....	5.70	6.25	.....	4.25	.....	6.40

NOTE.—The lower gage heights during the latter part of the year were probably caused by the filling of the new dam at Ware Shoals.

Rating table for Saluda River near Waterloo, S. C., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.90	200	4.90	472	5.90	930	7.80	2,100
4.00	219	5.00	510	6.00	985	8.00	2,250
4.10	240	5.10	550	6.20	1,095	8.20	2,400
4.20	262	5.20	592	6.40	1,205	8.40	2,560
4.30	286	5.30	636	6.60	1,320	8.60	2,725
4.40	312	5.40	682	6.80	1,440	8.80	2,900
4.50	340	5.50	730	7.00	1,560	9.00	3,085
4.60	370	5.60	780	7.20	1,690	9.50	3,590
4.70	402	5.70	830	7.40	1,820	10.00	4,150
4.80	436	5.80	880	7.60	1,960		

The foregoing table is based upon discharge measurements made during 1903 and 1904. It is well defined between gage heights 5 feet and 7 feet. Above 7 feet the curve is somewhat uncertain. Above gage height 10 feet the rating curve is a tangent, the difference being 120 per tenth. The table is the same as the 1903 table above 6 feet gage.

Estimated monthly discharge of Saluda River near Waterloo, S. C., for 1904.

[Drainage area, 1,056 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	1,625	436	868	0.822	0.948
February	5,470	706	1,460	1.38	1.49
March	4,870	755	1,398	1.32	1.52
April	1,657	614	1,130	1.07	1.19
May	1,625	210	857	.812	.936
June	2,065	286	798	.756	.844
July	1,960	229	730	.691	.797
August	15,070	402	3,118	2.95	3.40
September	1,233	251	738	.699	.780
October	636	200	444	.420	.484
November	1,260	299	683	.647	.722
December	2,945	436	961	.910	1.05
The year	15,070	200	1,099	1.04	14.16

REEDY RIVER NEAR WATERLOO, S. C.

This station was established as a bench-mark station. It is located at the highway bridge 2 miles from Waterloo, S. C., on the road to Greenwood, S. C. Discharge measurements are made from the downstream side of the single-span, wooden covered, highway bridge 92 feet long, having a trestle approach of 20 feet at the right bank and 400 feet at the left bank. The initial point for soundings is the left end of the downstream truss. The channel is curved for about 500 feet above and straight for about 500 feet below the station. The current is moderate. Both banks are high and wooded. The right bank overflows under the trestle approach, and the left bank over a wide bottom during extreme floods. The bed of the stream is composed of sand. There is but one channel at low and ordinary stages, broken during high water by the piers and trestle bents of the bridge. The bench mark is the top of the downstream bottom chord of truss, 20 feet from the initial point for soundings. Its elevation is 19.00 feet above the gage datum.

Discharge measurements of Reedy River near Waterloo, S. C., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
July 27	J. M. Giles	75	106	1.62	0.86	172
September 8	do	76	188	1.32	1.15	248

MISCELLANEOUS MEASUREMENTS IN SANTEE RIVER DRAINAGE BASIN.

The following is a list of miscellaneous discharge measurements made in Santee River drainage basin during 1904:

Catawba River near Rock Hill, S. C.—A measurement was made January 30 at Culp's bridge, 8 miles northeast of Rock Hill. The gage height was obtained from gage at Catawba Power Company's dam.

Width, 320 feet; area, 1,797 square feet; mean velocity, 0.92 foot per second; gage height, 99.97 feet; discharge, 1,648 second-feet.

Catawba River near Belmont, N. C.—A measurement was made March 4 at the Southern Railway bridge, 2 miles east of Belmont. The bench mark is the top of the inside bar of the downstream lower chord, at the first crossbeam from the third pier from the left bank. Its elevation was 26.70 feet above the water surface.

Width, 312 feet; area, 1,415 square feet; mean velocity, 1.54 feet per second; discharge, 2,181 second-feet.

Catawba River (South Fork) near Belmont, N. C.—On March 4 a measurement was made at the Southern Railway bridge, 2 miles west of Belmont. The bench mark is the top of crossbeam 67 feet from the left end of the bridge, 25.00 feet above the datum of the gage.

Width, 156 feet; area, 277 square feet; mean velocity, 2.27 feet per second; gage height, 1.70 feet; discharge, 629 second-feet.

On March 5 a measurement was made at the wagon bridge 2 miles southwest of Belmont. The bench mark is the top of the first crossbeam from the left end of the bridge. Its elevation is 24.00 feet above the datum of the gage.

Width, 130 feet; area, 249 square feet; mean velocity, 2.75 feet per second; gage height, 2.35 feet; discharge, 684 second-feet.

Saluda River near Waterloo, S. C.—A measurement was made, September 8, at the wagon bridge on the road to Greenwood, S. C. The bench mark is the top of the downstream end of the second crossbeam from the left end of the bridge, 28.65 feet above the datum of the gage.

Width, 145 feet; area, 314 square feet; mean velocity, 1.85 feet per second; discharge, 580 second-feet.

SAVANNAH RIVER DRAINAGE BASIN.

Savannah River is formed by the junction of Tugalo and Seneca rivers, which unite about 100 miles above Augusta, Ga. It flows in a southeasterly direction, forming the boundary between Georgia and South Carolina, and empties into the Atlantic Ocean near Savannah, Ga. It is navigable to Augusta, which is at the fall line.

Seneca River is formed by the junction of Little and Keowee rivers, about 5 miles northeast of Seneca, S. C. Both of these tributaries rise in the Blue Ridge in North Carolina and the northwestern part of South Carolina.

Tugalo River is formed by the junction of Chattooga and Tallulah rivers, which join at the western corner of Oconee County, S. C. It flows in a southeasterly direction, and is a part of the boundary between Georgia and South Carolina. Chattooga River rises in Jackson County, N. C., and flows in a southwesterly direction along the boundary between Georgia and South Carolina. Tallulah River rises in Macon County, N. C., and the northwestern part of Rabun County, Ga., and flows in a southeasterly direction. Parts of its course are cut through the solid rock for hundreds of feet, forming canyons and steep bluffs. Throughout its entire length the fall is very great, and at Tallulah Falls the stream drops more than 500 feet in a short distance.

Broad River joins the Savannah at the southeast corner of Elbert County, Ga. It rises in Habersham and Banks counties, and flows in a southeasterly direction to the southeast corner of Madison County, Ga., where the South Fork joins it. From there it flows east to Savannah River. Its drainage is from a rolling country, and there is a considerable amount of fall at various points. At Anthony Shoals the fall is more than 50 feet in a short distance. Above Augusta, Ga., there is much fall, which can be developed for water power. With exception of the large plant at Augusta, very little of this is being used.

The following pages give the results of the data collected in this drainage during 1904.

TALLULAH RIVER AT TALLULAH FALLS, GA.

This station was originally established August 29, 1900, by M. R. Hall, and records of gage heights were obtained until October 19, 1900, when the observer left Tallulah Falls. The record was resumed January 18, 1901, and maintained until December 31, 1901. The station was reestablished July 10, 1904, on which date bench marks were determined and regular gage readings begun. It is located at the wagon bridge, about one-fourth mile above the falls and about the same distance from the village of Tallulah Falls, Ga. The gage is a vertical rod 10 feet long, graduated to feet and tenths, spiked to a small maple tree on the left bank of the river about 50 feet above the bridge. It is read once each day by J. T. McKay, who is paid by the Georgia Geological Survey. Discharge measurements are made from

the iron wagon bridge, which has a single span of 100 feet and rests on timber piers. The initial point for soundings is the end of the bridge on the upstream side at the left bank. The channel is nearly straight for 300 feet above and for 200 feet below the station. The current is swift. Both banks are high, wooded, rocky bluffs, and are not subject to overflow. The bed of the stream is composed of rock, and is rough and permanent. There is but one channel at all stages. Bench mark No. 1 is the top of a large rock on the right bank, about 30 feet above the bridge. Its elevation is 7.51 feet above the zero of the gage. Bench mark No. 2 is a white paint mark on the downstream rail of the bridge, marked "U. S. 1445." Its elevation is 33.87 feet above the zero of the gage.

Discharge measurements of Tallulah River at Tallulah Falls, Ga., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 16	W. E. Hall	51	430	1.14	1.65	490
May 12	do	56	429	1.20	1.86	516
June 11	J. M. Giles	55	385	0.79	1.20	306
June 13	do	56	404	.73	1.05	295
July 15	M. R. Hall	56	354	.51	.70	181
August 22	W. E. Hall	53	369	.63	.92	233
August 23	do	53	357	.61	.80	218
September 29	A. T. Mitchelson	55	330	.44	.50	145
October 28	M. R. Hall	52	327	.38	.40	125
October 28	do	52	321	.40	.41	127
November 23	W. E. Hall	53	354	.48	.77	171
November 23	do	53	349	.48	.75	169

Mean daily gage height, in feet, of Tallulah River at Tallulah Falls, Ga., for 1904.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.9	0.9	0.5	0.4	0.7	17	0.7	1.4	0.7	0.4	0.5	0.8
2	.....	1.3	.8	.5	.4	.7	18	.7	1.3	.6	.4	.5	.8
3	.....	1.0	.8	.5	.6	.8	19	.7	1.1	.6	.4	.5	.7
4	.....	.9	1.8	.5	1.0	.8	20	.6	1.5	.7	.4	.5	.7
5	.....	.9	1.5	.5	.9	1.9	21	.6	1.0	.6	.4	.5	.7
6	.....	1.0	1.0	.5	.6	1.7	22	.6	.9	.6	.4	.6	.7
7	.....	2.5	.8	.5	.6	1.1	23	.7	.8	.6	.4	.6	.7
8	.....	2.5	.8	.5	.5	.9	24	.7	1.0	.6	.4	.6	.6
9	.....	1.6	.8	.5	.5	.8	25	1.2	1.4	.6	.4	.6	1.0
10	.....	1.7	.7	.5	.5	.8	26	.8	1.2	.6	.5	.5	.9
11	.....	2.6	.8	.5	.5	.7	27	.7	1.7	.6	.5	.5	.9
12	.....	2.0	.7	.5	.5	.7	28	.7	1.5	.7	.5	.5	2.4
13	.....	2.9	.8	.4	.8	.7	29	.8	1.1	.6	.5	.5	1.5
14	.....	1.7	.8	.4	.7	.7	30	.7	.9	.5	.4	.6	1.3
15	.7	1.5	.7	.4	.6	.7	31	.9	.8	.....	.4	.....	1.1
16	.7	1.4	.7	.4	.5	.7							

Rating table for Tallulah River at Tallulah Falls, Ga., from July 15 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.40	125	1.10	290	1.80	575	2.50	1,000
0.50	145	1.20	320	1.90	630	2.60	1,070
0.60	165	1.30	355	2.00	685	2.70	1,145
0.70	185	1.40	395	2.10	740	2.80	1,220
0.80	210	1.50	435	2.20	800	2.90	1,300
0.90	235	1.60	480	2.30	860	3.00	1,380
1.00	260	1.70	525	2.40	930		

The above table is based upon twelve discharge measurements made during 1904. It is well defined between gage heights 0.4 feet and 2 feet. The table has been extended beyond these limits.

Estimated monthly discharge of Tallulah River at Tallulah Falls, Ga., for 1904.

[Drainage area, 191 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
July 15–31	320	165	195	1.02	0.645
August	1,300	210	447	2.34	2.70
September	575	145	209	1.09	1.22
October	145	125	135	.707	.815
November	260	125	160	.838	.935
December	930	165	266	1.39	.160

TUGALOO RIVER NEAR MADISON, S. C.

This station was originally established July 19, 1898, at Cook's ferry and was discontinued December 31, 1901, when the ferry was moved. It was reestablished July 7, 1903, by M. R. Hall. It is located at Holcomb's ferry, 1 mile west of Madison, S. C., and 900 feet below the Southern Railway bridge. This station is about 1½ miles above the point where the old station was located. The gage consists of a vertical timber in three sections. The first section reads from 1 to 16 feet and 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 a sycamore tree on the left bank, about 18 feet above the ferry landing. The third section reads from 21 to 31 feet and is fastened to a locust tree on the left bank at the forks of the road, about 175 feet from the ferry landing. The gage is read once daily by T. A. Spencer, a farmer. Discharge measurements are made from the ferryboat, or a small boat which is held in place by a cable stretched across the river. The initial point for soundings is the side

away from the river of the windlass used for stretching the cable; it is located on the right bank. Distances are measured along the hand line which is used to pull the boat across the river.

The bed of the river is sandy and the current is moderately swift. The channel is about 160 feet wide and is fairly uniform in width and general appearance for some distance above and below, the current being moderately swift and the channel straight for 1,000 feet or more both above and below the station. The banks are both moderately high, but will overflow for about 200 feet on right bank and 250 feet on the left. Both are open and cultivated except a few trees along the edge of the river. These conditions make it possible to obtain fairly good float measurements at time of floods.

Bench mark No. 1 is a nail in a willow tree on the right bank 20 feet below the ferry landing. It is 7.00 feet above the zero of the gage. Bench mark No. 2 consists of two large nails in the locust tree to which a third section of the gage is attached. They are at an elevation of 22.00 feet above the zero of the gage. Bench mark No. 3 is a copper plug set in solid rock on the north side of the railroad 10½ feet from the north rail and about 400 feet east of the east end of the Southern Railway bridge. Its elevation is 44.27 feet above the zero of the gage. Bench mark No. 4 is the Geological Survey standard bronze tablet marked "666 Atlanta" on the right bank pier of the Southern Railway bridge. Its elevation is 35.37 feet above the zero of the gage, and 665.47 feet above sea level.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Tugaloo River near Madison, S. C., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
June 24	J. M. Giles		724	2.66	4.00	1,927
July 7	M. R. Hall		704	2.38	3.69	1,677
July 9	F. A. Murray		665	2.30	3.40	1,535
July 31	do		579	1.88	2.84	1,091
August 28	do		462	1.72	2.18	798
September 24	do		420	1.70	1.94	715
October 9	J. M. Giles		473	1.96	2.23	927
1904.						
January 13	F. A. Murray	156	388	1.75	1.81	680
March 11	J. M. Giles	166	691	2.43	3.86	1,679
June 10	do	160	425	1.90	2.30	809
July 23	B. S. Drane	157	348	1.78	1.80	622
August 25	W. E. Hall	155	499	2.14	2.96	1,070
September 6	B. S. Drane	157	470	1.91	2.52	896
October 27	M. R. Hall	152	284	1.43	1.41	406

Mean daily gage height, in feet, of Tugaloo River near Madison, S. C., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.70	2.00	2.70	3.35	2.70	3.30	2.40	3.70	2.35	1.60	1.40	1.50
2	1.70	1.90	2.80	3.20	2.70	3.40	2.00	3.95	2.20	1.55	1.40	1.60
3	1.80	1.90	2.80	3.10	2.85	2.80	2.00	2.50	2.40	1.60	1.50	1.60
4	1.70	1.90	2.50	2.95	3.10	2.60	1.90	2.40	3.20	1.55	2.20	1.70
5	1.60	1.90	2.50	2.90	2.90	2.40	1.80	2.40	3.20	1.50	2.20	2.00
6	1.60	1.80	2.30	2.85	2.80	2.35	1.80	2.45	2.65	1.50	2.00	4.90
7	1.90	2.00	13.20	4.10	2.70	2.30	1.80	7.00	2.30	1.50	1.60	2.60
8	1.70	4.80	6.90	3.90	4.95	3.30	1.80	6.90	2.20	1.50	1.50	2.10
9	1.60	3.00	5.00	6.10	6.50	2.50	2.10	4.10	2.20	1.50	1.50	1.90
10	1.60	2.50	4.20	4.50	4.50	2.30	2.30	5.50	2.20	1.55	1.50	1.80
11	1.70	2.60	3.90	4.00	3.60	2.30	2.00	6.60	2.05	1.50	1.50	1.80
12	1.70	2.90	3.60	3.70	3.30	2.30	1.90	5.40	2.10	1.45	1.50	1.80
13	1.80	2.30	3.40	3.50	3.10	2.20	2.10	3.80	2.05	1.45	1.80	1.80
14	1.70	2.10	3.50	3.40	3.05	2.10	1.80	3.30	2.00	1.40	2.00	1.70
15	1.70	2.10	3.60	3.30	3.00	2.10	1.75	2.80	1.90	1.40	1.80	1.70
16	1.60	2.10	3.30	3.20	2.90	2.10	1.70	3.00	1.85	1.40	1.60	1.65
17	1.90	2.10	3.10	3.10	2.80	2.10	1.80	2.50	1.90	1.40	1.50	1.70
18	2.00	2.00	3.05	3.10	2.75	2.10	1.80	2.30	1.80	1.40	1.50	1.75
19	1.80	2.20	2.95	3.00	2.70	2.10	1.70	2.20	1.75	1.35	1.50	1.70
20	1.80	4.40	2.85	2.90	2.60	2.50	1.60	3.80	1.75	1.35	1.50	1.65
21	1.70	3.20	2.80	2.95	2.55	2.50	1.55	2.50	1.75	1.40	1.55	1.60
22	5.10	9.50	5.30	2.90	2.50	2.20	2.20	2.20	1.90	1.35	1.60	1.65
23	6.50	5.40	5.30	2.80	2.50	2.10	1.85	2.05	1.80	1.35	1.80	1.60
24	3.40	4.20	5.80	2.80	2.45	2.00	1.75	2.20	1.70	1.35	1.70	1.60
25	2.80	3.50	4.90	2.80	2.45	1.95	1.90	2.20	1.70	1.40	1.55	1.90
26	2.40	3.20	4.70	2.90	2.40	1.95	2.00	2.85	1.70	1.40	1.50	2.00
27	2.30	3.00	4.30	3.30	2.40	1.90	1.90	4.50	1.70	1.40	1.50	1.95
28	2.20	3.00	4.00	2.90	2.30	1.90	1.70	3.60	1.65	1.40	1.50	7.00
29	2.20	2.80	3.70	2.85	2.25	2.70	2.00	2.80	1.70	1.45	1.50	3.50
30	2.10	.....	3.50	2.80	2.40	3.60	1.90	2.50	1.60	1.40	1.50	2.70
31	2.00	.....	3.40	.....	5.20	.....	3.95	2.30	.....	1.40	.....	2.30

Rating table for Tugaloo River near Madison, S. C., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.35	435	2.40	868	3.50	1,458	5.20	2,665
1.40	452	2.50	915	3.60	1,519	5.40	2,830
1.50	490	2.60	963	3.70	1,582	5.60	3,000
1.60	528	2.70	1,012	3.80	1,646	5.80	3,180
1.70	567	2.80	1,062	3.90	1,710	6.00	3,365
1.80	607	2.90	1,114	4.00	1,775	6.20	3,555
1.90	648	3.00	1,168	4.20	1,905	6.40	3,745
2.00	690	3.10	1,224	4.40	2,045	6.60	3,940
2.10	733	3.20	1,281	4.60	2,195	6.80	4,140
2.20	777	3.30	1,339	4.80	2,345	7.00	4,340
2.30	822	3.40	1,398	5.00	2,505		

The foregoing table is based upon 7 discharge measurements made during 1904. It is fairly well defined between gage heights 1.50 feet and 4 feet.

Estimated monthly discharge of Tugaloo River near Madison, S. C., for 1904.

[Drainage area, 593 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	3,840	528	829	1.40	1.61
February	7,325	607	1,304	2.20	2.37
March	14,450	822	2,100	3.54	4.08
April	3,460	1,062	1,369	2.31	2.58
May	3,840	800	1,259	2.12	2.44
June	1,519	648	880	1.48	1.65
July	1,742	509	682	1.15	1.33
August	4,340	712	1,543	2.60	3.00
September	1,281	528	717	1.21	1.35
October	528	435	469	.791	.912
November	777	452	539	.909	1.01
December	4,340	490	830	1.40	1.61
The year	14,450	435	1,043	1.76	23.94

SAVANNAH RIVER AT AUGUSTA, GA.

Observations of river heights have been maintained since 1875 by the city of Augusta at the city highway bridge. The results have been printed in a volume entitled "Stages of Water at River Stations," prepared by the United States Weather Bureau. Those for 1875 to 1889 are given in part 3, those for 1890 to 1892 in part 4, and those for 1893 to 1895 in part 5 of this publication. The gage consists of a vertical timber fastened to the pier and graduated to feet and inches. Readings are made four times a day by J. M. Youngblood, keeper of the city bridge, usually at 6 a. m., 12 m., 6 p. m., and 9 p. m. The 6 a. m. readings are those used by the Weather Bureau, but in the publications of the United States Geological Survey since 1900 the average of all four of the daily readings is used and is reduced to feet and tenths of feet.

Discharge measurements are made from the North Augusta Bridge at Thirteenth street in the city of Augusta, while the city gage is located at the city bridge at Fifth street, which is about a mile below.

The North Augusta Bridge consists of three iron spans, 208 feet each, with 319 feet of wooden approach on the right bank and 259

feet on the left. The channel is straight for a long distance above and below and is about 560 feet wide at low water. The banks are high, but will overflow at times under a part of the length of the approaches and, at very high stages, for a long distance on either side of the river beyond the ends of the bridge. The bed of the river is sandy and undergoes considerable change. The current is swift. Measurements are made from the downstream side of the bridge, and the initial point is the end of the iron bridge at the right bank on the downstream side.

The gage at the city bridge, 1 mile below the measuring station, is a heavy vertical timber, graduated to feet and inches, and is bolted to the first bridge pier which is in the water. It is on the side of the pier near the upstream corner, facing the right bank. The zero of the gage is the datum of all the city levels, and any city bench mark can therefore be used. A point is established on the North Augusta bridge from which to measure down with a steel tape. This is the top of the plate through which the top pipe of the bridge fencing passes, which is riveted to the right side of the intermediate post at the downstream end of the third floor beam from the right-bank end of the bridge, and at ordinary stages it is 55.00 feet above water, less the reading of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Savannah River at Augusta, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
June 10	M. R. Hall		7,303	2.43	15.10	17,740
September 29	do		3,075	1.24	7.13	3,831
December 3	W. E. Hall		3,069	1.27	7.20	3,898
1904.						
February 5	M. R. Hall	526	3,293	1.43	7.50	4,714
February 15	W. E. Hall	534	3,978	1.69	8.70	6,714
April 7	M. R. Hall	518	3,484	1.62	7.96	5,647
July 14	W. E. Hall	519	2,904	1.32	6.45	3,826
August 10	M. R. Hall	601	13,200	4.22	24.57	55,680
October 9	do	522	2,387	1.29	5.77	3,068
October 18	do	522	1,998	1.03	5.07	2,057

Mean daily gage height,[a] in feet, of Savannah River at Augusta, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.3	8.0	8.8	8.6	7.4	9.2	6.8	7.7	7.3	5.3	5.1	5.7
2	7.2	7.9	8.6	8.6	7.5	11.2	7.5	7.1	7.0	4.8	4.8	6.0
3	7.1	7.9	8.6	8.3	7.3	9.1	6.8	8.9	7.0	5.3	5.4	6.3
4	7.2	7.7	8.7	8.2	7.3	7.9	5.8	8.6	6.2	5.2	5.4	6.9
5	7.3	7.6	8.4	8.1	7.6	7.0	6.4	10.4	9.3	4.9	5.6	7.3
6	7.2	7.7	8.1	8.0	7.5	6.9	6.0	8.6	11.1	5.0	6.3	8.4
7	7.1	7.4	10.4	7.9	7.3	7.0	5.5	8.4	10.4	5.3	6.7	11.5
8	6.8	9.0	16.3	8.2	7.0	7.5	5.6	16.3	8.1	4.7	6.5	9.8
9	7.0	11.9	16.2	9.1	8.8	8.0	5.1	24.5	7.3	3.8	6.4	8.1
10	7.0	11.2	12.6	10.1	8.9	7.1	6.2	24.5	7.0	5.5	6.0	7.7
11	7.3	14.4	10.5	9.3	8.9	6.0	7.0	19.1	6.5	5.2	5.6	7.2
12	7.4	12.7	9.7	8.7	8.0	6.0	6.9	14.3	6.7	4.1	5.5	7.2
13	7.6	10.7	9.3	8.4	7.6	6.7	6.7	11.8	6.4	5.2	5.4	7.0
14	7.4	9.2	9.1	8.2	7.5	6.6	6.3	9.6	6.3	4.6	6.6	7.1
15	7.5	8.7	9.1	8.0	7.0	6.5	5.7	9.3	6.1	4.5	6.8	7.0
16	7.5	8.6	9.4	8.0	7.1	6.4	5.4	10.3	6.1	3.8	7.0	7.0
17	7.2	8.4	9.0	7.8	7.2	6.2	4.8	10.7	5.8	5.5	6.7	6.9
18	7.5	8.2	8.4	8.0	7.0	6.0	5.6	9.1	5.5	4.3	6.3	7.4
19	7.7	8.1	8.4	8.0	7.0	5.2	5.4	8.3	5.7	4.5	5.9	7.6
20	7.6	8.9	8.2	7.9	6.8	6.5	5.5	7.6	5.5	4.3	5.4	7.1
21	7.4	11.6	8.3	7.8	6.8	6.6	5.3	10.1	5.5	5.1	6.3	7.1
22	7.6	14.6	8.5	7.7	6.5	7.1	5.2	9.0	5.6	4.2	5.8	6.8
23	13.1	18.5	9.6	7.7	6.7	7.2	5.0	7.4	5.7	3.8	5.4	6.8
24	13.4	15.7	11.1	7.5	6.6	6.7	10.1	7.1	5.6	5.5	5.9	6.3
25	11.5	12.5	13.4	7.5	6.4	6.1	7.7	6.9	5.5	4.8	6.2	6.1
26	9.4	10.6	11.9	7.6	6.4	5.4	8.7	6.8	5.7	4.8	5.9	6.4
27	8.5	9.5	10.5	7.6	6.4	6.2	7.8	9.2	5.4	4.2	5.6	6.8
28	8.2	9.1	10.4	7.9	6.4	5.7	7.6	12.5	5.5	5.4	6.2	7.8
29	8.2	9.0	9.6	7.8	5.6	5.7	9.5	12.4	5.6	5.3	5.7	9.7
30	8.0	.....	9.1	7.6	5.6	6.6	8.5	9.9	5.3	3.8	5.4	9.9
31	7.9	.....	8.8	.....	6.8	.....	6.8	8.0	.....	5.6	.....	8.3

[a] All gage heights mean of four readings per day: 6 a.m., 12 m., 6 p.m., 9 p.m

Rating table for Savannah River at Augusta, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.80	1,450	5.80	2,870	13.50	15,080	21.50	38,900
3.90	1,500	6.00	3,050	14.00	16,200	22.00	41,000
4.00	1,550	6.50	3,550	14.50	17,350	22.50	43,300
4.10	1,610	7.00	4,100	15.00	18,550	23.00	45,800
4.20	1,670	7.50	4,680	15.50	19,780	23.50	48,700
4.30	1,730	8.00	5,300	16.00	21,050	24.00	52,000
4.40	1,790	8.50	5,980	16.50	22,350	24.50	55,750
4.50	1,850	9.00	6,700	17.00	23,700	25.00	60,000
4.60	1,920	9.50	7,480	17.50	25,120	25.50	64,500
4.70	1,990	10.00	8,300	18.00	26,600	26.00	69,000
4.80	2,060	10.50	9,150	18.50	28,170	26.50	73,500
4.90	2,130	11.00	10,050	19.00	29,800	27.00	78,000
5.00	2,200	11.50	10,980	19.50	31,470	27.50	82,500
5.20	2,360	12.00	11,950	20.00	33,200	28.00	87,000
5.40	2,520	12.50	12,950	20.50	35,020		
5.60	2,690	13.00	14,000	21.00	36,900		

The above table is based upon discharge measurements made during 1899–1904 and is fairly well defined.

Estimated monthly discharge of Savannah River at Augusta, Ga., for 1904.

[Drainage area, 7,294 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	14,860	3,880	5,583	0.765	0.882
February	28,170	4,560	9,206	1.26	1.36
March	21,830	5,430	8,579	1.18	1.36
April	8,470	4,680	5,512	.756	.844
May	6,550	2,690	4,292	.588	.678
June	10,410	2,360	4,088	.560	.625
July	8,470	2,060	3,769	.517	.596
August	55,750	3,880	11,710	1.61	1.86
September	10,230	2,440	3,796	.520	.580
October	2,690	[a] 1,450	2,079	.285	.329
November	4,100	2,060	3,015	.413	.461
December	10,980	2,780	4,772	.654	.754
The year	55,750	1,450	5,533	.759	10.33

[a] The low days in October occurred on Sundays, when the mills were not running, and water was being held back by the dam.

CHAUGA RIVER NEAR FORT MADISON, S. C.

A station was established on Chauga River at Bryan wagon bridge, 2 miles east of Fort Madison and 1 mile above the mouth of the river, by M. R. Hall, and measurements were made during 1900 and 1901 in connection with the old station on Tugaloo River at Cooks Ferry. When the Tugaloo River station was reestablished in 1903 the Chauga River station was also reestablished as a bench-mark station. No gage has been established, but all discharge measurements are referred to a bench mark. Discharge measurements are made from the upstream side of the single-span wooden bridge. The bridge is supported by log cribs which are filled with rock and anchored to bed rock. The floor of the bridge is about 10 feet above low water. The initial point for soundings is the top of anchor bolt in upstream corner of the right bank abutment. The channel is straight for about 500 feet above the station; below, it is curved for about 50 feet, and then straight. The current is swift. The right bank is high, clean, and liable to overflow during freshets. The left bank is high, rocky, wooded, and is not subject to overflow. Floods can not be measured, as high water goes over the bridge. Bench mark No. 1 is a nail in a sycamore sapling on the left bank about 100 feet above the bridge. Bench mark No. 2 is the top of the downstream guard rail 7 feet from right bank. Its elevation is 10.00 feet. Bench mark No. 3 is a large nail driven horizontally in the center of the downstream end of the lowest cross log of the right bank crib abutment. Elevation, 4.50 feet above datum.

Discharge measurements of Chauga River near Fort Madison, S. C., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
June 10	J. M. Giles	39	61	1.49	0.91	91
September 5	B. S. Drane	40	87	1.64	1.20	143
October 27	M. R. Hall	37	48	1.33	.44	64

SENECA RIVER NEAR CLEMSON COLLEGE, S. C.

This station was established by M. R. Hall as a regular station on December 8, 1903, at which time a boxed chain gage was installed and the bench marks were established. A vertical gage had been put in July 19, 1903, by F. A. Murray, and records obtained from it for a portion of the time. The station is located at the iron wagon bridge about 3 miles south of Clemson College, S. C., and about 300 feet up the river from the crossing of the Blue Ridge Railroad, which is a branch of the Southern Railway. The bridge is a single span of iron, about 157 feet long, with 40 feet of trestle approach on the right bank and 70 feet on the left bank. At ordinary stages the channel is about

150 feet wide. The right bank is high and will not overflow, but the left bank will overflow for a considerable width at a gage height of about 23 feet. The bed of the river is sandy. The current is moderate. At low stages there is a daily fluctuation of about 1 foot in the gage heights, caused by the operation of water powers above. On this account the gage is read twice each day, and a mean of the two readings is used. The observer is M. L. Sanders.

Discharge measurements are made from the downstream side of the bridge, and the initial point is the center of the tubular iron pier at the right bank downstream. The boxed chain gage is located on the lower chord on the downstream side. The 24-inch box extends from 20 to 22 feet from the initial point. The chain is 31.82 feet long from the bottom of the weight to the marker. The vertical gage is of 2 by 4 inch timbers in 5-foot sections, fastened to a scantling which is clamped to the iron braces between the cylinders of the right bank pier. Both gages are in good condition, except that mud accumulates at the lower end of the vertical gage.

Bench mark No. 1 is the top of the upstream cylinder of the right bank pier at a point marked "B. M." by chisel cuts. Its elevation is 28.95 feet above gage datum. Bench mark No. 2 is a copper plug set in rock on the right bank under the railroad bridge and about 20 feet to the right of the center pier. Its elevation is 10.27 feet above gage datum. This rock is low and has been uncovered by erosion of the bank. Bench mark No. 3 is a bench cut on the root of a hickory tree at the fork of the roads about 100 feet from the right bank end of the bridge. Its elevation is 30.52 feet above gage datum.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Seneca River near Clemson College, S. C., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
July 10	F. A. Murray	148	748	1.85	4.54	1,388
July 28	do	148	525	1.82	3.53	959
July 29	do	148	538	2.00	3.56	1,077
August 27	do	147	434	2.00	3.14	869
September 23	do	134	316	1.95	2.51	616
October 9	J. M. Giles	149	473	2.22	3.43	1,050
December 8	W. E. Hall	131	326	1.65	2.21	539
1904.						
January 14	F. A. Murray	128	336	1.78	2.23	601
January 14	do	140	426	1.88	2.87	802
January 28	W. E. Hall	148	529	1.94	3.41	1,027

Discharge measurements of Seneca River near Clemson College, S. C., etc.—Continued.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1904—Cont'd.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 10	J. M. Giles	148	722	2.33	5.28	1,680
March 11	do	148	653	2.29	4.76	1,493
May 11	W. E. Hall	148	488	2.00	3.43	978
June 9	J. M. Giles	147	494	1.86	3.55	920
June 9	do	147	524	1.94	3.73	1,015
July 16	B. S. Drane	142	208	1.37	1.41	286
August 25	W. E. Hall	128	331	1.54	2.38	509
September 6	B. S. Drane	148	487	1.90	3.40	924
October 5	do	145	300	1.73	2.15	520
December 6	do	150	874	2.60	6.35	2,274
December 6	do	150	778	2.44	5.52	1,901

Mean daily gage height, in feet, of Seneca River near Clemson College, S. C., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.55	2.85	3.20	3.80	3.10	6.40	2.95	4.45	2.70	2.40	1.90	2.20
2	2.65	2.75	3.55	3.80	3.15	4.00	2.50	3.95	3.15	2.25	1.95	2.15
3	2.50	2.85	3.40	3.10	3.45	3.30	2.40	3.25	2.80	2.25	1.90	2.25
4	2.75	2.85	3.30	3.50	3.35	3.20	2.10	2.65	2.55	2.00	3.05	2.05
5	2.30	2.80	3.45	3.40	3.60	2.85	1.75	3.15	3.20	1.95	2.70	2.90
6	2.30	2.60	3.05	3.50	3.25	3.20	2.30	4.45	3.10	1.95	2.55	6.05
7	2.60	2.70	11.70	4.75	3.05	4.20	2.30	7.00	2.70	1.85	2.55	3.75
8	2.70	4.45	8.00	5.25	3.65	4.80	2.00	9.00	2.70	1.50	2.00	3.40
9	2.55	3.90	6.00	5.25	6.20	3.60	2.50	5.10	2.80	1.80	1.95	3.55
10	2.45	3.70	5.10	4.15	4.35	3.10	2.50	4.00	2.70	1.80	2.15	2.70
11	2.75	3.65	4.80	4.25	4.15	3.40	2.45	5.50	2.80	1.95	2.05	2.80
12	2.50	3.25	4.55	3.95	3.45	2.75	2.40	6.00	2.65	2.40	2.45	2.65
13	2.50	3.25	4.15	3.95	3.40	2.70	2.40	4.60	2.75	1.80	2.60	2.45
14	2.50	3.10	4.25	3.70	3.35	2.70	2.40	3.70	2.75	2.30	2.70	2.40
15	2.50	2.75	4.05	3.75	3.20	2.50	2.10	3.15	2.45	2.25	2.90	2.40
16	2.50	2.95	3.90	4.10	3.20	2.70	2.05	5.35	2.45	1.35	2.60	2.30
17	2.60	2.70	3.75	3.75	3.00	2.60	2.45	3.70	2.50	1.45	2.25	2.50
18	2.75	2.75	3.75	3.50	3.20	2.50	2.40	3.60	2.35	1.75	2.20	2.50
19	2.50	3.25	3.70	3.45	3.00	2.30	2.55	2.85	2.45	1.25	2.60	2.45
20	2.50	5.70	3.30	3.45	3.00	3.55	1.85	4.40	2.05	1.30	2.15	2.30
21	2.45	4.45	3.60	3.45	3.10	3.00	2.00	3.10	2.45	1.40	2.25	2.30
22	3.05	10.15	4.80	3.40	2.50	2.50	2.45	2.50	2.90	1.70	2.25	2.30
23	6.90	6.45	5.70	3.50	2.95	2.50	2.55	2.90	3.00	1.40	2.80	2.15
24	4.35	5.15	6.50	3.50	2.75	2.45	2.00	2.85	2.90	1.60	2.60	1.95
25	3.85	4.35	5.30	3.20	2.50	2.20	2.60	3.20	2.35	1.70	2.65	2.15
26	3.25	3.75	4.20	3.30	2.50	2.00	2.70	3.10	2.40	1.80	2.60	2.45
27	3.10	4.05	4.70	3.60	2.50	2.05	2.10	4.30	2.25	1.75	2.05	2.95
28	3.00	4.00	4.40	3.10	2.40	2.45	2.30	4.75	3.45	1.80	2.05	5.25
29	3.10	3.55	4.30	3.20	2.55	3.10	2.45	3.10	2.95	1.70	2.05	4.00
30	3.05	.....	4.10	3.50	3.10	4.10	2.40	3.15	2.90	1.45	2.05	3.00
31	2.85	.....	3.90	.....	7.00	.....	2.45	3.00	.....	1.75	.....	2.95

Rating table for Seneca River near Clemson College, S. C., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.40	285	2.30	544	3.20	859	4.20	1,265
1.50	310	2.40	577	3.30	897	4.40	1,351
1.60	336	2.50	610	3.40	936	4.60	1,440
1.70	363	2.60	644	3.50	975	4.80	1,530
1.80	391	2.70	678	3.60	1,015	5.00	1,620
1.90	420	2.80	713	3.70	1,055	5.50	1,870
2.00	450	2.90	749	3.80	1,096	6.00	2,120
2.10	481	3.00	785	3.90	1,138	6.50	2,395
2.20	512	3.10	822	4.00	1,180	7.00	2,670

The above table is based upon discharge measurements made during 1903 and 1904. It is fairly well defined to gage height 6.4 feet. Discharges above 7-foot gage approximate estimates.

Estimated monthly discharge of Seneca River near Clemson College, S. C., for 1904.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
January	2,615	544	769
February	4,700	644	1,162
March	5,800	804	1,506
April	1,745	822	1,078
May	2,670	577	943
June	2,340	450	841
July	767	377	557
August	3,920	610	1,253
September	956	466	683
October	577	250	377
November	804	420	564
December	2,148	435	741
The year	5,800	250	873

ROCKY RIVER NEAR CALHOUN FALLS, S. C.

This station was established as a bench-mark station. It is located at a highway bridge just below Swearingen's mill, about 3½ miles northwest of Calhoun Falls, S. C. Discharge measurements are made from the downstream side of the bridge, which is 110 feet long and supported by two timber piers. The initial point for soundings is the right end of the downstream guard rail. The channel is curved for about 200 feet above and straight for 300 feet below the station. The current is swift. Both banks are subject to overflow during high

water. The bed of the stream is composed of sand and gravel and is very changeable. The washing out and filling in of the channel prevents rating. The bench mark is the top of the downstream end of trestle cap on the left side of pier next the right bank. Its elevation is 6.00 feet above gage datum.

Discharge measurements of Rocky River near Calhoun Falls, S. C., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 17	J. M. Giles	60	143	1.76	1.60	251
September 7	do	91	114	1.74	2.50	198

BROAD RIVER (OF GEORGIA) NEAR CARLTON, GA.

This station was established May 27, 1897, by M. R. Hall. The gage is now maintained and the observer paid by the United States Weather Bureau. The station is located at the Seaboard Air Line Railroad bridge 3 miles east of Carlton, Ga., and 2 miles above the mouth of the South Fork. The boxed chain gage is bolted to the guard rail, with its bottom resting on the upstream end of the cross-ties. The center of the pulley is 39.5 feet from the initial point for soundings. The length of the chain from the end of the weight to the marker is 54.00 feet. The observer is S. P. Powers, jr., who reads the gage once each day. Discharge measurements are made from the upstream side of the railway bridge to which the gage is attached. This is an iron deck bridge in two spans of 125 feet each, with trestle approaches 340 feet long on the left bank and 50 feet long on the right bank. The base of the rail of the track is about 51 feet above low water. The initial point for soundings is the end of the iron bridge on the right bank upstream side. The channel above and below the station is straight for 500 feet. The right bank is high and wooded and is not liable to overflow. The left bank is low for about 400 feet and is then high and rocky. It overflows at a gage height of about 16 feet. The bed of the stream is sand and gravel, and is somewhat changeable.

Bench mark No. 1 is the top of the upstream iron girder under the cross-ties at a point about 40 feet from the initial point for soundings. Its elevation is 51.00 feet above gage datum. Bench mark No. 2 is the top of the capstone of the right bank pier at a point under the upstream side of the end of the bridge. Its elevation is 30.78 feet above the gage datum. Bench mark No. 3 is a copper plug set in solid rock in the railroad cut 1,135 feet from the west end of the iron bridge, 11 feet north of the center of the track, and at about the same elevation as the bottom of the cross-ties. Its elevation above gage datum is 57.67 feet. Gage datum is 384 feet above sea level.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Broad River (of Georgia) near Carlton, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 21	J. M. Giles	207	859	3.02	4.55	2,592
May 8	do	185	582	2.13	3.10	1,242
June 11	do	200	734	2.40	3.65	1,766
August 14	do	181	456	2.09	2.70	953
September 16	do	198	877	2.77	4.52	2,435
October 29	do	162	359	1.69	2.16	606
December 8	do	172	395	1.59	2.20	628
1904.						
March 17	J. M. Giles	181	469	1.72	2.62	809
May 5	do	155	394	1.47	2.20	581
July 21	do	129	250	1.20	1.48	299
September 6	do	175	512	1.44	2.37	737
November 15	do	147	399	1.15	1.88	460

Mean daily gage height, in feet, of Broad River (of Georgia) near Carlton, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.2	2.6	2.6	2.5	2.2	2.4	2.1	1.6	1.9	1.5	1.6	1.9
2	2.2	2.5	2.6	2.5	2.2	2.5	2.0	2.6	1.9	1.5	1.6	2.0
3	2.3	2.4	2.8	2.5	2.1	2.1	1.9	2.4	1.8	1.5	1.7	2.5
4	2.3	2.4	2.8	2.4	2.1	2.0	1.8	2.0	2.4	1.5	1.9	2.1
5	2.2	2.3	2.6	2.4	2.1	1.9	1.7	1.9	3.2	1.5	2.1	2.4
6	2.2	2.3	2.6	2.4	2.1	1.9	1.7	2.8	2.8	1.5	2.0	4.2
7	2.2	2.5	3.7	2.6	2.2	2.1	1.6	2.5	2.7	1.5	1.8	3.2
8	2.2	3.4	5.7	2.6	2.2	2.2	1.6	6.5	2.1	1.5	1.7	2.6
9	2.2	3.1	4.8	2.7	3.5	1.9	4.2	10.4	2.0	1.5	1.7	2.4
10	2.2	3.0	3.4	2.5	3.0	1.9	2.7	6.3	1.9	1.5	1.6	2.2
11	2.3	3.3	3.0	2.5	2.4	1.8	2.0	4.2	1.8	1.5	1.6	2.3
12	2.3	3.0	2.8	2.4	2.2	1.8	2.0	3.3	1.8	1.5	1.6	2.1
13	2.4	2.7	2.7	2.4	2.2	1.8	2.0	3.0	1.8	1.5	2.0	2.0
14	2.4	2.6	2.9	2.3	2.1	1.8	1.8	2.7	1.7	1.5	2.2	2.0
15	2.3	2.6	3.0	2.3	2.1	1.7	1.7	2.5	1.7	1.5	2.0	2.0
16	2.2	2.5	2.8	2.3	2.1	1.7	1.6	2.6	1.7	1.5	1.9	2.0
17	2.3	2.5	2.7	2.4	2.0	1.7	2.1	2.4	1.6	1.5	1.9	2.0
18	2.5	2.4	2.6	2.4	2.0	1.6	1.8	2.2	1.6	1.5	1.8	2.0
19	2.4	2.4	2.6	2.3	2.0	1.8	1.6	2.1	1.6	1.5	1.8	2.0
20	2.2	3.6	2.5	2.3	2.0	1.7	1.5	4.2	1.6	1.5	1.7	1.9
21	2.2	3.3	2.5	2.4	1.9	2.5	1.5	2.9	1.6	1.5	1.7	1.9
22	2.2	4.8	4.0	2.3	1.9	2.1	1.6	2.1	2.1	1.5	1.7	1.9
23	3.8	4.6	3.4	2.3	1.9	2.0	1.9	2.0	1.6	1.5	1.9	1.9
24	3.2	3.7	4.3	2.2	1.9	1.7	1.8	1.9	1.6	1.5	2.3	1.9
25	2.7	3.4	3.5	2.2	1.8	1.7	1.6	1.9	1.6	1.5	2.0	2.0
26	2.5	2.9	3.3	2.3	1.8	1.6	2.6	1.9	1.6	1.6	1.9	2.1
27	2.4	2.8	3.0	2.4	1.8	1.6	1.9	3.1	1.6	1.7	1.8	2.1
28	2.4	2.7	2.9	2.3	1.8	1.6	1.7	3.3	1.6	1.7	1.8	3.3
29	2.5	2.6	2.7	2.2	1.8	1.9	3.0	2.9	1.6	1.6	1.7	3.0
30	2.6	.....	2.6	2.2	3.0	2.3	1.8	2.2	1.5	1.6	1.7	2.5
31	2.5	.....	2.6	.....	3.4	.....	1.6	2.0	.....	1.6	.....	2.3

Rating table for Broad River (of Georgia) near Carlton, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.50	305	2.70	920	3.80	1,770	5.80	3,840
1.60	340	2.80	990	3.90	1,860	6.00	4,100
1.70	380	2.90	1,060	4.00	1,950	6.50	4,750
1.80	420	3.00	1,130	4.20	2,130	7.00	5,400
1.90	460	3.10	1,200	4.40	2,320	7.50	6,100
2.00	510	3.20	1,280	4.60	2,520	8.00	6,800
2.10	560	3.30	1,360	4.80	2,720	8.50	7,500
2.20	610	3.40	1,440	5.00	2,920	9.00	8,200
2.30	670	3.50	1,520	5.20	3,140	9.50	8,950
2.40	730	3.60	1,600	5.40	3,360	10.00	9,700
2.50	790	3.70	1,680	5.60	3,600	10.50	10,450
2.60	850						

The above table is based upon discharge measurements made during 1900–1904. It is well defined between gage heights 1.5 feet and 5.3 feet. Above this latter point the curve is based on one measurement at 9.1 feet.

Estimated monthly discharge of Broad River (of Georgia) near Carlton, Ga., for 1904.

[Drainage area, 762 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	1,770	610	741	0.972	1.12
February	2,720	670	1,113	1.46	1.58
March	3,720	790	1,247	1.64	1.89
April	920	610	720	.945	1.05
May	1,520	420	629	.825	.951
June	790	340	478	.627	.700
July	2,130	305	522	.685	.790
August	10,300	340	1,409	1.85	2.13
September	1,280	305	471	.618	.690
October	380	305	314	.412	.475
November	670	340	434	.570	.636
December	2,130	460	688	.903	1.04
The year	10,300	305	730	.959	13.05

BROAD RIVER (SOUTH FORK) NEAR CARLTON, GA.

This station was established as a bench-mark station. It is located at Bull Rat Rock, about 1 mile south of Carlton, Ga. Discharge measurements are made at a shoal about 100 yards above the rock by means of a boat. The initial point for soundings is a small sweet gum tree on the left bank. The channel is curved for 200 feet above and 500 feet below the station. The current is sluggish. The right bank is cultivated, and the left is wooded. Both banks are subject to overflow at rare intervals. The bed of the stream is composed of rock and is very rough. The bench mark is composed of three copper nails driven into the gum tree, which forms the initial point for sounding. Its elevation is 5.00 feet above datum.

Discharge measurements of Broad River (South Fork) near Carlton, Ga., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
July 20	J. M. Giles	100	179	0.36	1.00	64
September 7	do	105	158	.73	1.20	115

MISCELLANEOUS MEASUREMENTS IN SAVANNAH RIVER DRAINAGE BASIN.

The following is a list of miscellaneous discharge measurements made in Savannah River drainage basin during 1904:

Keowee River near Calhoun, S. C.—Keowee River is tributary to Seneca River from the north near Seneca, S. C. A measurement was made January 16 from the Lawrence Bridge, 5 miles northwest of Calhoun. The bench mark is the top of the upstream end of the first iron cross bream from the right bank, 27.00 feet above the datum of the gage.

Width, 144 feet; area, 620 square feet; mean velocity, 1.11 feet per second; gage height, 2.91 feet; discharge, 691 second-feet.

Tiger Creek at Wiley, Ga.—This stream is tributary to Tallulah River from the north, entering near Tallulah Falls, Ga. A measurement was made June 13 from the railroad trestle, one-fourth mile northwest of Wiley.

Width, 14 feet; area, 11 square feet; mean velocity, 1.12 feet per second; discharge, 12.3 second-feet.

Broad River (South Fork) near Comer, Ga.—A measurement was made March 16 at the Seaboard Air Line Railroad bridge, 1½ miles west of Comer. The bench mark is the top of the girder at sounding point 30. Its elevation is 49.00 feet above the datum of the gage.

Width, 74 feet; area, 68 square feet; mean velocity, 1.56 feet per second; gage height, 1.18 feet; discharge, 106 second-feet.

Broad River (South Fork) near Carlton, Ga.—A measurement was made May 4 at the foot of the shoals below Watson's mill.

Width, 50 feet; area, 81 square feet; mean velocity, 1.28 feet per second; discharge, 104 second-feet.

The gage at Carlton read 2.20 feet.

Clouds Creek near Carlton, Ga.—This stream is tributary to Broad River. A measurement was made May 4 below the ford on the public road one-half mile east of Watson's mill, near Carlton.

Width, 36 feet; area, 36 square feet; mean velocity, 1 foot per second; discharge, 36 second-feet.

The gage at Carlton read 2.20 feet.

OGEECHEE RIVER DRAINAGE BASIN.

Ogeechee River is formed by the junction of Williamsons Swamp Creek and Rocky Comfort Creek in Jefferson County, Ga., and drains a small basin in southeastern Georgia lying between the Savannah and Altamaha basins. Ogeechee River flows in a southeasterly direction and empties into the Atlantic Ocean. Its main tributary is Cannoochee River, which rises in Emanuel County, Ga., flows southeast, and joins the Ogeechee about 20 miles from the Atlantic Ocean. The streams in this basin flow through a country that is mostly low. The current is generally good, but the fall available for power is probably small. The bank on one side or the other of the stream is generally low and swampy.

The following pages give the results of the data collected in this drainage during 1904:

WILLIAMSONS SWAMP CREEK AT DAVISBORO, GA.

This station was established June 19, 1903, by F. A. Murray. It is located at the Davisboro Bridge, about 200 yards south of the Central of Georgia Railroad station, which is in the middle of the town. The gage is a vertical 1 by 3 inch wooden rod 10 feet long, graduated to feet and tenths with notches and numbered with brass figures. The rod is nailed to the left side of the upstream post of the bent which supports the bridge at a point 302 feet from the initial point for soundings. The gage is read once each day by A. Baker, a hotel proprietor, who is paid by the Georgia Geological Survey. Discharge measurements are made from the upstream side of the wooden highway bridge, which is supported by wooden bents about 18 feet apart. The initial point for soundings is the outer edge of the post which supports the end of the hand rail on the left bank upstream side of the bridge. The channel is straight for about 200 feet above and below the station. The right bank is low and overflows at a gage reading of

4 to 4½ feet. The left bank will overflow at a gage height of 3 feet. The bed of the stream is sandy and is slightly shifting. There is but one channel at all stages. The current is somewhat obstructed by the bents which support the bridge at low water and by trees and brush on the banks at high water.

Bench mark No. 1 is the top of the bridge floor at the bent 302 feet from the initial point for soundings on the upstream side of the bridge. The point is marked with a cross and the letters "B. M." cut into the top of the bridge-floor plank. Its elevation is 11.00 feet above the zero of the gage, which is attached to the same bent. Bench mark No. 2 is the center of a large wire nail driven horizontally in an ash tree which stands in the creek near the right bank about 40 feet below the bridge. The nail is on the side of the tree toward the bridge and is at an elevation of 5.50 feet above the zero of the gage. Bench mark No. 3 is the center of a large wire nail driven horizontally in a small cypress tree on the right bank about 45 feet below the bridge. The nail is on the side of the tree toward the bridge and is at an elevation of 5.50 feet above the zero of the gage. The nails for both bench marks are driven within about one-half inch of the wood, from which the bark has been removed. This station was discontinued on December 31, 1904.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Williamsons Swamp Creek at Davisboro, Ga., in 1904.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Square feet.	*Feet per sec.*	*Feet.*	*Second-feet.*
June 19	F. A. Murray	104	0.80	2.41	83
July 18	do	123	.81	2.58	100
July 29	M. R. Hall	60	.77	1.64	46
July 29	do	43	1.05	1.64	45
October 13	F. A. Murray	62	.75	1.72	47
October 13	do	64	.64	1.64	41
November 21	do	124	.76	2.58	94
December 2	do	133	.73	2.69	97

Mean daily gage height, in feet, of Williamsons Swamp Creek at Davisboro, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.70	2.80	2.80	2.50	1.80	3.10	2.20	4.60	2.20	1.65	1.40	2.10
2	2.60	2.90	2.70	2.70	1.80	3.10	1.30	4.60	2.10	1.50	1.40	2.10
3	2.50	2.60	2.60	2.40	1.85	2.30	1.40	2.30	2.00	1.50	2.00	4.00
4	2.40	2.50	3.40	2.25	1.90	1.90	1.30	1.80	2.00	1.80	2.90	3.10
5	2.50	2.60	3.20	2.30	1.55	1.45	1.30	3.80	2.05	1.70	2.90	3.70
6	2.50	2.60	3.10	2.40	1.60	1.40	1.30	3.60	2.05	1.60	2.40	3.60
7	2.50	3.20	4.10	2.45	1.80	1.30	1.30	3.80	2.10	1.60	2.20	3.20
8	2.50	3.10	3.60	2.20	1.90	3.40	1.35	3.85	2.00	1.70	2.10	3.00
9	2.50	3.30	3.40	2.90	1.80	2.00	1.35	5.35	2.00	1.60	2.00	2.10
10	2.50	4.20	3.20	2.70	1.80	1.60	2.70	5.50	2.00	1.45	1.90	2.90
11	2.70	5.10	3.10	2.60	1.80	1.60	2.00	4.00	2.00	1.50	1.80	2.60
12	2.80	3.80	3.10	2.30	1.65	1.60	1.70	2.80	2.00	1.50	1.80	2.60
13	2.60	3.50	2.80	2.25	1.55	1.50	1.50	2.60	2.00	1.40	3.20	2.60
14	2.60	3.70	2.70	2.30	1.45	1.50	1.40	2.40	1.95	1.50	3.60	2.50
15	2.90	3.50	3.20	2.25	1.65	1.50	1.50	2.40	1.90	1.50	3.00	2.70
16	2.70	3.50	2.80	2.20	1.60	1.40	1.35	2.20	1.85	1.50	2.10	3.30
17	2.60	3.30	2.50	2.10	1.50	1.40	1.30	2.05	1.80	1.40	2.20	3.00
18	2.50	3.10	2.40	2.00	1.50	1.40	1.80	2.00	1.80	1.50	2.00	2.10
19	2.60	3.10	2.70	2.10	1.45	1.35	1.60	1.90	1.80	1.50	2.00	2.10
20	2.70	3.10	2.60	2.10	1.40	1.30	1.50	1.80	1.80	1.40	2.00	2.10
21	2.80	3.70	2.90	2.05	1.40	1.30	1.20	1.80	1.70	1.60	2.00	2.60
22	2.90	4.00	2.60	2.00	1.40	1.40	1.40	1.80	1.70	1.50	2.00	2.60
23	4.20	3.70	2.60	2.00	1.25	1.25	1.50	1.90	1.75	1.40	2.60	2.60
24	3.90	3.30	2.60	2.00	1.60	1.20	1.85	1.80	1.80	1.40	2.80	2.60
25	3.00	3.00	3.00	1.90	1.30	1.20	1.45	1.80	1.80	1.40	2.80	2.60
26	2.80	3.10	2.90	2.00	1.25	1.20	2.50	1.70	1.80	1.70	2.60	2.50
27	2.80	3.10	3.40	2.00	1.25	1.20	1.80	5.10	1.70	1.50	2.30	2.50
28	3.00	3.00	3.30	2.00	1.25	1.10	1.60	5.00	1.80	1.40	2.20	2.60
29	3.00	2.90	2.50	1.95	1.30	1.50	2.50	3.60	1.60	1.40	2.20	2.60
30	2.90	.....	2.50	1.90	1.60	1.55	2.25	2.50	1.60	1.40	2.40	3.00
31	2.90	.....	2.60	.....	3.00	.....	2.10	2.30	.....	1.40	.....	2.80

CANNOOCHEE RIVER NEAR GROVELAND, GA.

This station was established June 12, 1903, by F. A. Murray. It is located at Moody's bridge, 3 miles south of Groveland, Bryan County, Ga. The original gage, reading from 0 to 17 feet, is nailed to the right side of the upstream post of the fourth bent from the left bank. From 17 to 20 feet the post is graduated to feet and half feet with nails and brass figures. A new gage consisting of two 5-foot sections of notched gage rod, reading from 0 to 10 feet is fastened with lag screws to the left bank side of upstream post of the third bent from left bank, this being the first bent in water at ordinary stage. A third section of the gage, reading from 5 to 10 feet, is fastened to a gum tree on the left bank 25 feet above the bridge. This gage faces the bridge and is used for the stages which it covers. The observer is J. M. Edwards, who reads the gage once each day. He is paid by the Georgia Geological Survey. Discharge measurements are made from the downstream side of the 9-span wooden highway bridge. The initial point for soundings is the outer edge of the post which supports the

end of the hand rail of the downstream side of the bridge on the left bank. The channel is straight for about 300 feet above and for about 400 feet below the station. The current is swift in the main channel and sluggish near the banks. Both banks are of clay and sand and overflow at from 15 to 16 feet gage height. The bed of the stream is of silt and is shifting. There is but one channel at all stages up to the height at which the river overflows its banks.

Bench mark No. 1 is the top of the bridge floor at the fourth bent from the left end of the bridge on the upstream side opposite a point 61 feet from the initial point for soundings. The point is marked by a cross and the letters B. M. cut in the floor. It is at an elevation of 20.00 feet above the zero of the gage. Bench mark No. 2 is a spike in a pine tree which stands near the upstream side of the road 15 feet from the left end of the bridge and 9 feet upstream from the line of the edge of the bridge. It is at an elevation of 20.12 feet above the zero of the gage. Bench mark No. 3 consists of two large wire nails driven into the tree to which the third section of the gage is fastened at a gage height of 5.30 feet. Two more nails are also driven at the 8-foot mark.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Cannoochee River near Groveland, Ga., in 1903 and 1904.

Date.	Hydrograper.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
June 12	F. A. Murray	132	1,492	2.32	12.90	3,467
June 23	do	101	560	1.31	5.20	734
July 17	do	110	1,077	2.06	9.97	2,224
July 17	do	104	1,049	2.44	9.92	2,562
August 21	do	141	1,821	2.26	15.11	4,125
October 9	do	95	480	.96	4.45	462
November 18	do	96	526	1.39	5.05	734
December 29	do	105	603	1.68	6.20	1,014
1904.						
February 20	F. A. Murray	121	1,069	1.94	9.45	2,075
July 22	M. R. Hall	63	125	.22	1.53	27
July 22[a]	do	33	43	.70	1.61	30
September 12	W. E. Hall	96	428	1.02	4.16	438
September 12	do	96	430	1.01	4.16	435
October 29[a]	B. S. Drane	32	34	.83	1.54	29
October 29[a]	do	32	36	.85	1.54	31
November 29	W. E. Hall	78	237	.38	2.27	91
November 30	do	78	238	.39	2.36	93

[a] Wading 1,000 feet below bridge.

Mean daily gage height, in feet, of Cannoochee River near Groveland, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.2	9.3	9.6	5.9	2.4	2.0	1.7	4.5	6.2	2.1	1.5	2.2
2	7.6	8.5	9.1	5.7	2.4	2.0	1.7	4.6	6.4	2.0	1.5	2.2
3	7.6	8.2	8.2	5.2	2.3	2.0	1.7	5.9	6.2	1.9	1.6	2.1
4	6.9	7.6	8.0	4.7	2.2	2.0	1.7	4.9	4.8	1.9	1.8	2.2
5	6.5	7.0	7.6	4.3	2.2	2.0	1.6	5.9	4.1	1.9	2.1	2.4
6	6.1	6.8	7.6	4.2	2.1	2.0	1.6	8.0	3.8	1.8	2.1	2.4
7	5.7	6.6	7.6	4.0	2.1	1.9	1.6	10.8	5.0	1.8	2.0	2.7
8	5.3	6.2	8.0	4.0	2.1	1.9	1.6	13.2	6.8	1.7	2.0	2.8
9	5.2	6.3	8.0	4.0	2.0	1.9	1.6	14.2	6.0	1.7	2.0	2.9
10	5.1	7.6	8.1	4.4	2.0	1.9	1.6	14.2	4.7	1.7	2.0	2.8
11	4.9	12.5	7.6	4.8	2.0	1.9	1.9	13.7	4.1	1.7	1.9	2.8
12	5.2	14.5	7.7	5.0	2.0	1.8	1.9	11.0	4.1	1.7	1.9	2.8
13	5.2	15.4	7.4	5.2	2.0	1.8	1.9	9.9	3.9	1.6	2.0	2.8
14	5.2	15.3	7.1	5.3	2.0	1.7	2.1	8.9	3.5	1.6	2.5	2.7
15	5.0	14.5	7.1	5.1	2.0	1.7	2.0	7.9	3.2	1.6	2.7	2.6
16	5.0	13.7	6.9	4.8	2.0	1.7	1.8	6.9	3.0	1.6	2.6	2.4
17	5.0	13.7	6.7	4.3	1.9	1.6	1.7	6.0	2.9	1.7	2.5	2.4
18	4.7	11.5	6.4	3.8	1.8	1.6	1.6	5.3	2.8	1.7	2.5	2.5
19	4.5	10.2	6.2	3.5	1.8	1.6	1.6	4.8	2.9	1.7	2.5	2.6
20	4.4	9.5	6.0	3.0	1.7	1.6	1.6	4.6	2.5	1.7	2.5	2.6
21	4.4	9.2	5.8	3.2	1.7	1.7	1.6	4.4	2.4	1.7	2.3	2.4
22	4.0	10.0	5.5	3.4	1.7	1.8	1.5	4.2	2.4	1.6	2.2	2.4
23	5.5	11.5	5.3	3.6	1.7	1.9	1.8	4.0	2.7	1.6	2.2	2.7
24	9.7	12.3	5.2	3.0	1.6	1.9	2.0	3.8	3.0	1.6	2.2	2.4
25	11.6	13.7	5.9	2.8	1.6	1.9	2.2	3.9	2.7	1.6	2.3	2.3
26	12.7	12.5	6.8	2.6	1.6	1.9	2.4	4.2	2.6	1.6	2.4	2.2
27	13.4	11.7	7.2	2.5	1.6	1.9	2.2	4.5	2.5	1.5	2.4	2.2
28	12.2	10.2	8.0	2.5	1.6	1.8	2.0	4.9	2.4	1.5	2.2	2.2
29	11.0	9.8	7.6	2.5	1.9	1.8	2.0	5.2	2.3	1.5	2.2	2.4
30	10.5	.....	6.9	2.3	1.8	1.8	1.9	5.6	2.2	1.5	2.2	2.5
31	9.8	.....	6.3	.....	1.9	.....	2.3	5.9	.....	1.5	.....	2.7

Rating table for Cannoochee River near Groveland, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.50	30	2.50	120	3.80	360	5.80	882
1.60	36	2.60	134	4.00	405	6.00	940
1.70	42	2.70	149	4.20	453	6.50	1,090
1.80	49	2.80	165	4.40	503	7.00	1,245
1.90	57	2.90	182	4.60	554	7.50	1,405
2.00	65	3.00	200	4.80	606	8.00	1,570
2.10	74	3.10	218	5.00	660	8.50	1,740
2.20	84	3.20	237	5.20	714	9.00	1,915
2.30	95	3.40	276	5.40	769	9.50	2,095
2.40	107	3.60	317	5.60	825	10.00	2,275

The foregoing table is based upon 17 discharge measurements made during 1903–4. It is well defined between gage heights 1.5 feet and 6.2 feet. Above 10 feet the rating curve is a tangent, the difference being 75 per 0.2 feet rise in gage.

Estimated monthly discharge of Cannoochee River near Groveland, Ga., for 1904.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
January	3,550	405	1,317
February	4,300	1,000	2,508
March	2,131	714	1,301
April	911	95	428
May	107	36	60.8
June	65	36	52.2
July	107	30	52.6
August	3,850	360	1,324
September	1,183	84	390
October	74	30	42.0
November	149	30	84.1
December	182	74	122
The year	4,300	30	640

ALTAMAHA RIVER DRAINAGE BASIN.

Altamaha River is formed by the junction of Oconee and Ocmulgee rivers, which unite at the southern boundary of Montgomery County, Ga. Ohoopee River is also a tributary and enters it, from the north side, about 50 miles below the junction of the Oconee and Ocmulgee. The Altamaha River drainage basin is entirely within the State of Georgia. The river rises in the north-central part and flows in a southeasterly direction, emptying into the Atlantic Ocean near Darien. Below the junction of the Oconee and Ocmulgee and for a long distance above, on both rivers, there is no great amount of fall. Steamboat navigation is carried on from Darien to Macon on the Ocmulgee, and to Dublin, and at times to Milledgeville, on the Oconee.

Ohoopee River rises in Washington County and flows in a southeasterly direction to the Altamaha. It flows from the low hills of southeastern Georgia into the flat pine lands. Though it has not so much fall as the more northern streams, it has considerable fall that can be developed into power.

Oconee River rises on the southern slope of the Chattahoochee Ridge, in Hall County, and joins the Middle Oconee on the southwest boundary of Clarke County. From there it flows in a southeasterly direction to the Altamaha. Apalachee River is a large tributary

which rises in Gwinnett and Walton counties and enters the Oconee near the southeastern corner of Morgan County. Little River enters the main stream at the corner of Putnam, Hancock, and Baldwin counties, about 15 miles above Milledgeville, Ga. These tributaries have much fall, and a small part of it is developed. The Oconee has a fall of 250 feet in 45 miles. It has some very large water powers available from its source down to Milledgeville, where it crosses the fall line.

Ocmulgee River, the most westerly of the main tributaries, rises in the north-central part of Georgia on the southern slope of the Chattahoochee Ridge, in Fulton, Dekalb, and Gwinnett counties. It is formed by the junction of Yellow and South rivers just south of the southern corner of Newton County. Yellow River rises in Gwinnett County and flows in a southerly direction into the Ocmulgee. South River rises in Fulton and Dekalb counties and flows in a southeasterly direction. Alcovy River joins the Ocmulgee about 5 miles below the junction of South and Yellow rivers. Towaliga River enters the Ocmulgee at about the southwest corner of Jasper County.

All these tributaries rise in and flow through a very hilly country and have a great deal of fall. Ocmulgee River has a fall of over 210 feet in 35 miles. The last fall of much size is only a few miles above Macon, Ga.

The following pages give the results of data collected in this drainage during 1904:

SOUTH RIVER NEAR LITHONIA, GA.

This station was established August 17, 1903, by F. A. Murray. The station is located a short distance above Albert Shoals, 6 miles south of Lithonia, Ga. The gage is a vertical 10-foot rod fastened to a tree on the right bank just below the bridge. It is read once each day by W. N. New, who is paid by the Georgia Geological Survey. Discharge measurements are made from the 3-span wooden highway bridge. The initial point for soundings is the end of the bridge on the right bank, upstream side. The channel above the station is nearly straight for about 300 feet, and the current is sluggish, being held back by rock ledges below the station. Below the station the channel curves slightly and the current is sluggish for about 400 feet, at which point the shoals begin. The right bank is low and overflows at a gage height of 9 or 10 feet into a second channel, which has a width at high water of about 200 feet. The left bank is high and rocky and does not overflow. The bottom is solid rock.

Bench mark No. 1 is the top of the upstream end of the first wooden floor beam from the right bank. Its elevation is 15.00 feet above the zero of the gage. Bench mark No. 2 is the center of a wire nail driven

horizontally in the upstream side of the base of a willow tree on the left bank about 40 feet upstream from the bridge. Its elevation is 4.00 feet above the zero of the gage. The station was discontinued on December 31, 1904.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of South River near Lithonia, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
August 17	F. A. Murray	96	294	0.61	3.55	179
September 10	M. R. Hall	102	279	.37	3.43	104
September 10[a]	do	60	81	1.48	3.46	120
October 5	do	100	273	.38	3.40	104
1904.						
January 13	M. R. Hall	103	290	.44	3.58	138
March 7	F. A. Murray	108	382	1.44	4.20	549
March 11	M. R. Hall	97	293	.63	3.67	185
July 16	W. E. Hall	91	216	.26	3.22	56
August 9	F. A. Murray	109	446	2.62	4.90	1,172
August 9	do	109	416	2.24	4.60	934
August 10	do	109	398	2.04	4.53	812
September 23	M. R. Hall	102	250	.22	3.16	55
December 5	do	105	369	1.59	4.28	588

[a] Parkers Bridge, 1 mile above station.

Mean daily gage height, in feet, of South River near Lithonia, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.5	3.6	3.6	3.6	3.6	4.1	3.7	3.6	3.5	3.4	3.3	3.5
2	3.5	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.5	3.4	3.3	3.5
3	3.5	3.6	3.6	3.6	3.6	3.6	3.6	4.3	3.5	3.4	3.3	3.5
4	3.5	3.5	3.7	3.6	3.6	3.5	3.5	3.6	4.2	3.4	3.3	3.5
5	3.5	3.5	3.6	3.6	3.6	3.6	3.5	3.5	3.8	3.4	3.3	4.3
6	3.5	3.6	3.5	3.6	3.5	3.8	3.5	3.7	3.6	3.4	3.3	3.7
7	3.5	3.6	4.2	3.7	3.5	4.4	3.5	5.7	3.6	3.4	3.3	3.6
8	3.5	4.1	4.1	3.7	4.1	3.8	3.5	6.8	3.6	3.4	3.3	3.6
9	3.5	3.7	3.6	3.6	3.7	3.7	3.5	6.5	3.6	3.3	3.3	3.5
10	3.5	4.5	3.6	3.7	3.6	3.6	3.6	4.6	3.6	3.2	3.3	3.6
11	3.5	4.3	3.7	3.6	3.6	3.6	3.5	3.8	3.6	3.3	3.3	3.6
12	3.5	3.7	3.7	3.7	3.6	3.6	3.6	3.7	3.6	3.3	3.3	3.6
13	3.5	3.6	3.6	3.7	3.6	3.6	3.6	3.6	3.5	3.3	3.4	3.6
14	3.5	3.7	4.1	3.6	3.6	3.5	3.6	3.6	3.5	3.3	3.3	3.6
15	3.6	3.7	3.7	3.6	3.6	3.5	3.5	3.7	3.5	3.3	3.3	3.6
16	3.5	3.6	3.7	3.6	3.6	3.5	3.5	4.2	3.5	3.2	3.3	3.6
17	3.7	3.6	3.7	3.6	3.6	3.5	3.5	3.8	3.6	3.2	3.3	3.6
18	3.6	3.7	3.6	3.6	3.6	3.5	3.6	3.6	3.5	3.2	3.3	3.6
19	3.6	3.7	3.6	3.6	3.5	3.5	3.5	4.1	3.5	3.3	3.3	3.6
20	3.6	4.5	3.6	3.6	3.5	3.6	3.5	3.6	3.5	3.3	3.3	3.6
21	3.6	4.1	3.6	3.6	3.5	3.6	3.5	3.6	3.5	3.3	3.3	3.6
22	4.6	4.6	3.7	3.6	3.6	3.8	3.5	3.6	3.5	3.3	3.4	3.6
23	4.2	4.5	3.7	3.6	3.5	3.7	3.7	3.5	3.5	3.3	3.4	3.6
24	4.1	4.3	3.7	3.6	3.5	3.6	3.6	3.5	3.5	3.2	3.4	3.6
25	4.1	3.8	3.7	3.6	3.5	3.6	3.5	3.6	3.5	3.2	3.4	3.6
26	3.6	3.7	3.7	3.7	3.5	3.5	3.5	3.5	3.5	3.2	3.4	3.6
27	3.6	3.7	3.6	3.7	3.5	3.5	3.5	3.6	3.5	3.2	3.4	3.8
28	3.5	3.7	3.6	3.6	3.5	3.8	3.5	3.7	3.4	3.2	3.4	3.9
29	3.5	3.6	3.6	3.6	3.5	3.8	4.5	3.6	3.4	3.2	3.4	3.6
30	3.5	.....	3.6	3.6	3.8	3.8	3.7	3.6	3.4	3.2	3.4	3.6
31	3.5	.....	3.6	.....	4.6	.....	3.5	3.5	.....	3.2	.....	3.6

Rating table for South River near Lithonia, Ga., from August 17, 1903, to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.20	55	4.10	454	5.00	1,220	5.80	2,050
3.30	77	4.20	530	5.10	1,320	5.90	2,190
3.40	100	4.30	606	5.20	1,420	6.00	2,340
3.50	130	4.40	684	5.30	1,520	6.20	2,660
3.60	168	4.50	764	5.40	1,620	6.40	3,020
3.70	214	4.60	848	5.50	1,720	6.60	3,400
3.80	266	4.70	936	5.60	1,820	6.80	3,800
3.90	322	4.80	1,025	5.70	1,930	7.00	4,200
4.00	384	4.90	1,120				

The above table is based upon 13 discharge measurements made during 1903 and 1904. It is well defined between gage heights 3.2 feet and 5 feet. The table has been extended beyond these limits.

Estimated monthly discharge of South River near Lithonia, Ga., for 1903 and 1904.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
1903.			
August 17–31	454	100	169
September	764	100	167
October	168	130	131
November	848	130	178
December	168	130	135
1904.			
January	848	130	198
February	848	130	318
March	530	130	213
April	214	168	179
May	848	130	189
June	684	130	206
July	764	130	168
August	3,800	130	502
September	530	100	155
October	100	55	74.4
November	100	77	84.7
December	606	130	186
The year	3,800	55	206

OCMULGEE RIVER NEAR FLOVILLA, GA.

A station was established July 26, 1901, on Ocmulgee River at Lamar's ferry, one-half mile below Lamar's mill and 5 miles east of Flovilla, Ga. The object of this station was to compare the discharge of the river at this point with its discharge below at Macon through the low-water season.

The gage consisted of a $\frac{7}{8}$ by 5 inch by 10 foot poplar board, graduated to feet and tenths with brass figures, staples, and tacks. The rod was nailed to a 16-foot pine plank, which was spiked to an ash tree 25 feet below the ferry landing. The tree was graduated with nails 1 foot apart, extending the gage up to 20 feet above datum.

The gage and bench marks were washed away by a flood on February 27, 1902. The station was reestablished June 18, 1903, at Lamar's ferry, by M. R. Hall. The vertical timber gage is in three sections. The first section is a 1 by 4 inch board, reading from 0 to 5 feet, nailed to a 2 by 6 inch scantling which is spiked to a willow tree at the mouth of a small branch about 20 feet above the ferry landing on the right bank. The second section, reading from 5 to 15 feet, is nailed to an ash tree about 60 feet from the river up the same branch.

The third section, reading from 15 to 25 feet, is attached to a cottonwood tree on bank of same branch about 200 feet from the river. No attempt was made to place this gage on the same datum of the old one. The observer is B. S. White, who reads the gage once each day. He is paid by the Georgia Geological Survey. Measurements are made from the ferryboat. The initial point for soundings is the windlass on the right bank. The channel is straight for 1,000 feet above and 5,000 feet below the station. The current is swift and regular; the right bank is high, but overflows at extreme high water. The left bank is somewhat lower. The bed of the stream is sandy and shifting, and there is but one channel.

Bench mark No 1 is a nail driven in a large cottonwood tree about 200 feet from the river on the branch on which the gage is located. Its elevation is 14.00 feet above the zero of the gage. Bench mark No. 2 is a cross in the solid rock, 100 feet uphill from the first bench mark and 140 feet north from the wagon road, at a point 250 feet west of the ferry. Its elevation is 34.24 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Ocmulgee River near Flovilla, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-f*
August 25	F. A. Murray	206	484	1.84	1.61	893
September 29	do	207	404	1.90	1.35	771
October 13	J. M. Giles	208	414	1.69	1.10	701
November 12	M. R. Hall	210	535	2.00	1.78	1,070
December 19	J. M. Giles	215	542	1.62	1.61	879
1904.						
January 13	W. E. Hall	213	593	1.90	1.97	1,130
January 21	do	208	504	1.99	1.85	1,003
January 22	do	220	1,207	2.87	5.50	3,459
February 16	F. A. Murray	212	764	2.28	2.93	1,745
April 15	W. E. Hall	211	512	1.89	1.67	970
May 28	do	200	319	1.60	.50	511
June 17	B. S. Drane	197	305	1.52	.47	463
July 12	do	209	529	1.68	1.39	891
August 26	do	212	724	2.00	2.36	1,450
September 20	J. M. Giles	186	227	1.46	— .03	332
October 6	do	196	230	1.31	— .21	302
November 2	B. S. Drane	205	260	1.57	.03	406
December 21	W. E. Hall	208	434	1.70	.93	740

Mean daily gage height, in feet, of Ocmulgee River near Florilla, Ga., for 1904.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.7	0.7	−0.3	−0.3	0.6	17	4.0	0.0	−0.6	0 6	1.0
2	2.7	.7	− .3	− .2	.6	18	2.7	.0	− .6	.5	1.0
3	2.2	.3	− .3	.2	.8	19	1.7	.0	− .4	.4	1.0
4	3.2	.4	− .5	.7	1.2	20	1.5	− .1	− .4	.4	.9
5	1.5	3.7	− .3	.9	1.8	21	1.1	− .1	− .3	.2	1.0
6	1.0	2.3	− .3	.7	4.0	22	1.2	− .1	− .3	.5	.9
7	4.2	1.4	− .3	.6	3.8	23	.9	.4	− .3	.9	.9
8	7.4	1.0	− .3	.4	3.0	24	1.3	.0	− .4	.5	.8
9	10.5	.8	− .3	.3	2.0	25	.9	− .2	− .6	.4	.8
10	11.0	.5	− .4	.1	2.8	26	2.4	− .3	− .6	.8	.7
11	7.6	.4	− .5	.1	1.4	27	1.5	− .3	− .2	.7	1.0
12	5.0	.3	− .3	.1	1.5	28	1.4	− .2	− .2	.4	3.5
13	4.0	.4	− .3	.6	1.3	29	2.2	− .1	− .2	.6	3.5
14	3.9	.3	− .3	1.1	1.0	30	1.1	− .2	− .1	.5	3.0
15	2.0	.2	− .4	1.0	1.0	31	.9	.....	− .3	.....	1.9
16	4.1	.2	− .4	.8	.9						

Rating table for Ocmulgee River near Florilla, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
−0.50	225	0.70	560	1.90	1,070	4.20	2,490
− .40	250	.80	595	2.00	1,120	4.40	2,640
− .30	275	.90	630	2.20	1,225	4.60	2,790
− .20	300	1.00	670	2.40	1,335	4.80	2,940
− .10	325	1.10	710	2.60	1,450	5.00	3,090
.00	350	1.20	750	2.80	1,570	5.50	3,475
.10	375	1.30	790	3.00	1,690	6.00	3,875
.20	400	1.40	835	3.20	1,820	6.50	4,275
.30	430	1.50	880	3.40	1,950	7.00	4,675
.40	460	1.60	925	3.60	2,080	7.50	5,085
.50	490	1.70	970	3.80	2,210		
.60	525	1.80	1,020	4.00	2,350		

The above table is based upon discharge measurements made during 1903 and 1904. It is well defined between gage heights 0 feet and 6 feet. The table has been extended beyond these limits. Above 7 feet gage height estimates have been made from logarithmic diagram.

Estimated monthly discharge of Ocmulgee River near Florilla, Ga., for 1904.

[Drainage area, 1,500 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
August	8,100	630	2,005	1.34	1.54
September	2,145	275	507	.338	.377
October	325	200	261	.174	.201
November	710	275	493	.329	.367
December	2,350	525	987	.658	.759

OCMULGEE RIVER AT MACON, GA.

Ocmulgee River rises in the north-central part of Georgia and flows in a southeasterly direction, joining the Oconee south of Mount Vernon to form Altamaha River. The drainage area has the same general features as that of the Oconee. A station was established at Macon, Ga., January 21, 1893, by the United States Weather Bureau. Discharge measurements were begun by the United States Geological Survey in 1895, and a wire gage was established on the bridge of the Macon, Dublin and Savannah Railroad, and was set on the same datum as the Weather Bureau gage. For a time gage-height records were maintained by the Geological Survey, as the Weather Bureau records were for a part of the year only and were discontinued altogether from June 30, 1897, to June 1, 1899. Since June 1, 1899, the Weather Bureau gage-height records have been taken continuously, and have been furnished to the Geological Survey.

The gage is a heavy timber graduated to feet and tenths by copper nails and is bolted to the downstream portion of the right bank stone pier of the Central of Georgia Railroad bridge. Discharge measurements are made from the downstream side of the Fifth Street Bridge, an iron bridge of two 190-foot spans, located about 500 feet above the railroad bridge to which the gage is attached. The initial point for soundings is the end of the iron hand rail of the footway at the right bank on the downstream side. The channel is straight and without obstructions, except one bridge pier. The banks are high and not subject to overflow. The bed of the river is soft and changeable. The station was a fairly good one until the spring of 1902, when the bed of the stream (which is of shifting sand) below the station changed to such an extent as to make the current very sluggish at low stages.

Bench mark No. 1 is the top of the iron rim of the sidewalk 80 feet from the initial point for soundings. Its elevation is 34.35 feet above

the zero of the gage. It was determined by measuring down to the water surface. Bench mark No. 2 is the top of a cast-iron post at the end of the hand rail on the right bank, downstream side, of the Fifth Street Bridge. Its elevation is 37.37 feet above the zero of the gage. Bench mark No. 3 is the top of the downstream side of the capstone of the right bank abutment of the Central of Georgia Railroad bridge. Its elevation is 32.30 feet above the zero of the gage. Bench mark No. 4 is an aluminum tablet on the wall at the west side of the door of the United States Government building at the Mulberry street front. This bench mark is marked 334 feet and has an elevation of 64.37 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Ocmulgee River at Macon, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
January 26	M. R. Hall		2,337	0.77	4.00	1,794
April 2	J. M. Giles		4,720	1.56	11.30	7,244
April 4	do		4,006	1.28	9.00	5,118
April 21	E. C. Murphy		3,652	1.20	7.88	4,385
July 14	M. R. Hall		4,368	1.76	11.00	7,676
July 14	F. A. Murray		4,368	1.65	11.00	7,314
August 24	do		2,115	.65	3.61	1,382
September 30	do		1,765	.57	2.55	1,022
September 30	do		1,765	.60	2.56	1,057
October 15	J. M. Giles		541	1.71	2.22	926
October 15	do		1,683	.54	2.28	915
November 13	M. R. Hall		1,891	.65	2.84	1,236
December 21	J. M. Giles		1,877	.67	2.88	1,264
December 21	do		1,923	.69	2.95	1,329
1904.						
February 17	F. A. Murray	262	2,280	.97	4.35	2,232
April 11	W. E. Hall	271	2,060	.85	3.52	1,759
May 24	do	218	1,424	.49	1.38	703
May 27	do	223	1,426	.44	1.29	625
July 20	M. R. Hall	252	1,576	.64	1.87	1,011
August 19	W. E. Hall	255	1,833	.86	3.31	1,584
September 20[a]	J. M. Giles	148	279	1.54	.30	431
October 6[b]	do	59	137	1.70	— .20	232
November 1[b]	B. S. Drane	63	140	2.16	— .14	302

[a] At shoals above bridge. [b] Boat at Second street.

Mean daily gage height, in feet, of Ocmulgee River at Macon, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.5	3.5	4.2	3.1	2.8	3.9	1.9	3.5	1.8	0.0	0.0	1.0
2	2.5	3.5	4.1	3.0	2.8	4.8	1.9	2.3	1.7	— .3	— .1	1.1
3	2.1	3.6	4.2	3.1	2.8	3.4	2.0	2.9	1.4	*a*— .5	.2	2.4
4	2.8	3.3	4.4	3.0	2.7	3.3	1.2	4.4	1.0	*a* — .8	.7	1.8
5	2.7	3.2	4.2	2.9	2.7	1.9	.9	5.3	1.0	*a*—1.0	1.6	2.0
6	2.6	3.1	3.8	2.8	2.6	1.7	1.7	3.4	4.7	— .2	1.5	5.1
7	2.4	3.2	6.1	3.0	2.5	1.5	1.2	2.4	3.0	.2	1.4	6.0
8	2.4	8.3	7.3	3.2	2.6	2.0	1.2	10.0	2.0	.1	.9	4.4
9	2.6	7.5	7.1	5.7	3.6	4.3	1.0	11.1	1.6	.0	.9	3.3
10	2.7	6.5	5.7	5.1	3.3	3.3	.7	15.4	1.5	— .1	.8	2.5
11	3.1	10.3	5.1	3.9	3.7	2.0	1.0	13.0	1.4	.0	.8	2.3
12	3.3	9.7	4.6	3.1	3.0	1.5	1.0	9.7	1.3	— .1	.5	2.0
13	3.2	7.9	4.2	3.2	2.8	1.3	1.9	6.7	1.3	— .1	.9	2.0
14	3.2	6.1	4.1	3.1	2.7	1.1	1.7	3.7	1.1	.1	1.3	1.9
15	3.3	5.2	4.2	3.0	2.6	1.0	1.7	6.7	1.0	— .1	1.8	1.9
16	3.2	4.8	5.0	2.9	2.5	1.0	1.2	5.4	1.0	— .2	1.8	2.0
17	3.5	4.5	4.3	3.0	2.4	.9	1.0	5.3	.9	— .3	1.3	1.9
18	4.5	4.2	3.9	2.8	2.3	.9	1.1	4.9	.8	— .1	1.0	2.0
19	4.2	3.8	3.7	2.8	2.2	1.1	1.4	3.5	.8	— .3	.9	1.8
20	3.5	4.1	3.7	3.0	2.1	.9	1.9	2.5	.7	— .3	1.0	1.8
21	3.2	5.8	3.6	3.0	2.0	.8	1.3	2.0	.5	.0	.9	1.7
22	3.1	7.0	3.4	2.9	1.9	4.3	1.3	1.8	1.7	— .3	.9	1.5
23	12.9	10.3	3.6	2.9	1.8	3.4	1.1	1.7	.6	— .2	1.0	1.4
24	10.2	9.3	3.9	2.9	1.7	2.0	1.4	1.7	.9	.4	1.5	1.4
25	6.9	7.2	4.0	2.9	1.6	1.4	2.7	7.0	.6	.2	2.1	1.5
26	5.0	5.4	3.7	2.8	1.6	1.0	2.2	5.3	.4	.3	1.8	1.7
27	4.3	5.2	3.6	2.8	1.5	.8	1.2	6.3	.3	.3	1.3	2.0
28	3.8	4.7	3.8	3.0	1.4	.8	1.1	4.8	.3	.2	1.2	6.4
29	3.7	4.3	4.3	3.0	1.3	1.3	.8	3.3	.2	.0	1.0	5.5
30	3.6	.....	3.2	2.9	1.3	3.0	1.7	2.9	.1	.1	1.0	4.7
31	3.5	.....	3.0	.....	1.8	.....	4.6	2.0	.....	— .1	.....	3.3

a See footnote to estimated monthly discharge.

Rating table for Ocmulgee River at Macon, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
—0.30	250	0.70	480	1.70	810	3.40	1,660
— .20	270	.80	510	1.80	850	3.60	1,770
— .10	290	.90	540	1.90	895	3.80	1,890
.00	310	1.00	570	2.00	940	4.00	2,010
.10	330	1.10	600	2.20	1,030	4.20	2,130
.20	350	1.20	630	2.40	1,130	4.40	2,250
.30	375	1.30	665	2.60	1,230	4.60	2,370
.40	400	1.40	700	2.80	1,330	4.80	2,490
.50	425	1.50	735	3.00	1,440	5.00	2,610
.60	450	1.60	770	3.20	1,550		

The foregoing table is based upon 9 discharge measurements made during 1904. It is well defined between gage heights −0.3 foot and 5 feet. For gage heights above 5 feet the discharge has been estimated from 1903 measurements.

Estimated monthly discharge of Ocmulgee River at Macon, Ga., for 1904.

[Drainage area, 2,425 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	9,480	985	2,064	0.851	0.981
February	6,540	1,495	3,149	1.30	1.40
March	4,100	1,440	2,214	.913	1.05
April	3,050	1,330	1,535	.633	.706
May	1,830	665	1,120	.462	.533
June	2,490	510	1,029	.424	.473
July	2,370	480	772	.318	.367
August	12,600	810	2,967	1.22	1.41
September	2,430	330	671	.277	.309
October[a]	400	250	300	.124	.143
November	985	290	602	.248	.277
December	3,505	570	1,295	.534	.616
The year	12,600	250	1,476	.609	8.26

[a] Gage heights from October 3 to 5 are considered too low to represent the true mean. The minimum discharge for the month has been assumed to apply for those days.

ALCOVY RIVER NEAR COVINGTON, GA.

This station was established on April 30, 1901. It is located about 3 miles east of Covington, at a low wooden bridge which is often under water. The gage is a vertical rod 10 feet long, graduated to feet and tenths, marked by V-shaped grooves cut into the face of rod and brass figures. It is spiked to a birch tree on the left bank of the river 2 feet from the upstream side of the bridge. The observer is Stephen Belcher, a farmer living near, who is paid by the Georgia Geological Survey. Discharge measurements are made from the upstream side of a low, two-span, wooden bridge about 100 feet long. The initial point for soundings is the end of the bridge floor on the left bank, upstream side. The banks are low and liable to overflow. The ground on the right bank is low and swampy for several hundred yards and is flooded by a moderate rise. The bed of the stream is sandy and shifting, and the water is sluggish at low stages.

Bench mark No. 1 is a notch and nail in a maple tree on the right bank, about 15 feet from the upper side of the bridge. Its elevation is 5.91 feet above the zero of the gage. Bench mark No. 2 is a copper

plug set in the solid rock on the north edge of the side ditch on the upstream side of the road, 100 feet from the end of the bridge, on the left bank of the river. Its elevation is 7.82 feet above the zero of the gage. This station was discontinued on December 31, 1904.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Alcovy River near Covington, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 11	M. R. Hall		518	1.11	4.41	575
May 28	do		465	.83	3.48	385
July 24	do		352	.49	1.92	174
August 27	do		334	.38	1.60	127
October 8	do		306	.39	1.50	120
November 14	F. A. Murray		334	.47	1.90	157
December 19	do		344	.45	1.85	155
1904.						
February 20	W. E. Hall	71	470	.88	3.67	415
April 13	M. R. Hall	60	320	.63	2.11	202
June 16	do	59	230	.29	.63	68
July 12	W. E. Hall	57	254	.37	1.00	94
September 22	M. R. Hall	60	207	.26	.45	53
September 22 [a]	do	24	26	1.61	.45	42
September 22 [b]	do	30	33	1.27	.45	42
December 6	do	67	392	.84	3.35	328
December 6	do	67	396	.90	3.38	358

[a] 200 feet below bridge. [b] 300 feet above bridge.

Mean daily gage height, in feet, of Alcovy River near Covington, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.00	2.60	2.90	2.40	2.10	2.90	1.25	0.80	1.15	0.25	0.55	1.10
2	2.90	2.50	2.80	2.40	1.90	2.40	1.15	1.20	1.00	.45	.65	1.40
3	2.00	2.40	2.90	2.50	1.80	2.30	.80	3.65	.80	.30	.80	1.50
4	2.20	2.30	3.00	2.40	1.70	1.50	.60	1.85	1.30	.20	1.30	1.70
5	2.40	2.20	2.90	2.00	1.70	1.30	.60	1.45	2.50	.20	1.45	2.50
6	2.30	2.20	2.60	2.00	1.70	1.50	.50	1.30	1.70	.20	1.55	3.40
7	2.20	2.50	4.00	2.50	1.50	1.40	.40	2.80	1.15	.35	1.35	3.45
8	2.10	2.70	4.50	3.00	2.50	1.50	.75	3.10	1.00	.30	.95	3.40
9	2.20	2.80	4.90	3.70	2.20	1.50	1.75	4.40	1.10	.35	.95	2.40
10	2.20	3.50	4.60	2.90	2.60	1.50	1.70	4.80	1.00	.30	.90	2.30
11	2.30	5.50	4.00	2.50	2.90	1.30	1.65	5.70	1.00	.30	.85	2.20
12	2.50	5.00	3.30	2.30	2.00	1.20	1.60	5.90	.75	.30	.85	2.25
13	2.40	4.50	3.00	2.10	1.90	1.10	1.00	4.75	.80	.25	1.50	2.00
14	2.60	4.10	3.00	2.00	1.40	1.00	1.20	3.30	.75	.25	1.45	1.95
15	2.30	3.80	3.50	2.00	1.40	.90	.90	3.10	.75	.25	1.30	1.70
16	2.10	3.60	3.60	2.00	1.50	.80	.75	4.90	.70	.25	1.35	1.70
17	2.50	3.20	3.20	2.00	1.40	.60	.70	4.75	.50	.25	1.20	1.80
18	2.70	3.00	3.00	2.00	1.50	.60	.50	2.80	.65	.25	1.10	1.70
19	2.60	3.40	2.80	2.00	1.30	.50	.60	2.00	.60	.25	1.05	1.70
20	2.40	3.70	2.50	2.00	1.30	.40	.70	1.80	.50	.30	1.10	1.60
21	3.40	4.20	2.50	2.10	1.30	.40	.90	1.70	.45	.25	1.15	1.60
22	3.50	4.70	2.90	2.10	1.30	.70	.50	1.40	.40	.25	1.10	1.50
23	4.50	5.00	3.10	2.00	1.20	.60	.70	1.20	.30	.25	1.60	1.50
24	4.10	4.70	3.10	2.10	1.20	.50	.80	1.20	.30	.25	1.80	1.50
25	3.50	4.40	2.90	2.00	1.10	.50	.70	1.20	.50	.90	2.15	1.75
26	3.00	3.90	2.80	2.20	1.10	.50	.60	1.10	.45	.85	2.00	1.85
27	2.90	3.40	2.80	2.20	1.10	.45	.50	1.15	.40	.75	1.50	1.80
28	2.70	3.20	2.70	2.20	1.10	.40	.40	1.70	.35	.65	1.30	2.10
29	2.60	3.00	2.50	2.00	1.00	.75	.60	1.40	.30	.65	1.20	2.60
30	2.50	.....	2.30	1.90	1.00	1.30	.50	1.25	.30	.65	1.20	2.90
31	2.90	.....	2.30	.....	2.00	.....	.70	1.10	.....	.65	.....	2.75

Rating table for Alcovy River near Covington, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.20	38	1.50	135	2.70	259	3.90	460
.30	45	1.60	144	2.80	272	4.00	480
.40	52	1.70	153	2.90	286	4.20	522
.50	59	1.80	162	3.00	300	4.40	564
.60	66	1.90	171	3.10	315	4.60	606
.70	73	2.00	180	3.20	331	4.80	648
.80	80	2.10	190	3.30	347	5.00	690
.90	87	2.20	201	3.40	364	5.20	734
1.00	95	2.30	212	3.50	382	5.40	778
1.10	103	2.40	223	3.60	401	5.60	822
1.20	111	2.50	234	3.70	420	5.80	866
1.30	119	2.60	246	3.80	440	6.00	910
1.40	127						

The foregoing table is based upon nine discharge measurements made during 1904. It is well defined between gage heights 0.0 and 4 feet. Above 4 feet the curve is determined by two measurements made in 1902 and 1903.

Estimated monthly discharge of Alcovy River near Covington, Ga., for 1904.

[Drainage area, 228 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	585	180	264	1.16	1.34
February	800	201	406	1.78	1.92
March	669	212	331	1.45	1.67
April	420	171	209	.917	1.02
May	286	95	147	.645	.744
June	286	52	105	.460	.513
July	157	52	84.2	.369	.425
August	888	80	290	1.27	1.46
September	234	45	80.8	.354	.395
October	87	38	50.6	.222	.256
November	195	63	115	.504	.562
December	373	103	193	.846	.975
The year	888	38	190	.831	11.28

APALACHEE RIVER NEAR BUCKHEAD, GA.

This station was established February 13, 1901, by M. R. Hall. It is located at the iron wagon bridge over Apalachee River about 3½ miles north of the town of Buckhead, Ga. The bridge is a single span 103 feet long, supported by tubular piers. Its trestle approaches are about 500 feet long on the right bank and about 100 feet on the left. At ordinary stages the channel is about 80 feet wide, and it is only slightly curved above and below the bridge. The bed of the river is part rock and part sand. The current is moderately swift and is somewhat broken and irregular on account of ruins of old pier bases about 50 feet upstream. The right bank is low for a distance of 400 feet and will overflow at a gage height of 10 feet. The low portion is thickly covered with trees and a brushy growth, which will greatly retard the flood water passing over it. The left bank is high and will not overflow, except to a short distance up the steep slope. Measurements are made from the downstream side of the bridge, and the initial point is the outside edge of the iron pier, left bank, downstream. The original gage was graduated to feet and tenths with brass figures and staples, and consisted of two parts. The first section, extending from zero to 10 feet, was fastened to a small ash tree

on the left bank about 100 feet below the bridge. The second section, extending from 6 to 20 feet, was nailed to the upstream post of the last wooden bent next to the iron bridge, on the right bank.

On March 22, 1905, a standard chain gage was attached to the upstream side of the bridge, in the third panel from the right bank. The length of the chain from the end of the weight to the marker is 30.70 feet.

Bench mark No. 1 is the top of the iron pier from the right bank, downstream side. Its elevation is 25.00 feet above the zero of the gage. Bench mark No. 2 is the top of the downstream end of the first floor beam from the right bank. Its elevation is 25.50 feet above the zero of the gage. Bench mark No. 3 is a copper plug set in solid rock 10 feet west of the upstream tubular pier on right bank and 3 feet upstream from the line of the upper edge of the bridge. Its elevation is 3.73 feet above the zero of the gage.

The observer is G. A. J. Adams, a farmer living about one-third of a mile from the bridge. Readings are made once a day, except for three months during low water, when they were made twice a day. The observer is paid by the Georgia Geological Survey.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Apalachee River near Buckhead, Ga.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
January 15	M. R. Hall		290	1.53	2.33	444
May 27	do		222	1.63	1.88	361
June 12	do		327	1.97	3.07	643
July 25	do		204	1.30	1.51	266
August 28	do		198	1.08	1.31	214
October 9	do		211	1.12	1.45	237
December 1	do		231	1.10	1.60	255
1904.						
March 19	M. R. Hall	85	279	1.67	2.39	466
May 12	do	73	260	1.20	1.83	311
July 13	W. E. Hall	75	244	.91	1.48	223
August 9	M. R. Hall	95	771	2.43	7.15	1,877
August 9	do	95	785	2.42	7.30	1,903
September 21	do	73	180	.70	.90	128
October 13	W. E. Hall	70	166	.55	.80	91
October 13	do	70	166	.57	.80	94
November 26	M. R. Hall	77	232	.80	1.39	186
November 26	do	77	227	.74	1.34	167

Mean daily gage height, in feet, of Apalachee River near Buckhead, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.80	1.90	2.40	2.20	1.90	2.30	2.00	1.70	1.50	0.65	0.95	1.40
2	1.80	1.80	2.50	2.40	1.50	2.10	1.80	1.90	1.50	.65	1.25	1.50
3	1.90	1.80	2.50	2.20	1.80	1.50	1.30	2.10	1.40	a.50	1.20	1.90
4	1.80	1.90	2.40	2.10	1.90	1.30	1.40	3.00	1.60	.65	1.90	1.65
5	1.70	2.00	2.30	2.00	1.60	1.50	1.30	2.70	2.80	.65	1.85	2.25
6	1.70	2.10	2.40	2.00	1.70	1.40	1.20	2.40	2.30	.65	1.50	2.75
7	1.60	2.10	3.60	2.20	1.80	1.30	1.10	3.00	1.90	.75	a1.00	3.55
8	1.60	3.10	5.70	2.80	1.90	2.90	1.00	4.50	1.70	.80	1.45	2.65
9	1.50	4.00	4.80	4.00	2.00	2.40	3.00	5.70	1.60	.65	1.40	2.15
10	1.80	4.50	3.40	2.90	2.50	1.90	1.90	9.90	1.40	a.45	1.25	1.90
11	1.90	7.00	3.00	2.40	2.10	1.60	1.80	6.70	1.30	.65	1.35	1.80
12	1.90	6.50	2.80	2.20	2.00	1.60	1.70	6.40	1.30	.65	1.35	1.80
13	2.00	5.50	2.50	2.30	1.80	1.50	1.60	2.50	1.40	.60	1.90	1.75
14	2.00	3.10	2.30	2.20	1.70	1.50	1.50	2.60	1.40	.60	1.80	1.70
15	2.00	3.00	3.50	2.10	1.90	1.40	1.40	2.80	1.30	.65	1.85	1.70
16	2.00	2.80	3.30	2.00	1.80	1.40	1.20	3.50	1.20	.65	1.75	1.80
17	2.20	2.40	2.80	1.90	1.80	1.30	1.00	4.50	1.00	a.45	1.70	1.80
18	2.10	2.20	2.60	2.00	1.80	1.30	.80	2.60	.85	.55	1.70	2.00
19	2.10	2.50	2.40	2.10	1.70	1.00	1.00	2.80	a.65	.65	1.65	1.80
20	2.00	3.30	2.30	2.20	1.70	.70	1.20	2.00	.80	.65	1.45	1.90
21	2.10	4.00	2.20	2.30	1.60	2.00	1.00	1.70	.80	.65	a1.00	1.80
22	2.20	5.10	3.00	2.20	1.50	1.70	1.60	1.50	.80	.65	1.45	1.70
23	6.00	6.80	3.20	2.10	1.50	1.50	1.60	2.00	.75	.60	1.75	1.70
24	6.50	5.00	3.10	2.00	1.40	1.40	2.00	2.10	.75	a.40	1.65	1.60
25	2.70	3.50	2.90	1.90	1.40	1.30	1.20	2.30	.75	.70	1.70	1.50
26	2.50	3.00	2.70	2.10	1.40	1.30	1.60	2.00	a.55	.85	1.50	1.60
27	2.40	2.80	3.00	2.20	1.30	1.20	1.50	1.70	.60	1.40	1.45	1.60
28	2.40	2.60	2.70	2.30	1.30	1.20	1.50	2.00	1.05	1.05	a1.25	3.00
29	2.30	2.50	2.50	2.20	1.30	1.60	1.60	1.70	.90	.90	1.50	3.20
30	2.00	.....	2.40	2.10	1.20	2.50	1.60	1.60	.75	.95	1.45	2.50
31	2.00	.....	2.30	.....	1.80	.....	1.50	1.60	.....	a.65	.....	2.20

a During low water in September, October, and November the Monday gage heights are lower than natural flow on account of storing water during Sunday at High Shoals Factory 25 miles above this station.

Rating table for Apalachee River near Buckhead, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.40	43	1.20	174	2.00	358	3.60	791
.50	55	1.30	195	2.20	409	3.80	849
.60	69	1.40	216	2.40	461	4.00	907
.70	84	1.50	238	2.60	514	4.20	965
.80	100	1.60	261	2.80	568	4.40	1,025
.90	117	1.70	284	3.00	622	4.60	1,085
1.00	135	1.80	308	3.20	678	4.80	1,145
1.10	154	1.90	333	3.40	734	5.00	1,205

The above table is based upon 26 discharge measurements made during 1901–1904. It is well defined between gage heights 0.8 foot and 3 feet and fairly well from gage

heights 3 to 8 feet. Above gage height 4.2 feet the rating curve is a tangent, the difference being 30 per tenth.

Estimated monthly discharge of Apalachee River near Buckhead, Ga., for 1904.

[Drainage area, 440 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	1,655	238	438	0.995	1.15
February	1,805	308	751	1.71	1.84
March	1,415	409	596	1.35	1.56
April	907	333	425	.966	1.08
May	487	174	286	.650	.749
June	595	84	264	.600	.669
July	622	100	239	.543	.626
August	2,675	238	647	1.47	1.70
September	568	[a]62	187	.425	.474
October	216	[a]43	84.1	.191	.220
November	333	[a]126	240	.545	.608
December	776	216	363	.825	.951
The year	2,675	43	377	.856	11.00

[a] See note under gage heights.

OCONEE RIVER NEAR GREENSBORO, GA.

This station was established July 25, 1903, by M. R. Hall. It is located at the new wagon bridge, about 5 miles west of Greensboro, on the road to Madison, Ga. The bridge is of two spans. The first one from the right bank is 80 feet long, and is not over the water except at time of floods. The main span over river is 144 feet long. There is also 52 feet of iron trestle and about 40 feet of wooden trestle on the right bank, and 253 feet of iron trestle and about 325 feet of wooden trestle on the left bank. Ordinarily the river is about 120 feet wide. The bed is sandy and shifting. The channel is nearly straight, and the current is regular and sluggish at low stages. The right bank is high and rocky, with the exception of a low bench under the bridge and approach. The left bank is low and will overflow at a gage height of 12 to 15 feet to the end of the approach, a distance of about 600 feet, and extreme high water may pass beyond the end of the approach.

Discharge measurements are made from the downstream side of the bridge. The initial point is the end of the iron trestle on the right bank, downstream.

The boxed chain gage is bolted to the lower chord of the downstream side of the bridge 163 to 165 feet from the initial point for soundings. The length of the chain from the end of the weight to the marker is 38.73 feet. The gage is read once each day by M. A. Stevens, who is paid by the Georgia Geological Survey.

Bench mark No. 1 is the top of the downstream end of the second floor beam from the right-bank pier. Its elevation is 36.00 feet above gage datum. Bench mark No. 2 is a copper plug set in the rock under the upstream side of the bridge opposite a point 84 feet from the initial point for soundings. Its elevation is 13.55 feet above gage datum. Bench mark No. 3 is on a hickory tree 26 feet downstream from the end of the wooden trestle on the right bank. Its elevation is 33.15 feet above gage datum. Bench mark No. 4 is the concrete foundation under the iron post below the initial point for soundings. Its elevation is 27.58 feet above gage datum.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Oconee River near Greensboro, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
June 12	M. R. Hall		808	1.88	4.00	1,521
July 25	do		439	1.67	1.75	733
August 28	do		439	1.51	1.70	665
October 9	do		424	1.63	1.70	690
December 2	W. E. Hall		389	1.86	1.66	725
1904.						
February 19	W. E. Hall	117	525	2.03	2.75	1,066
March 19	M. R. Hall	117	544	1.86	2.75	1,023
May 12	do	113	404	1.86	1.90	753
June 9	do	115	368	1.68	1.57	617
July 13	W. E. Hall	115	326	1.40	.99	455
August 9	M. R. Hall	131	1,409	3.56	9.82	5,017
August 9	do	133	1,504	3.61	10.49	5,435
September 21	do	94	295	1.01	.45	297
September 21	do	94	291	1.03	.45	301
October 13	W. E. Hall	93	285	1.06	.51	302
October 13	do	93	285	1.02	.50	291
November 26	M. R. Hall	103	320	1.63	1.35	523
November 26	do	103	308	1.60	1.28	494

Mean daily gage height, in feet, of Oconee River near Greensboro, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.8	2.0	3.1	2.6	1.8	3.1	2.5	2.6	1.5	0.4	0.7	1.4
2	1.8	2.2	2.8	2.6	1.8	2.6	1.7	2.7	1.5	.3	.8	1.4
3	2.0	2.3	3.0	2.4	1.7	2.0	1.5	2.4	1.7	.3	.8	1.8
4	1.8	2.4	3.4	2.3	1.5	1.4	1.0	2.0	2.0	.4	1.2	1.7
5	1.8	2.5	3.4	2.3	1.5	1.2	.9	1.4	3.8	.6	1.3	1.9
6	1.6	2.5	3.4	2.2	1.6	1.0	.9	3.4	2.8	.5	1.0	4.4
7	1.7	2.3	6.0	2.7	1.6	1.0	.8	3.2	1.9	.4	.9	4.7
8	1.8	5.1	7.9	2.8	1.6	1.8	.8	3.7	1.8	.4	.9	2.8
9	1.8	5.5	7.6	3.8	1.7	1.3	1.1	9.3	1.2	.3	.7	2.2
10	1.9	4.0	4.3	3.0	1.8	1.2	1.0	11.9	1.0	.2	.6	1.9
11	2.0	8.5	3.8	2.5	4.5	1.1	1.7	10.0	1.0	.6	.6	2.0
12	2.0	6.2	3.6	2.4	2.0	2.3	1.5	5.3	.9	.6	.6	2.0
13	2.1	4.2	3.4	2.2	2.0	1.3	1.1	3.8	.9	.5	1.6	1.8
14	2.0	3.9	3.1	2.1	1.8	1.2	.9	2.8	.9	.5	1.4	1.7
15	2.0	3.3	4.8	2.2	1.8	1.1	.8	2.4	.8	.2	1.2	1.7
16	1.9	3.2	3.5	2.1	1.7	.9	.7	3.9	.7	.1	1.2	1.5
17	2.5	2.8	3.2	2.2	1.8	.9	.7	2.7	.7	.2	1.2	1.8
18	2.0	2.7	2.8	2.2	1.6	1.0	.7	2.1	.6	.2	1.1	1.8
19	2.0	3.0	2.7	2.3	1.5	.9	.7	1.7	.6	.4	1.1	1.7
20	1.8	4.7	2.5	2.0	1.3	.7	.7	1.6	.6	.4	1.0	1.7
21	2.2	4.9	2.7	2.0	1.2	1.2	.8	1.5	.5	.5	.8	1.5
22	2.0	6.7	3.7	2.0	1.2	2.1	1.7	1.6	.5	.5	.8	1.5
23	2.2	5.2	4.3	2.4	1.1	1.5	1.2	1.5	.5	.6	1.0	1.5
24	4.7	4.8	3.7	2.0	1.1	1.4	1.0	1.5	.5	.1	1.5	1.4
25	4.8	4.5	3.4	2.0	1.0	1.0	1.1	1.4	.4	.1	1.8	1.2
26	3.0	4.0	3.3	2.0	1.0	1.0	1.1	1.3	.4	.2	1.4	1.2
27	2.5	3.4	3.6	3.5	.9	.9	1.0	1.8	.5	.1	1.2	1.4
28	2.4	3.4	3.1	3.0	1.0	.7	1.0	1.8	.6	.8	1.0	3.3
29	2.3	3.0	2.8	2.8	1.1	1.0	.9	1.8	.5	.6	1.0	3.8
30	2.3	.....	2.7	2.6	1.2	2.7	.8	1.6	.4	.5	1.3	2.8
31	2.1	.....	2.6	.....	2.8	.....	3.7	1.6	.....	.4	.....	2.2

NOTE.—The low water gage heights are liable to more or less error owing to the storing of water at developed powers above this station.

Rating table for Oconee River near Greensboro, Ga., from July 26, 1903, to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.10	215	0.90	420	1.70	675	3.00	1,140
.20	235	1.00	450	1.80	710	3.20	1,220
.30	255	1.10	480	1.90	745	3.40	1,300
.40	280	1.20	510	2.00	780	3.60	1,384
.50	305	1.30	540	2.20	852	3.80	1,472
.60	330	1.40	570	2.40	924	4.00	1,560
.70	360	1.50	605	2.60	996		
.80	390	1.60	640	2.80	1,068		

It is based upon 18 discharge measurements made during 1903–4. It is well defined between gage heights 0.4 foot and 4 feet. Above 4 feet gage height, esti-

mates of daily discharge are based upon the extension of the rating curve, through two measurements at about 10 feet gage height.

Estimated monthly discharge of Oconee River near Greensboro, Ga., for 1903 and 1904.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
1903.			
July (26–31)	924	640	716
August	7,450	605	1,481
September	5,244	420	1,051
October	710	510	610
November	1,428	640	790
December	924	605	718
1904.			
January	1,924	640	868
February	4,070	780	1,576
March	3,676	960	1,464
April	1,472	780	941
May	1,780	420	656
June	1,180	360	578
July	1,428	360	508
August	6,522	540	1,348
September	1,472	280	481
October	390	215	278
November	710	330	468
December	1,876	510	812
The year	6,522	215	832

OCONEE RIVER AT MILLEDGEVILLE, GA.

This station was established August 22, 1903, by M. R. Hall, although several discharge measurements were made before that time. The first one was made by C. C. Babb on October 19, 1895. The bench mark to which the present gage is referred was used to get the water height at the time of each of these measurements.

The station is located at the iron highway bridge in the eastern part of Milledgeville, which consists of four spans, 100 feet, 150 feet, 150 feet, and 80 feet long, beginning at the right bank end, and short wooden trestles about 25 feet long at each end.

At low water the river is about 300 feet wide, including two piers, and often a sand bar of considerable extent in the third span. This bar sometimes practically stops the third-span channel, leaving the river about 200 feet wide. The bed is sandy and shifting, and the

water is shallow and swift. These conditions are unfavorable to accurate measurements as well as a constant rating. The channel is only slightly curved. Both banks are high and will not overflow. Measurements are made from the downstream side of the bridge, and the initial point is the end of the iron bridge at the right bank, downstream. The gage is read once daily by J. A. Brooks, who was paid by the Georgia Geological Survey until June 30, but has since that time been paid by the United States Weather Bureau.

Bench mark No. 1 is the top of the third floor beam from the pier on the east bank, downstream end. It is 39.00 feet above gage datum.

The gage established during August, 1904, is a boxed chain gage of the 24-inch box type, fastened to a horizontal timber, which is bolted at each end to the intermediate posts on the upstream side of the third panel of the third span from right bank. The bottom of the gage box is 43.80 feet above datum, and the length of chain is 45.80 feet. The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Oconee River at Milledgeville, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
August 22	M. R. Hall	299	1,022	2.24	3.95	2,301
September 11	do	282	604	1.89	2.39	1,141
September 12	do	270	570	1.83	2.27	1,042
October 16	F. A. Murray	264	607	1.87	2.39	1,140
December 16	do	293	821	2.31	3.05	1,908
December 18	do	292	738	2.33	2.74	1,720
1904.						
February 17	W. E. Hall	302	1,237	2.31	3.99	2,852
February 18	do	299	1,135	2.16	3.71	2,449
May 25	do	226	484	1.71	1.47	827
May 26	do	251	501	1.71	1.47	857
June 10	M. R. Hall	292	660	1.84	2.04	1,213
June 28	W. E. Hall	211	453	1.55	1.12	703
June 28	do	211	469	1.53	1.14	723
August 18	do	299	1,135	1.99	3.40	2,256
September 19	M. R. Hall	262	427	1.44	.95	628
October 11	W. E. Hall	197	304	1.10	.37	335
October 11	do	199	305	1.18	.41	361
October 12	do	209	341	1.20	.49	410

Mean daily gage height, in feet, of Oconee River at Milledgeville, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.90	3.40	3.90	3.20	2.50	3.55	2.40	4.60	1.80	0.60	0.60	1.30
2	2.85	3.40	3.90	3.50	2.40	3.65	2.35	2.90	1.40	.50	.60	1.40
3	2.80	3.20	3.80	3.20	2.35	2.65	2.10	2.80	1.40	.50	.70	2.20
4	2.80	3.20	3.80	3.10	2.40	2.20	1.80	3.60	1.30	.90	1.10	2.00
5	2.80	3.10	3.80	2.90	2.30	1.80	1.60	2.80	1.30	.60	1.70	2.10
6	2.75	3.10	3.40	3.00	2.10	1.55	1.50	2.40	2.70	.50	1.80	3.20
7	2.75	3.10	4.40	3.10	2.10	1.65	1.40	4.60	2.50	.50	1.50	4.80
8	2.75	5.20	6.40	3.40	2.10	2.25	1.20	[a]11.60	2.20	.50	1.50	4.10
9	2.75	5.20	7.40	3.70	2.10	2.75	1.20	7.20	1.80	.40	1.40	2.90
10	2.95	5.40	6.10	4.40	2.30	2.20	1.70	9.20	1.60	.80	1.30	2.40
11	2.95	9.50	4.70	3.60	3.50	1.70	2.20	11.60	1.30	.40	1.10	2.20
12	2.90	9.00	4.20	3.10	2.30	1.60	4.20	7.10	1.30	.50	1.30	2.10
13	3.00	6.70	3.90	3.00	2.20	2.10	2.10	5.20	1.30	.50	1.50	2.20
14	3.10	5.10	3.70	2.90	2.10	1.70	1.80	3.40	1.10	.50	1.80	2.00
15	3.10	4.60	3.90	2.75	2.10	1.50	1.40	2.80	1.20	.30	2.00	2.00
16	3.00	4.40	4.70	2.70	2.10	1.45	1.30	7.30	1.00	.20	1.80	2.40
17	3.00	4.00	4.00	2.70	2.10	1.45	1.10	5.50	1.20	.70	1.60	2.20
18	4.20	3.80	3.50	2.70	2.00	1.20	1.20	4.10	.90	.20	1.40	2.50
19	3.50	3.60	3.50	2.75	1.95	1.20	1.00	3.30	1.00	.20	1.30	2.30
20	3.40	3.60	3.40	2.70	1.80	1.10	1.20	2.70	.90	.30	1.20	2.00
21	3.10	3.70	3.30	2.70	1.75	1.00	.90	2.10	1.00	.30	1.10	2.00
22	3.20	6.90	3.30	2.65	1.75	1.40	1.00	1.90	1.00	.40	1.30	1.90
23	11.50	9.40	3.90	2.70	1.70	2.65	.60	1.80	.70	.40	1.40	1.80
24	8.95	8.10	6.10	2.75	1.65	2.00	1.50	1.60	.80	.40	1.50	1.70
25	5.70	6.30	6.20	2.60	1.60	1.65	1.80	2.10	.60	.30	1.70	1.70
26	4.50	5.10	4.60	2.50	1.45	1.40	2.40	1.90	.60	.30	1.90	1.80
27	3.80	4.40	4.10	2.75	1.25	1.40	1.80	2.10	.60	.30	1.60	1.80
28	3.60	4.10	4.30	2.85	1.45	1.10	1.40	2.60	.50	.60	1.30	5.40
29	3.60	4.10	3.80	2.75	1.45	2.00	1.40	2.10	.50	.80	1.20	4.80
30	3.60	.....	3.40	2.60	1.60	1.80	1.40	2.00	.40	.70	1.40	3.90
31	3.40	.....	3.30	.....	2.55	.....	2.40	1.80	.....	.70	.....	3.00

[a] This height is doubtful.

NOTE.—Owing to the irregular running of the mill above this station during the low-water period, the true mean gage height was not always obtained, although two readings were made each day. From this cause the gage heights below 0.5 foot are probably too low and in some cases gage heights above 0.5 foot may be artificially high.

Rating table for Oconee River at Milledgeville, Ga., from August 25, 1903, to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.20	290	1.00	630	1.70	1,010	2.80	1,760
.30	330	1.10	680	1.80	1,070	3.00	1,920
.40	370	1.20	730	1.90	1,130	3.20	2,090
.50	410	1.30	785	2.00	1,190	3.40	2,265
.60	450	1.40	840	2.20	1,320	3.60	2,450
.70	495	1.50	895	2.40	1,460	3.80	2,640
.80	540	1.60	950	2.60	1,610	4.00	2,840
.90	585						

The foregoing table is based upon twelve discharge measurements made during 1904. It is well defined between gage heights 0.2 foot and 4 feet. Above 4-feet gage height, daily discharge estimates are based on a tangent, the difference being 105 per tenth.

Estimated monthly discharge of Oconee River at Milledgeville, Ga., for 1903 and 1904.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
1903.			
August 25–31	2,090	1,573	1,823
September	16,800	1,255	2,998
October	4,625	1,320	1,702
November	2,740	1,573	1,872
December	2,740	1,648	1,911
1904.			
January	10,720	1,723	2,643
February	8,615	2,005	3,903
March	6,410	2,175	3,152
April	3,260	1,535	1,926
May	2,355	758	1,229
June	2,498	630	1,138
July	3,050	450	1,019
August	10,820	950	3,138
September	1,685	370	755
October	585	[a] 290	403
November	1,190	450	840
December	4,310	785	1,638
The year	10,820	290	1,815

[a] See note under gage heights.

OCONEE RIVER AT DUBLIN, GA.

Oconee River rises in the northern part of Georgia, near Gainesville, on the southern slope of the Chattahoochee Ridge, which separates the headwaters of this stream from the tributaries of Chattahoochee River. It flows in a southeasterly direction and joins the Ocmulgee at the southern border of Montgomery County to form the Altamaha. The drainage area is for the most part hilly and is made up of cultivated ground broken by extensive tracts of forest.

A station was established by the United States Weather Bureau in 1894 at Dublin, Ga., about 60 miles above the junction of the Oconee with the Ocmulgee. Records were kept, with the exception of the summer months of 1896, until April 30, 1897, when the station was discontinued. In 1898 discharge measurements were commenced by

the United States Geological Survey, and on February 11 an observer was employed to read the gage. On October 15, 1898, the Weather Bureau again adopted the station and has maintained the gage and furnished gage heights to the Geological Survey continuously since that time. The present observer is R. F. Mathis, who reads the gage once daily.

The gage is a heavy timber bolted to the downstream side of the center pier of the Wrightsville and Tennille Railroad bridge in the eastern part of the city of Dublin. The bridge is a drawbridge, and the pier to which the gage is attached is the circular center pier of the turn span. The gage is graduated to feet and tenths, and the markings face toward the right bank. A secondary sloping gage is attached to a solid rock on right bank about 25 feet above the railroad bridge. This gage is graduated by chisel cuts on a 3-inch by 5-inch oak timber, and reads from −1.6 to +1.9. Measurements are made from the iron highway bridge, which is 500 feet upstream from the gage. This bridge is also a drawbridge, and consists of the turn span between two other spans of 75 feet each. The total length of bridge proper is 320 feet. On the left bank, which is low, there is 1,100 feet of iron-frame trestle approach. There is also a short trestle on the right bank, which is high. The ordinary width of the river is about 235 feet. At a gage height of about 20 feet the left bank begins to overflow, and it is practically covered to end of the approach at 25 feet. This ground is thickly covered with a brushy growth, which will no doubt cause the velocity of the water overflowing it to be small. The right bank does not overflow. The bed of the stream is of loose rock, sand, and gravel. The channel is straight and the current is swift and fairly uniform, except where it is broken by the three bridge piers. The initial point for soundings is the end of the bridge at the right bank, on the upstream side.

Bench mark No. 1 is the top of the upstream end of the floor beam on top of the first tubular pier and is 41.30 feet above the zero of the gage. Bench mark No. 2 is a point on the fifth step from the bottom at the south entrance of the court-house, 6 inches from the east end of the step. Its elevation is 82.51 feet above the zero of the gage. Bench mark No. 3 is the top of the granite water table 2½ feet west of the southeast corner of the court-house. Its elevation is 80.97 feet above the zero of the gage. Bench mark No. 4 consists of three large nails driven into a cypress tree on the right bank about 200 feet above the bridge. Its elevation is 3.00 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Oconee River at Dublin, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
April 3	J. M. Giles		5,038	4.00	15.40	20,160
April 4	do		4,930	4.02	14.95	19,800
June 6	F. A. Murray		2,923	3.35	8.81	9,804
June 6	do		2,832	3.33	8.51	9,432
June 15	do		1,824	2.75	4.47	5,017
July 15	do		2,235	2.93	5.95	6,579
August 24	do		1,910	2.34	4.61	4,475
October 6	do		806	2.12	.12	1,713
November 14	M. R. Hall		1,114	2.22	1.15	2,472
1904.						
February 18	F. A. Murray	248	1,998	2.57	4.33	5,136
April 12	W. E. Hall	242	1,528	2.30	2.45	3,521
July 21	M. R. Hall	210	729	1.11	— .98	808
September 16	W. E. Hall	200	750	1.12	— .90	840
September 17	do	200	732	1.09	— .95	798
October 27	B. S. Drane	249	662	.78	—1.55	515
October 27	do	249	666	.84	—1.55	557
December 3	W. E. Hall	222	1,086	1.81	.45	1,968

Mean daily gage height, in feet, of Oconee River at Dublin, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.7	2.5	3.9	2.5	1.0	0.0	−0.1	−0.5	0.6	−1.3	−1.1	−0.5
2	1.7	2.8	3.5	2.0	1.0	.8	.2	.8	.1	−1.4	−1.2	− .5
3	1.7	2.7	3.5	2.0	1.0	2.0	.6	1.4	− .3	−1.3	−1.1	.3
4	1.6	2.7	3.9	2.0	.7	1.3	.2	.9	− .4	−1.3	−1.0	1.2
5	1.6	2.7	4.0	1.8	.7	.5	− .4	1.5	− .5	−1.3	− .8	1 2
6	1.6	2.0	3.9	1.6	.7	.3	− .6	2.4	− .5	−1.3	− .5	1.3
7	1.5	2.0	3.9	1.6	.4	.1	− .7	1.6	.4	−1.3	− .3	1.7
8	1.4	3.0	4.5	2.0	.4	.1	− .7	2.4	1.1	−1.4	− .3	2.9
9	1.4	5.0	5.5	2.0	.3	.0	− .8	5.0	.6	−1.3	− .4	3.0
10	1.6	7.0	5.5	2.7	.3	− .1	− .8	6.2	.2	−1.3	− .7	2.0
11	1.4	8.5	6.8	3.0	.3	− .3	− .9	6.5	− .1	−1.4	− .7	1.0
12	1.4	9.0	5.5	3.0	.3	− .5	− .7	6.8	− .4	−1.3	− .5	.8
13	2.0	9.9	4.0	2.0	1.0	− .1	.2	6.9	− .7	−1.4	− .5	.8
14	2.0	9.9	3.5	2.0	1.0	− .1	.3	6.6	− .7	−1.4	− .3	.6
15	2.0	9.9	3.4	1.4	1.0	− .1	− .4	3.5	− .7	−1.4	− .1	.5
16	2.0	7.5	3.4	1.0	.7	− .3	− .6	1.8	− .8	−1.4	− .2	.5
17	2.0	5.5	3.4	1.0	.7	− .5	− .8	3.8	− .9	−1.4	− .1	.8
18	2.0	4.5	3.4	1.0	.7	− .5	− .9	3.3	− .9	−1.5	− .1	.8
19	3.0	4.0	3.0	1.0	.7	− .5	−1.0	3.0	− .9	−1.4	− .2	.9
20	2.8	3.5	2.9	1.0	.7	− .6	−1.0	2.0	−1.0	−1.5	− .4	.9
21	2.6	4.0	2.5	1.0	.7	− .5	−1.0	.9	−1.0	−1.5	− .4	.8
22	2.0	5.5	2.0	1.0	.4	− .5	−1.0	.4	−1.0	−1.5	− .5	.6
23	2.9	7.0	2.0	1.0	.4	− .5	− .8	.1	−1.0	−1.5	− .5	.4
24	6.6	7.8	2.9	1.0	.4	− .1	− .8	− .1	−1.1	−1.5	− .4	.3
25	7.6	8.0	3.8	1.0	.0	− .1	− .6	.1	−1.1	−1.5	− .3	.2
26	7.8	8.3	5.0	1.0	.0	− .4	− .3	.3	−1.1	−1.5	− .1	.2
27	6.9	7.0	4.5	1.0	.0	− .8	− .2	.9	−1.2	−1.4	− .1	.3
28	4.4	5.0	4.0	1.0	− .2	− .9	− .1	2.5	−1.2	−1.4	− .1	.6
29	3.6	4.0	3.8	1.0	− .2	− .8	− .4	3.0	−1.2	−1.4	− .2	2.5
30	3.2	.....	3.4	1.0	− .5	− .5	− .6	1.0	−1.2	−1.3	− .4	2.5
31	2.9	.....	3.0	.....	.0	.....	− .6	1.0	.....	−1.1	.....	2.5

Rating table for Oconee River at Dublin, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
−1.50	560	−0.30	1,305	1.60	2,800	5.00	5,790
−1.40	600	− .20	1,381	1.80	2,964	5.50	6,300
−1.30	645	− .10	1,457	2.00	3,130	6.00	6,830
−1.20	695	.00	1,534	2.20	3,296	6.50	7,380
−1.10	750	.20	1,688	2.40	3,462	7.00	7,930
−1.00	810	.40	1,842	2.60	3,630	7.50	8,505
− .90	874	.60	1,998	2.80	3,799	8.00	9,090
− .80	941	.80	2,154	3.00	3,969	8.50	9,690
− .70	1,010	1.00	2,312	3.50	4,402	9.00	10,330
− .60	1,081	1.20	2,473	4.00	4,850	9.50	10,980
− .50	1,154	1.40	2,636	4.50	5,310	10.00	11,630
− .40	1,229						

The foregoing table is based upon eight discharge measurements made during 1904. It is fairly well defined between gage heights −1.50 feet and 4.30 feet. Above 4.30 the curve is rather uncertain. The table has been extended beyond these limits.

Estimated monthly discharge of Oconee River at Dublin, Ga., for 1904.

[Drainage area, 4,182 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	8,850	2,636	3,897	0.932	1.07
February	11,500	3,130	6,599	1.58	1.70
March	7,710	3,130	4,717	1.13	1.30
April	3,969	2,312	2,766	.661	.738
May	2,312	1,154	1,899	.454	.523
June	3,130	874	1,449	.346	.386
July	1,998	810	1,169	.280	.323
August	7,820	1,154	3,617	.865	.997
September	2,392	695	1,131	.270	.301
October	750	560	609	.146	.168
November	1,611	695	1,205	.288	.321
December	3,969	1,154	2,329	.557	.642
The year	11,500	560	2,616	.626	8.47

OHOOPEE RIVER NEAR REIDSVILLE, GA.

This station was established June 13, 1903, by F. A. Murray. It is located at the wooden highway bridge, commonly known as Sheppards Bridge, 4½ miles west of Reidsville. The gage is on the downstream side of the middle post which supports the bridge protector. The section from zero to 10 feet is two 5-foot sections of notched and painted gage fastened with lag screws to the post. From 10 to 13 feet the post is graduated to feet and half feet with white paint, and from 13 to 20 feet it is graduated to feet with nails and numbered with brass figures. On November 19, 1903, a new 1 by 4 inch section 5 feet long, reading from 3 to 8 feet, was spiked to a pine plank which is securely nailed to a cypress tree on the left bank of the river about 120 feet above the bridge. The observer is J. D. Swain, who is paid by the Georgia Geological Survey. Bench mark No. 1 is the top of the cap of the fifth bent from the left end of the bridge on the upstream side, opposite a point 106 feet from the initial point for soundings. It is at an elevation of 20.00 feet above the zero of the gage. Bench mark No. 2 consists of two nails driven horizontally in the downstream side of a cypress tree on the left bank about 120 feet

above the bridge. This bench mark is 8.00 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Ohoopee River near Reidsville, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
June 13	F. A. Murray		2,001	2.88	12.47	5,762
June 24	do		1,187	1.40	6.41	1,692
July 16	do		1,650	2.20	10.34	3,667
July 16	do		1,774	2.10	10.46	3,756
August 22	do		2,183	2.95	14.00	6,441
October 8	do		667	.71	2.84	476
October 8	do		635	.72	2.85	462
November 19	do		889	1.27	4.96	1,131
December 30	do		1,123	1.63	6.69	1,836
1904.						
February 19	F. A. Murray	136	1,667	2.16	10.19	3,611
April 13	W. E. Hall	115	775	1.34	4.53	1,038
July 23	M. R. Hall	112	490	.76	2.28	369
September 13	W. E. Hall	113	713	1.15	4.20	823
September 13	do	113	708	1.21	4.20	858
September 14	do	113	641	.98	3.63	628
September 15	do	113	578	.81	3.00	470
September 15	do	113	569	.80	3.00	454
October 31[a]	B. S. Drane		42	1.25	.32	52
December 1	W. E. Hall	108	423	.45	1.56	190

[a] Wading 1,000 feet above the bridge. Three narrow channels.

Mean daily gage height, in feet, of Ohoopee River near Reidsville, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.4	6.7	8.2	4.4	1.4	0.9	0.5	1.1	8.3	1.1	0.3	1.6
2	6.6	6.4	7.8	4.8	1.4	1.6	.5	1.0	6.4	1.0	.3	1.4
3	.....	6.0	7.3	4.1	1.3	1.8	.5	2.2	6.5	1.0	.7	1.6
4	6.1	5.6	7.0	3.8	1.3	1.5	.6	4.6	6.0	.9	1.0	1.8
5	6.0	5.3	7.1	3.5	1.3	1.2	1.0	6.2	5.2	.8	1.5	2.1
6	5.4	5.0	7.1	3.3	1.1	1.1	1.2	8.4	4.3	.8	1.5	2.8
7	4.8	4.8	7.1	3.0	1.1	1.0	1.1	9.0	4.8	.7	1.5	3.1
8	4.6	5.0	7.4	2.9	1.0	.9	1.0	9.8	5.6	.6	1.3	3.1
9	4.8	5.1	7.8	2.8	1.0	.7	.8	9.0	5.6	.7	1.0	3.0
10	.....	6.0	8.0	3.8	1.0	.7	1.1	8.4	5.5	.7	.9	2.8
11	.....	8.2	8.0	4.6	.9	.6	1.4	8.6	5.1	.7	.8	2.7
12	.....	12.1	7.8	4.8	.9	.6	1.0	9.0	5.0	.7	.7	2.5
13	.....	12.0	7.6	4.7	.8	.6	1.0	9.4	4.4	.6	1.0	2.5
14	.....	.....	7.5	4.4	.8	.5	.8	8.9	3.6	.6	1.5	2.4
15	.....	11.5	7.1	3.4	.7	.5	.6	8.6	3.1	.7	1.9	2.3
16	.....	11.2	6.9	3.1	.7	.5	.8	8.3	2.6	.6	2.0	2.2
17	2.6	11.0	6.6	2.8	.7	.5	.6	7.6	2.3	.6	1.8	2.2
18	2.4	10.7	6.2	2.3	.7	.4	.5	6.3	2.1	.5	1.5	2.2
19	2.4	10.1	5.9	2.1	.6	.4	.5	6.4	1.9	.5	1.3	2.1
20	2.3	9.4	5.7	2.0	.6	.5	.4	5.4	1.6	.4	1.2	2.1
21	2.3	9.3	5.3	1.9	.6	.4	.4	4.8	1.5	.4	1.1	2.0
22	2.9	9.8	5.1	1.8	.6	.9	.6	4.5	1.5	.4	1.0	2.0
23	3.1	10.1	4.9	1.8	.5	.8	2.3	3.9	2.1	.4	1.1	1.9
24	4.0	10.4	4.6	1.7	.5	.6	1.9	3.7	2.2	.4	1.6	1.9
25	4.8	10.2	4.7	1.6	.5	.6	1.7	3.9	1.9	.3	1.2	1.9
26	5.7	9.8	4.8	1.5	.5	.5	1.5	3.9	1.7	.3	2.7	1.8
27	6.4	9.3	4.6	1.4	.5	.5	1.5	3.9	1.5	.4	2.4	1.9
28	7.2	.....	4.8	1.4	.5	.5	1.4	5.4	1.3	.4	2.2	2.0
29	7.8	8.5	4.9	1.5	.9	.5	1.5	6.3	1.2	.3	1.8	2.4
30	7.1	.....	5.0	1.5	1.1	.5	1.5	9.2	1.2	.3	1.6	2.7
31	6.8	.....	4.6	.....	.8	.....	1.3	9.2	.....	.3	.....	2.7

Rating table for Ohoopee River near Reidsville, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.30	50	1.60	197	3.80	690	7.00	1,950
.40	57	1.70	213	4.00	755	7.50	2,184
.50	65	1.80	230	4.20	824	8.00	2,430
.60	74	1.90	247	4.40	895	8.50	2,685
.70	83	2.00	265	4.60	968	9.00	2,950
.80	93	2.20	302	4.80	1,043	9.50	3,222
.90	104	2.40	341	5.00	1,120	10.00	3,500
1.00	115	2.60	382	5.20	1,198	10.50	3,800
1.10	127	2.80	425	5.40	1,277	11.00	4,120
1.20	140	3.00	470	5.60	1,357	11.50	4,460
1.30	153	3.20	519	5.80	1,438	12.00	4,820
1.40	167	3.40	572	6.00	1,520	12.50	5,198
1.50	182	3.60	629	6.50	1,728	13.00	5,590

The foregoing table is based upon nineteen discharge measurements made during 1903 and 1904. It is well defined between gage heights 0.0 foot and 11.0 feet. Above gage height 11.0 the table is determined by one measurement at 14.0 feet.

Estimated monthly discharge of Ohoopee River near Reidsville, Ga., for 1904.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
January	2,330	321	1,062
February	4,894	1,043	2,877
March	2,531	968	1,703
April	1,043	167	495
May	167	65	101
June	230	57	91.8
July	321	57	125
August	3,388	115	1,811
September	2,582	140	747
October	127	50	74.0
November	403	50	170
December	494	167	316
The year	4,894	50	798

MISCELLANEOUS MEASUREMENTS IN ALTAMAHA RIVER DRAINAGE BASIN.

The following is a list of miscellaneous discharge measurements made in Altamaha River drainage basin during 1904:

Yellow River near Jackson, Ga.—A measurement was made October 7 at the wagon bridge, 11 miles from Jackson, on the road to Covington, Ga. The bench mark is the downstream edge of the bridge floor, 40 feet from the initial point for soundings, and is 8.00 feet above the datum of the gage.

Width, 113 feet; area, 229 square feet; mean velocity, 0.30 foot per second; gage height, 1.80 feet; discharge, 69 second-feet.

South River near Jackson, Ga.—A measurement was made October 7 at the wagon bridge, 10 miles from Jackson, on the road to Covington, Ga. The bench mark is the upstream end of floorbeam, 66 feet from the initial point for soundings, 20.00 feet above the datum of the gage.

Width, 121 feet; area, 152 square feet; mean velocity, 0.90 foot per second; gage height, 1.10 feet; discharge, 137 second-feet.

Pole Bridge Creek near Lithonia, Ga.—This stream is a tributary of South River from the left near Lithonia, Ga. A measurement was made July 16 near the mouth of the creek, on the road between New's Bridge and Parker Bridge.

Width, 15 feet; area, 7 square feet; mean velocity, 1.43 feet per second; discharge, 10 second-feet.

A measurement at the same section September 23 gave the following results:

Width, 17 feet; area, 7 square feet; mean velocity, 1.00 foot per second; discharge, 7 second-feet.

Alcovy River near Newton Factory, Ga.—A measurement was made October 7 from the wagon bridge at Henderson's mill, 4 miles from Newton Factory, on the road to Covington, Ga. The bench mark is the upstream edge of the bridge floor, 90 feet from the initial point for soundings, 11.00 feet above the datum of the gage.

Width, 40 feet; area, 43 square feet; mean velocity, 1.46 feet per second; gage height, 1.25 feet; discharge, 62 second-feet.

Horse Creek near Lumber City, Ga.—This stream is a tributary of Ocmulgee River from the left. A measurement was made September 8, 1½ miles above the mouth of the creek, 10 miles north of Lumber City. The bench mark is a nail driven into the end of the second floorbeam above the second bent from the left bank, 15.00 feet above the zero of the gage.

Width, 55 feet; area, 115 square feet; mean velocity, 1.03 feet per second; gage height, 3.17 feet; discharge, 118 second-feet.

Little Ocmulgee River at Wilcox, Ga.—A measurement was made September 7 at the wagon bridge at Wilcox, 2½ miles upstream from Lumber City, Ga. The bench mark is the center of lag bolt driven into the end of the second floorbeam from the right bank on the downstream side, 15.00 feet above the zero of the gage.

Width, 100 feet; area, 488 square feet; mean velocity, 1.92 feet per second; gage height, 3.15 feet; discharge, 937 second-feet.

Sugar Creek at Wilcox, Ga.—A measurement was made September 7, from the Southern Railway bridge, one-fourth mile north of Wilcox. The bench mark is the top of the steel girder, upstream side, 150 feet from the right end of the trestle, 25.00 feet above the datum of the gage.

Width, 41 feet; area, 117 square feet; mean velocity, 1.06 feet per second; gage height, 7.50 feet; discharge, 124 second-feet.

Oconee River near Milledgeville, Ga.—Measurements were made at Fraley's ferry, 6 miles upstream from Milledgeville. The bench mark is a nail in an ash tree on the right bank, 100 feet above the ferry, 10.00 feet above the datum of the gage.

June 29; width, 270 feet; area, 1,310 square feet; mean velocity, 0.79 foot per second; gage height, 4.90 feet; discharge, 1,030 second-feet.

September 20; width, 207 feet; area, 1,108 square feet; mean velocity, 0.50 foot per second; gage height, 4.35 feet; discharge, 547 second-feet.

Beaverdam Creek near Greensboro, Ga.—This stream enters Oconee River from the left. A measurement was made March 19, at Veazey Ford, 6 miles south of Greensboro, on the road to Sparta, Ga. The

bench mark is a nail in a small ash tree on the left bank, 20 feet below the foot plank, 3.00 feet above the datum of the gage.

Width, 15 feet; area, 10 square feet; mean velocity, 1.70 feet per second; gage height, 1.50 feet; discharge, 17 feet.

Little River near Milledgeville, Ga.—A measurement was made from the wagon bridge, 9 miles north of Milledgeville, 1 mile above the mouth of the river. The bench mark is the top of the downstream end of the cap of left bent of the second pier from the left bank, marked by a copper brad. Its elevation is 15.00 feet above the datum of the gage.

Width, 89 feet; area, 65 square feet; mean velocity, 1.09 feet per second; gage height, 3.17 feet; discharge, 71 second-feet.

MINOR SOUTHERN ATLANTIC DRAINAGE BASINS.

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous discharge measurements were made in the Satilla River drainage basin during 1904:

Satilla River near Waycross, Ga.—A measurement was made September 9, at the covered wagon bridge, 3 miles east of Waycross. The bench mark is the center of lag bolt driven into the left side of the first floorbeam from the first pier from the left bank, 20.00 feet above the datum of the gage.

Width, 108 feet; area, 1,077 square feet; mean velocity, 1.07 feet per second; gage height, 8.2 feet; discharge, 1,150 second-feet.

Hurricane Creek near Blackshear, Ga.—This stream is an important tributary of Satilla River, entering from the north. A measurement was made September 10, at Baxley's bridge, near Blackshear. The bench mark is a large nail driven into the downstream end of the floorbeam over the second pier from the right bank, 15.00 feet above the datum of the gage.

Width, 67 feet; area, 415 square feet; mean velocity, 1.35 feet per second; gage height, 6.57 feet; discharge, 562 second-feet.

APALACHICOLA RIVER DRAINAGE BASIN.

Apalachicola River is formed by the union of Flint and Chattahoochee rivers at the Georgia-Florida line. It flows in a southerly direction through Florida to the Gulf of Mexico. It is navigable, and boats run up Flint River to Albany, Ga., and up Chattahoochee River to Columbus, Ga.

Flint River rises in Fulton County, Ga., a few miles south of Atlanta. It flows in a southerly direction to Talbot County, southeasterly to Macon County, southerly to Worth County, and southwesterly to Apalachicola River. It drains the south-central portion of Georgia, extending from Atlanta south to the Florida line. The

tributaries to Flint River are mainly large creeks with much fall. The principal ones among these are Whitewater, Whiteoak, Redoak, Elkins, Big Potato, Muckalee, Kinchafoonee, Ichawaynochaway, and Spring creeks.

Flint River has many good water powers on its course. Between a point opposite Woodbury, Ga., and a point opposite Knoxville, Ga., in Crawford County, a distance of about 45 miles, the river falls 334 feet. Very little of its power is yet developed.

Chattahoochee River rises in the Blue Ridge, in White County, and flows in a southwesterly direction until it reaches the Alabama line at the southwest corner of Troup County, Ga. From there it flows in a southerly direction, forming the western boundary of Georgia, until it flows into Apalachicola River at the southern boundary of the State. It drains almost all of the north-central, middle-west, and southwest portions of Georgia, and has a drainage area of 4,900 square miles at Columbus, Ga., which is at the fall line.

Soque River joins the Chattahoochee on the western edge of Habersham County. This river rises in Habersham County and flows in a southwesterly direction. It has considerable fall, dropping as much as 40 feet within a few hundred feet.

Farther down the Chattahoochee, at the west boundary of Hall County, Chestatee River enters. It rises in Lumpkin County and flows in a southerly direction through a very hilly and steep country and has much fall all along its course.

From its source down to Columbus, Ga., Chattahoochee River is an excellent water-power stream. From the lower edge of Lumpkin County down to Columbus, Ga., there is a fall of over 850 feet, 366 feet of this fall being between Westpoint and Columbus. All along its course there are many small tributaries flowing from a high, hilly country. These have much fall, and many small water powers are available.

The following pages give the results of the data collected at this station during 1904:

CHATTAHOOCHEE RIVER NEAR CORNELIA, GA.

This station was established as a bench-mark station. It is located at Duncan Bridge, about 7 miles northwest of Cornelia, Ga., and 1 mile below the mouth of Soque River. Discharge measurements are made from the downstream side of the inclosed wooden highway bridge, the meter being lowered through holes cut in the floor or by raising floor plank. The initial point for soundings is the end of the bridge at the left bank, downstream side. The channel is curved for about 500 feet above and straight for about 800 feet below the station. The current is moderate. The right bank is clean, and overflows for about 200 feet. The left bank is high, rocky, wooded, and does not overflow. The

bed of the stream is composed of rock at the left and silt at the right bank, free from vegetation, and shifting. There is but one channel at all stages, broken by the piers of the bridge. A fish-trap dam about 800 feet below the bridge will probably affect the rating at this station. The bench mark is the top of downstream stringer at a point 59 feet from the left end of the bridge. Its elevation is 21.00 feet above datum.

Discharge measurements of Chattahoochee River near Cornelia, Ga., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
June 8.....	J. M. Giles	124	363	1.34	1.40	487
September 30 ..	A. T. Mitchelson	115	364	.70	.95	253
October 29.....	M. R. Hall	103	319	.67	.91	215

CHATTAHOOCHEE RIVER NEAR NORCROSS, GA.

This station was established June 10, 1902, by M. R. Hall. It is located at Medlock's toll bridge, about 4½ miles north of Norcross, Ga. This point is above the mouth of Johns Creek and below the mouth of Sewannee Creek. A vertical section of gage, reading from zero to 8 feet, is attached to an oak tree on the right bank of the river, 100 feet above the bridge. A chain gage was established March 14, 1903. The center of the pulley is 28.32 feet above the zero of the gage, and the length of the chain from the end of the weight to the marker is 28.75 feet. The gage is read twice each day by W. O. Medlock, the bridge owner. He is paid by the Georgia Geological Survey. Discharge measurements are made from the downstream side of the single-span bridge and its approaches. The initial point for soundings is 50 feet to right of the center of the downstream tubular pier on the right bank. The channel is slightly curved for 600 feet above and 700 feet below this station. The current is sluggish at low stages, but not excessively so, and the discharge measurements are considered good at lowest stage. The right bank is high and will overflow only for 50 feet from the water's edge; the left bank will overflow for about 800 feet at a gage height of from 16 to 18 feet. The bed of the stream is sandy and probably changes.

Bench mark No. 1 is the top of the iron pier on the right bank, downstream side. Its elevation is 27.00 feet above gage datum. Bench mark No. 2 is a copper plug set in a stone post set flush with the surface of the ground at the side of the road just outside of the toll bridge, on the right bank. The post is on line with the downstream side of the bridge and is 145 feet from the center of the pier at the right-bank end of the bridge. Its elevation is 26.92 feet above gage datum.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Chattahoochee River near Norcross, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
January 9	M. R. Hall		1,375	1.34	2.70	1,837
March 14	do		2,035	2.43	5.35	4,940
May 5	do		1,854	1.91	4.08	3,543
May 29	J. M. Giles		1,583	1.50	3.15	2,378
June 26	do		1,570	1.56	3.13	2,447
July 17	M. R. Hall		1,537	1.46	3.06	2,254
July 17	do		1,537	1.46	3.06	2,255
August 19	do		1,503	1.55	3.15	2,337
August 19	do		1,486	1.54	3.05	2,288
August 19	F. A. Murray		1,503	1.52	3.15	2,281
August 19	do		1,486	1.48	3.05	2,203
September 26	do		1,245	.96	2.06	1,197
October 23	do		1,265	.85	1.94	1,078
November 25[a]	do		493	2.15	1.95	1,062
November 25	do		1,221	.87	1.95	1,071
1904.						
January 19	W. E. Hall	174	1,308	1.08	2.19	1,419
January 19	C. A. Greene	174	1,308	1.04	2.19	1,362
February 20	M. R. Hall and J. C. Hoyt.	169	1,467	1.78	3.45	2,607
April 7	W. E. Hall	173	1,314	1.14	2.50	1,496
June 7	J. M. Giles	160	1,234	1.27	2.54	1,571
June 20	M. R. Hall	155	1,049	.63	1.53	662
August 9	W. E. Hall	190	2,354	4.22	8.62	9,938
August 9	do	180	1,972	3.36	6.57	6,624
August 10	do	177	1,410	1.88	3.60	2,658
September 28	M. R. Hall	156	917	.59	1.22	537
September 28	do	156	919	.59	1.22	538
October 11	B. S. Drane	166	943	.60	1.32	569
October 14	M. R. Hall and N. C. Grover.	158	925	.60	1.28	558
December 9	M. R. Hall	163	1,002	.95	1.88	951

[a] Measurement taken at Warsaw Ferry, 1 mile above bridge.

Mean daily gage height, in feet, of Chattahoochee River near Norcross, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.90	2.20	2.50	2.55	2.30	2.40	1.70	2.65	1.80	1.35	1.25	1.50
2	1.90	2.10	2.60	2.55	2.25	2.30	1.55	2.70	1.75	1.30	1.30	1.35
3	2.00	2.10	2.60	2.50	2.20	2.30	1.50	2.35	1.70	1.35	1.35	1.40
4	1.90	2.10	2.40	2.40	2.50	2.10	1.45	2.20	1.90	1.20	1.50	1.55
5	1.90	2.10	2.30	2.35	2.40	1.95	1.70	3.10	2.40	1.15	1.65	2.00
6	1.80	2.10	2.30	2.35	2.30	1.90	1.55	2.55	2.10	1.25	1.60	3.45
7	1.80	2.30	4.70	2.50	2.20	2.65	1.50	2.15	2.05	1.30	1.50	2.85
8	2.00	3.00	6.00	3.20	3.60	2.30	1.50	7.70	1.80	1.30	1.45	2.10
9	1.90	2.90	3.90	3.40	4.05	2.05	1.30	8.20	1.70	1.30	1.40	1.90
10	1.90	2.70	3.30	3.70	3.60	1.90	1.30	3.70	1.80	1.15	1.40	1.90
11	1.90	2.70	3.00	3.00	2.80	1.80	1.55	4.50	1.65	1.25	1.40	1.90
12	2.00	2.70	2.85	2.80	2.55	1.90	1.75	3.95	1.55	1.10	1.40	1.80
13	2.00	2.50	2.70	2.70	2.40	1.80	1.85	2.85	1.60	1.30	1.60	1.70
14	2.10	2.30	3.20	2.60	2.35	1.80	1.90	2.55	1.55	1.30	1.65	1.70
15	2.10	2.30	3.10	2.50	2.35	1.70	1.60	2.40	1.50	1.20	1.60	1.65
16	2.00	2.30	2.75	2.50	2.25	1.70	1.60	2.50	1.45	1.25	1.50	1.65
17	2.20	2.20	2.60	2.55	2.20	1.70	1.85	2.15	1.45	1.25	1.50	1.70
18	2.50	2.10	2.55	2.50	2.20	1.65	1.50	2.00	1.45	1.15	1.45	1.70
19	2.20	2.30	2.50	2.45	2.15	1.20	1.65	1.90	1.40	1.10	1.45	1.60
20	2.10	3.50	2.45	2.40	2.15	1.60	1.40	2.00	1.40	1.10	1.45	1.60
21	2.00	3.60	2.60	2.40	2.10	1.50	1.70	2.20	1.40	1.10	1.40	1.60
22	2.80	4.90	3.00	2.40	2.10	1.45	1.85	1.85	1.40	1.25	1.55	1.60
23	3.10	5.30	3.40	2.40	2.05	1.35	2.05	1.70	1.40	1.25	1.80	1.55
24	3.30	4.00	3.60	2.35	2.00	1.25	1.70	1.80	1.45	1.20	1.85	1.55
25	2.60	3.30	3.50	2.30	2.00	1.20	1.60	2.05	1.40	1.20	1.65	1.70
26	2.40	2.90	3.20	2.30	2.00	1.20	1.80	2.00	1.30	1.25	1.55	1.85
27	2.30	2.80	3.00	2.45	1.95	1.40	1.80	2.40	1.20	1.30	1.50	1.95
28	2.20	2.60	2.90	2.50	1.90	1.95	1.60	2.80	1.20	1.20	1.45	3.80
29	2.20	2.60	2.75	2.35	1.90	2.30	1.70	2.45	1.25	1.10	1.45	3.55
30	2.20	.....	2.65	2.30	2.00	2.40	2.10	2.05	1.40	1.30	1.50	2.50
31	2.20	.....	2.60	.....	2.50	.....	1.90	1.90	.....	1.30	.....	2.20

Rating table for Chattahoochee River near Norcross, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.10	480	1.90	1,015	3.20	2,410	5.50	5,210
1.20	515	2.00	1,120	3.40	2,630	6.00	5,885
1.30	560	2.20	1,330	3.60	2,860	6.50	6,580
1.40	615	2.40	1,540	3.80	3,090	7.00	7,295
1.50	680	2.60	1,750	4.00	3,320	7.50	8,035
1.60	750	2.80	1,970	4.50	3,920	8.00	8,805
1.70	830	3.00	2,190	5.00	4,555	8.20	9,125
1.80	920						

The above table is based upon discharge measurements made during 1902, 1903, and 1904, and is well defined. Above gage height 1.90 feet it is the same as the 1903 curve.

Estimated monthly discharge of Chattahoochee River near Norcross, Ga., for 1904.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
January	2,520	920	1,306
February	4,945	1,225	1,967
March	5,885	1,435	2,227
April	2,975	1,435	1,729
May	3,380	1,015	1,510
June	1,805	515	987
July	1,225	560	814
August	9,125	830	2,079
September	1,540	515	764
October	588	480	530
November	968	537	689
December	3,090	588	1,119
The year	9,125	480	1,310

CHATTAHOOCHEE RIVER AT OAKDALE, GA.

This station was established at Oakdale, Ga., on October 17, 1895, by Cyrus C. Babb. It is located at the Southern Railway bridge, 1 mile above the mouth of Proctor Creek, 2 miles below the mouth of Peachtree Creek, one-fourth mile west of Chattahoochee, 1 mile east of Oakdale, and 8 miles northwest of Atlanta.

On July 30, 1896, the location of the station was changed to Mason and Turner's ferry, 1 mile below Oakdale. The gage at this point, know as the "Oakdale lower gage," is nailed to a tree on the right bank 100 feet below the ferry and set 1 foot lower than the gage at the Southern Railway bridge. On June 1, 1899, the lower gage was discontinued and the upper gage resumed and adopted by the United States Weather Bureau, the United States Geological Survey still receiving the records and making the current-meter discharge measurements at this point. The gage now used is in two sections, the first, reading from zero to 8 feet, fastened to a willow tree 100 feet above the bridge on the left bank; the second, reading from 8 to 26 feet, fastened to an ash tree 30 feet above the bridge on the left bank. It is set on the same datum as the old wire gage of the United States Geological Survey established at that point by Mr. Babb in 1895 and above referred to. Its zero point is 753.5 feet above sea level. Discharge measurements are made from the railway bridge. The initial point for soundings is the end of the iron bridge on the right bank, upstream side.

Bench mark No. 1 is a railroad spike in the corner of the pier on the right bank 12.39 feet above datum of gage. Bench mark No. 2 is a large bridge spike in a sycamore tree about 50 feet above the bridge on the left bank; it is at an elevation of 11.00 feet above the zero of the gage. Bench mark No. 3, determined by measuring down to the water, is the top of the iron girder, 40 feet from the initial point for soundings, on the upstream side of the bridge. Its elevation is 57.55 feet above the zero of the gage. The flow is obstructed by rafts, which have to be cleared from the channel occasionally. The channel is straight and the current swift. The banks are subject to overflow. The bed of the stream is constant and the results are fairly good except at high stages, when the water flows through the trestlework. The observer is J. B. Austin.

This station was discontinued by the Weather Bureau on November 30, 1904, but the single daily readings for several months before that time are not considered reliable as representing the flow of the river on account of the operation of a large water-power plant above. Only the records for the first five months of the year are used.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Chattahoochee River at Oakdale, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 2	M. R. Hall		2,644	3.70	9.95	9,787
March 23	J. M. Giles		8,553	3.93	21.85	33,620
April 23	E. C. Murphy and M. R. Hall.		1,598	3.03	5.03	4,836
June 2	J. M. Giles		3,240	3.85	12.20	12,480
September 2	do		809	2.00	1.25	1,612
October 7	do		622	2.18	1.10	1,359
November 5	do		828	2.27	1.90	1,882
1904.						
February 11	J. M. Giles	221	1,225	2.39	3.28	2,926
March 15	do	224	1,277	2.53	3.50	3,233
May 3	do	198	723	1.88	1.38	1,361
June 29	J. M. Giles and B. S. Drane.	187	556	1.85	.60	1,030

Mean daily gage height, in feet, of Chattahoochee River at Oakdale, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Jan.	Feb.	Mar.	Apr.	May.
1	1.3	1.6	2.0	2.0	1.5	17	1.7	1.6	2.5	2.0	1.5
2	1.3	1.5	2.3	2.0	1.5	18	1.5	1.6	2.0	2.0	1.5
3	1.7	1.7	2.4	1.9	1.4	19	1.9	1.7	2.0	1.8	1.4
4	1.3	1.5	2.4	1.8	1.4	20	1.6	2.5	2.0	1.7	1.3
5	1.3	1.5	2.0	1.8	1.4	21	1.5	2.7	1.8	1.7	1.3
6	1.3	1.5	2.3	1.5	1.4	22	1.7	4.5	2.0	1.7	1.0
7	1.4	1.6	4.5	1.7	1.4	23	4.0	7.7	3.8	1.7	1.0
8	1.4	3.6	8.2	2.5	1.8	24	4.0	4.3	4.0	1.5	1.0
9	1.3	3.0	4.0	3.0	4.0	25	3.5	3.5	4.4	1.5	1.0
10	1.4	3.6	3.0	5.0	4.5	26	3.0	3.0	4.0	1.5	.8
11	1.4	4.0	2.8	3.0	2.7	27	3.0	2.8	3.0	1.7	.8
12	1.3	2.7	2.5	2.5	2.0	28	3.0	2.4	2.6	1.7	.8
13	1.5	2.0	2.2	2.2	1.8	29	3.5	2.0	2.3	1.5	.8
14	1.6	1.8	2.5	2.0	1.7	30	3.6	.....	2.0	1.5	1.0
15	1.5	2.0	4.5	1.9	1.7	31	1.6	.....	1.8	.....	1.7
16	1.5	1.9	3.0	1.9	1.7						

Rating table for Chattahoochee River at Oakdale, Ga., from January 1, 1903, to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.00	1,300	3.00	2,730	9.00	8,940	16.50	18,650
1.10	1,360	3.20	2,900	9.50	9,540	17.00	19,400
1.20	1,420	3.40	3,080	10.00	10,140	17.50	20,160
1.30	1,480	3.60	3,260	10.50	10,740	18.00	20,960
1.40	1,545	3.80	3,450	11.00	11,340	18.50	21,800
1.50	1,610	4.00	3,640	11.50	11,940	19.00	22,800
1.60	1,675	4.50	4,140	12.00	12,540	19.50	23,800
1.70	1,740	5.00	4,640	12.50	13,190	20.00	25,000
1.80	1,810	5.50	5,140	13.00	13,840	20.50	26,500
1.90	1,880	6.00	5,640	13.50	14,490	21.00	27,800
2.00	1,950	6.50	6,190	14.00	15,140	21.50	29,550
2.20	2,095	7.00	6,740	14.50	15,840	22.00	31,300
2.40	2,245	7.50	7,290	15.00	16,540	23.00	34,800
2.60	2,400	8.00	7,840	15.50	17,240	24.00	38,300
2.80	2,560	8.50	8,390	16.00	17,940		

The above table is based upon discharge measurements made during 1902–1904. It is well defined between gage heights 0.6 feet and 12 feet. Above that point the table is based upon four scattered measurements.

Estimated monthly discharge of Chattahoochee River at Oakdale, Ga., for 1904.

[Drainage area, 1,560 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	3,640	1,480	1,993	1.28	1.48
February	7,510	1,610	2,504	1.61	1.74
March	8,060	1,810	2,749	1.76	2.03
April	4,640	1,610	1,983	1.27	1.42
May	4,140	1,180	1,699	1.09	1.26

CHATTAHOOCHEE RIVER AT WEST POINT, GA.

This station was established July 30, 1896, by M. R. Hall, and the gage is now maintained by the United States Weather Bureau. It is located at Montgomery street wagon bridge. The boxed chain gage is securely bolted to the outside of the iron railing of the downstream footway at a point 122 to 124 feet from the initial point for soundings. The boxed gage is so constructed that the length of the chain is always 2 feet greater than the elevation of the bottom of the box above gage datum. The length of the chain is 29.26 feet from the end of the weight to the marker. The wagon bridge from which discharge measurements are made is in three spans, with short approaches from each end. The floor of the bridge is about 24 feet above low water. The initial point for soundings is the end of the hand rail on the right bank, downstream side of the bridge. The channel is straight for about 2,000 feet above and 3,000 feet below the station. The current has a fair velocity, except at low stages. The right bank is high and overflows only at high water, when most of the town is covered. The left bank is somewhat lower and overflows for about 800 feet at a gage height of 20 feet. The bed of the stream is of sand and gravel and is unstable.

Bench mark No. 1 is the top of the downstream end of the second iron floor beam under the bridge floor from the right-bank end of the highway bridge. Its elevation is 24.19 feet above gage datum. Bench mark No. 2 is the top of the thirty-eighth milepost on the Franklin and West Point survey of the United States engineers. This post is a cast-iron cap 6 inches square, set in concrete, and approximately on a level with the ground. It is marked "U. S. 38." A raised point in the center of the cap is the bench mark; its elevation is 15.68 feet above gage datum. The location of this post is on the right bank of the river, 340 feet upstream from the wagon bridge and 50 feet from the edge of the river. It is 60 feet south of the Episco-

pal church, and is 132 feet east of the northeast corner of a lot belonging to W. G. Sheafers, which is the southwest corner of Jasper and Front streets. Bench mark No. 3 is the top of the first marble block and bottom of the second marble block of the Confederate monument in the center of the street, 1,300 feet from the initial point of soundings and 860 feet from the east end of the bridge. Its elevation is 25.56 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Chattahoochee River at Westpoint, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
January 6	M. R. Hall	383	3,550	1.42	3.95	5,056
April 22	E. C. Murphy & M. R. Hall.	394	4,040	2.16	5.39	8,713
June 5	M. R. Hall	381	5,458	3.84	9.70	20,960
June 6	do	386	6,046	4.24	11.30	25,620
July 30	J. M. Giles	358	3,312	1.44	3.46	4,761
July 31	do	356	3,569	1.68	4.07	5,993
September 23	M. R. Hall	375	2,875	.85	2.40	2,451
September 24	do	369	2,858	.85	2.32	2,416
December 17	W. E. Hall	376	2,901	.85	2.37	2,460
1904.						
February 3–4	W. E. Hall	376	3,101	.97	2.80	3,005
April 7	J. M. Giles	377	2,781	1.13	2.83	3,144
April 7	do	377	2,787	1.13	2.88	3,155
April 14	do	377	2,805	1.13	2.90	3,179
April 14	do	377	2,785	1.14	2.90	3,180
June 20	do	353	2,223	.58	1.56	1,298
June 20	do	353	2,228	.59	1.56	1,306
September 2	W. E. Hall	368	2,397	.50	1.46	1,203
September 3	do	371	2,621	.71	2.00	1,862
September 29	J. M. Giles	368	2,451	.41	1.20	1,005
September 30	do	368	2,474	.41	1.27	1,010
December 6	W. E. Hall	380	2,933	.96	2.70	2,808

Mean daily gage height, in feet, of Chattahoochee River at Westpoint, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.4	2.9	3.3	2.9	2.5	3.0	2.5	2.6	2.3	1.2	1.2	1.7
2	2.3	2.9	3.3	2.9	2.5	3.6	2.3	2.7	1.4	1.2	.9	1.8
3	2.4	2.9	3.7	2.9	2.4	2.7	2.1	2.5	2.0	1.2	1.1	1.9
4	2.4	2.8	3.5	2.8	2.4	2.4	2.1	3.3	1.9	1.2	1.5	2.0
5	2.4	2.8	3.3	2.7	2.4	2.2	1.7	2.5	1.8	1.1	1.7	2.0
6	2.3	2.8	3.1	2.7	2.4	2.1	1.9	3.1	2.5	1.1	1.6	2.6
7	2.3	3.1	4.7	2.8	2.4	1.5	1.6	5.3	2.4	1.2	1.6	3.0
8	2.4	4.8	6.0	3.2	2.4	1.4	1.3	11.4	2.2	1.2	1.5	3.2
9	2.4	5.0	6.0	3.6	2.4	2.0	2.4	12.6	2.1	1.1	1.6	3.1
10	2.7	4.4	5.4	3.5	3.1	2.3	2.1	12.4	1.9	1.1	1.5	2.5
11	3.0	5.4	4.2	3.5	3.4	2.1	1.8	9.6	1.7	1.1	1.5	2.2
12	2.8	5.1	3.7	3.4	3.1	2.0	1.6	6.2	1.6	1.1	1.5	2.1
13	2.7	4.1	3.6	3.1	2.6	1.8	1.6	4.8	1.6	1.2	1.6	1.9
14	2.7	3.7	3.6	2.9	2.4	1.6	1.8	4.2	1.6	1.1	1.7	2.0
15	2.7	3.4	4.0	2.8	2.3	1.6	1.9	5.0	1.5	1.0	1.8	1.8
16	2.6	3.3	4.2	2.7	2.3	1.6	1.4	4.0	1.5	1.0	1.7	1.8
17	3.5	3.2	3.7	2.7	2.3	1.6	1.4	3.9	1.4	1.0	1.6	1.8
18	3.6	3.0	3.4	2.7	2.3	1.5	1.7	3.4	1.4	1.1	1.6	1.8
19	3.3	3.1	3.2	2.7	2.2	1.5	1.4	3.0	1.4	1.0	1.6	1.8
20	3.1	3.7	3.1	2.7	2.1	1.5	2.0	2.9	1.3	1.1	1.6	1.8
21	2.8	4.0	3.0	2.7	2.0	1.5	1.7	2.3	1.3	1.2	1.6	1.7
22	3.3	5.4	3.0	2.7	2.0	1.4	2.0	2.4	1.4	.9	1.6	1.7
23	5.5	6.4	3.3	2.7	2.0	1.3	2.1	2.2	1.8	.9	1.8	1.7
24	5.1	6.1	3.3	2.6	1.9	1.7	2.3	2.2	1.9	.9	1.8	1.7
25	4.2	5.3	3.8	2.6	1.9	1.3	2.0	4.3	1.5	.9	1.8	1.9
26	3.8	4.3	3.8	2.6	1.9	1.4	1.9	5.1	1.4	.9	1.8	2.1
27	3.3	3.9	3.6	2.6	1.8	1.3	1.4	4.1	1.3	1.1	1.7	2.1
28	3.0	3.6	3.3	2.6	1.8	1.2	1.9	5.8	1.3	1.2	1.7	3.5
29	3.0	3.4	3.2	2.6	1.8	1.4	1.7	3.9	1.3	1.1	1.7	3.6
30	2.9	.....	3.1	2.6	1.8	2.0	2.1	3.0	1.3	1.0	1.6	3.7
31	2.9	.....	3.0	.....	2.7	.....	2.2	2.4	.....	1.1	.....	3.6

Rating table for Chattahoochee River at Westpoint, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.90	800	2.00	1,840	4.20	5,830	6.40	11,380
1.00	850	2.20	2,100	4.40	6,290	6.60	11,940
1.10	920	2.40	2,380	4.60	6,760	6.80	12,520
1.20	1,000	2.60	2,680	4.80	7,240	7.00	13,100
1.30	1,090	2.80	3,000	5.00	7,740	8.00	16,000
1.40	1,180	3.00	3,340	5.20	8,240	9.00	18,900
1.50	1,280	3.20	3,700	5.40	8,740	10.00	21,800
1.60	1,380	3.40	4,080	5.60	9,260	11.00	24,700
1.70	1,490	3.60	4,500	5.80	9,780		
1.80	1,600	3.80	4,940	6.00	10,300		
1.90	1,720	4.00	5,380	6.20	10,840		

The foregoing table is based upon discharge measurements made during 1903 and 1904. It is well defined between gage heights 1.20 feet and 11.40 feet. The table has been extended beyond these limits. Above gage height 6.50 feet the rating curve is a tangent, the difference being 290 per tenth.

Estimated monthly discharge of Chattahoochee River at Westpoint, Ga., for 1904.

[Drainage area, 3,300 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	9,000	2,240	3,520	1.07	1.23
February	11,380	3,000	5,447	1.65	1.78
March	10,300	3,340	4,858	1.47	1.70
April	4,500	2,680	3,107	.942	1.05
May	4,080	1,600	2,285	.692	.798
June	4,500	1,000	1,695	.514	.574
July	2,530	1,090	1,705	.517	.596
August	29,340	2,100	7,515	2.28	2.63
September	2,530	1,090	1,484	.450	.502
October	1,000	800	913	.277	.319
November	1,600	800	1,375	.417	.465
December	4,720	1,490	2,294	.695	.801
The year	29,340	800	3,016	.914	12.44

SOQUE RIVER NEAR DEMOREST, GA.

This station was established July 16, 1904, by M. R. Hall. It is located at Cannon Bridge on road from Cornelia to Acorn, 2½ miles from Demorest and about 4 miles above the mouth of the river. The gage is a vertical 10-foot timber fastened to a scantling which is spiked to the sill and upstream post of trestle bent at the left bank. It is graduated to feet and tenths. The gage is read once each day by Charles Cannon. This station is maintained in cooperation with the Georgia Geological Survey, by whom the gage reader is paid. Discharge measurements are made from the single-span, wooden, wagon bridge, to which the gage is attached. The bridge has a 28-foot approach on the left bank and 90-foot approach on the right bank. The initial point for soundings is the end of the bridge on the upstream side at the left bank. The channel is curved for 500 feet above and slightly curved for 500 feet below the station. The current is swift. Both banks are high and wooded. The right bank overflows during extreme high water. The bed of the stream is composed largely of rock and is permanent. There is but one channel at all stages. Bench mark No. 1 is the top of the upstream end

of the right bank wooden pier, and is marked with white paint. Its elevation is 21.30 feet above the zero of the gage. Bench mark No. 2 is a nail in an ironwood tree 20 feet above bridge on the right bank. Its elevation is 6.00 feet above the zero of the gage.

Discharge measurements of Soque River near Demorest, Ga., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
June 8	J. M. Giles	74	159	1.14	1.74	182
July 16	M. R. Hall	74	139	.88	1.46	123
August 24	W. E. Hall	81	209	.97	1.81	202
October 28	M. R. Hall	81	169	.60	1.31	102
October 28	do	81	169	.60	1.31	101
November 23	W. E. Hall	80	192	.78	1.58	150

Mean daily gage height, in feet, of Soque River near Demorest, Ga., for 1904.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.25	1.65	1.40	1.35	1.40	17	1.40	1.80	1.50	1.30	1.40	1.50
2	.....	2.10	1.65	1.35	1.40	1.40	18	1.35	1.80	1.45	1.30	1.40	1.50
3	.....	2.15	1.60	1.35	1.40	1.45	19	1.40	1.75	1.50	1.30	1.40	1.55
4	.....	1.70	2.75	1.35	1.65	1.55	20	1.40	2.20	1.45	1.30	1.40	1.50
5	.....	2.00	2.60	1.35	1.60	3.05	21	1.40	1.75	1.60	1.25	1.40	1.50
6	.....	3.45	2.00	1.35	1.50	2.30	22	3.70	1.70	1.50	1.25	1.45	1.45
7	.....	1.60	1.85	1.40	1.40	1.70	23	1.55	1.60	1.40	1.30	1.60	1.45
8	.....	5.25	2.10	1.40	1.40	1.65	24	1.50	1.65	1.40	1.30	1.65	1.45
9	.....	2.90	1.85	1.35	1.35	1.55	25	2.30	2.30	1.45	1.30	1.50	1.70
10	.....	2.70	1.70	1.40	1.35	1.50	26	1.60	2.35	1.45	1.30	1.45	1.65
11	.....	1.95	1.60	1.35	1.35	1.45	27	1.45	2.40	1.50	1.30	1.40	2.40
12	.....	2.40	1.60	1.35	1.40	1.45	28	1.40	2.10	1.45	1.30	1.40	2.30
13	.....	2.00	1.60	1.35	1.45	1.55	29	1.65	2.00	1.40	1.30	1.40	2.10
14	.....	1.95	1.55	1.35	1.45	1.50	30	1.50	1.75	1.40	1.30	1.40	1.85
15	.....	1.80	1.50	1.30	1.40	1.50	31	2.70	1.70	.....	1.35	.....	1.70
16	1.45	1.85	1.50	1.30	1.40	1.50							

Rating table for Soque River near Demorest, Ga., from July 16 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.25	93	1.50	132	1.80	198	2.10	282
1.30	100	1.60	152	1.90	224	2.20	314
1.40	115	1.70	174	2.00	252		

The above table is based upon six discharge measurements made during 1904 and one measurement made in 1905. It is well defined between gage heights 1.30 feet and 2.20 feet. Estimates made above 2.50 feet can only be considered a rough approximation.

Estimated monthly discharge of Soque River near Demorest, Ga., for 1904.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
July (16–31)	980	108	218
August	1,745	93	322
September	525	115	174
October	115	93	104
November	163	108	122
December	666	115	183

SWEETWATER CREEK NEAR AUSTELL, GA.

This station was established May 6, 1904, by M. R. Hall. It is located at the south side of Lithia Springs Park, near Austell, Ga. The station is maintained in cooperation with the Georgia Geological Survey, by whom the gage reader is paid. The gage is composed of two sections. The first or inclined section, graduated by tenths to 8 feet, is bolted to a large rock on the right bank. The second or vertical section, graduated from 8 to 16 feet, is spiked to a maple tree on the right bank about 100 feet upstream. The gage is read twice each day by J. L. Causey. Discharge measurements are made from a boat at low and ordinary stages about 400 yards below the gage. High-water measurements are made from Strickland's wagon bridge, 1½ miles downstream. The channel is straight for about 300 feet above and for 200 feet below the gage. The current above the gage is sluggish; below the gage it is swift for about 50 feet, at several places with sluggish water between. Both banks are high and wooded, the right being composed of rock, and are not liable to overflow. There is but one channel at all stages. Bench mark No. 1 is a nail in a small maple on the right bank about 200 feet below the gage. Its elevation is 5.00 feet above the zero of the gage. Bench mark No. 2 is a cross cut on a large rock about 10 feet south of the sloping section of the gage. Its elevation is 10.00 feet about the zero of the gage.

Discharge measurements of Sweetwater Creek near Austell, Ga., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
May 6 [a]	W. E. and M. R. Hall.	42	148	0.82	1.68	122
June 16 [b]	J. M. Giles	45	71	.85	1.15	61
June 16 [a]	do	41	119	.54	1.20	64
July 9 [a]	W. E. Hall	43	140	.61	1.40	85
July 29 [a]	J. M. Giles	54	201	1.26	2.70	254
August 30 [a]	W. E. Hall	53	194	.92	2.35	178
August 31 [c]	J. M. Giles	45	99	1.24	1.96	122
October 1 [d]	M. R. Hall	55	105	.58	1.24	61
October 1 [d]	do	55	104	.58	1.28	60

[a] Strickland's bridge.
[b] Boat 100 yards below gage.
[c] Wading 100 yards below gage.
[d] 1,000 feet above gage.

Mean daily gage height, in feet, of Sweetwater Creek near Austell, Ga., for 1904.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.40	1.90	1.50	1.90	0.90	0.90	1.65
2	.....	2.50	1.45	1.60	1.70	.65	1.05	1.60
3	.....	1.90	1.30	4.40	1.60	1.05	.95	1.80
4	.....	1.60	1.25	2.90	3.00	.70	1.60	1.85
5	.....	1.50	1.20	3.90	2.65	1.05	1.80	2.50
6	.....	1.50	1.10	3.85	2.05	.75	1.70	3.65
7	.....	1.95	1.05	2.30	1.70	.95	1.40	2.60
8	.....	1.70	1.35	11.90	1.65	.90	1.35	2.25
9	.....	1.45	1.35	16.30	1.60	.65	1.25	2.05
10	.....	1.30	1.15	11.40	1.45	.90	1.25	2.05
11	.....	1.20	1.10	4.95	1.40	.90	1.25	2.20
12	.....	1.20	1.05	6.30	1.30	.85	1.30	2.00
13	.....	1.10	1.15	4.30	1.25	.90	1.65	1.85
14	.....	1.00	.90	3.45	1.25	.95	2.10	1.75
15	.....	1.00	1.00	3.25	1.35	.85	1.75	1.75
16	.....	1.15	1.05	4.55	1.10	.55	1.45	1.80
17	.....	1.00	.55	3.20	.90	1.00	1.40	1.85
18	1.50	1.00	1.00	3.45	1.20	.70	1.35	1.75
19	1.50	1.00	.75	2.40	1.20	.70	1.45	1.80
20	1.45	1.90	.75	1.95	1.05	.85	1.40	1.65
21	1.45	2.80	.75	2.15	1.10	.70	1.45	1.65
22	1.35	3.50	.90	2.00	1.10	.75	1.80	1.60
23	1.30	2.15	1.15	1.95	1.00	.60	2.40	1.70
24	1.30	1.70	.70	2.65	1.15	1.00	2.00	1.65
25	1.25	1.30	1.05	4.05	1.00	.90	1.75	1.65
26	1.15	1.15	1.00	5.50	1.05	.90	1.60	1.65
27	1.20	1.20	.90	7.15	.85	.85	1.45	1.75
28	1.20	2.40	1.25	6.00	1.10	.85	1.60	3.45
29	1.15	5.60	2.50	3.10	1.05	.90	1.50	3.25
30	1.30	2.85	2.20	2.35	.95	.50	1.50	3.20
31	2.55	.....	1.65	2.10	.....	.95	.....	2.50

MULBERRY CREEK NEAR COLUMBUS, GA.

This station was established as a bench-mark station June 23, 1904, by W. E. Hall. It is located at Mitchell's bridge, about 16 miles north of Columbus, Ga., and 12 miles south of Hamilton, Ga. Mulberry Creek is a tributary of Chattahoochee River, which it enters about 6 miles to the west of the station. Discharge measurements are made from the downstream side of the two-span open wooden truss highway bridge, resting upon stone abutments and center wooden pile bent. The initial point for soundings is the left end of the bridge on the downstream side. The channel is straight for about 50 feet above and 200 feet below the bridge. The current is rather sluggish above and swift below the station. Both banks are high and not liable to overflow. The right bank is clean; the left bank is wooded and covered with brush. The bed of the stream is composed of rock and sand. There is but one channel at all stages, broken by one wooden pier. The bottom is very uneven, causing the currents to change directions during low water. The bench mark is the top of the downstream end of the wooden cap of center pile bent. Its elevation is 32.00 feet above datum.

Discharge measurements of Mulberry Creek near Columbus, Ga., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
June 23	W. E. Hall	38	62	0.92	1.40	58
September 21	do	32	47	.68	1.23	32
September 21	do	32	47	.70	1.23	33

FLINT RIVER NEAR WOODBURY, GA.

Measurements of the flow of Flint River were made during 1897 and 1898 at Molina, Ga., but the river bed was so shifting that the station was discontinued on June 2, 1898. Two measurements were made in 1899 at the Macon and Birmingham Railroad bridge, near Woodbury, Ga., 5 miles below the Molena station. On March 29, 1900, a gage was put in near this bridge, and the station was reestablished.

The gage is graduated on a 1 by 5 inch plank in 5-foot sections; the part reading from zero to 10 feet is attached to a willow tree on the left bank about 300 feet above the bridge and about 50 feet below Riggins's old ferry; the section reading from 10 to 15 feet is fastened to a sweet gum tree 50 feet from the left bank and 150 feet upstream from the bridge. This gage was maintained by the Georgia Geological Survey until November 1, 1900, when it was adopted by the United States Weather Bureau instead of the one at Reynolds, Ga. The

observer is G. A. Wright, who is paid by the United States Weather Bureau. Discharge measurements are made from the Macon and Birmingham Railroad bridge and its trestle approaches. This is a two-span iron bridge, each span being 150 feet long and supported by brick piers. There are wooden trestle approaches about 150 feet on the right bank and 225 feet on the left. The initial point for soundings is the end of the iron bridge on the right bank, downstream side. The bridge and its piers are oblique to the direction of the current, and the bed is rough and irregular and mostly permanent. The channel above and below the station is slightly curved for 800 feet. Above ten feet the banks are subject to overflow for a width of 300 or 400 feet, but all water passes beneath the bridge and its approaches.

Bench mark No. 1 is the top of the downstream end of the second and third crossbeams from the left bank end of the bridge. The elevation of this bench mark is 27.00 feet above the zero of the gage. Bench mark No. 2 is a cut in the hickory tree on the upstream side of the old ferry landing, 50 feet from the left bank of the river and about 75 feet upstream from the gage. Its elevation is 7.00 feet above the zero of the gage. Bench mark No. 3 is a copper plug set in solid rock on the west side of the river about 100 feet from the water and 100 feet upstream from a point opposite the gage. Its elevation is 16.24 feet above the zero of the gage. The zero of the gage is at an elevation of 660 feet above sea level.

The observations at the station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Flint River near Woodbury, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
April 22	E. C. Murphy		1,145	2.34	2.45	2,679
February 12[a]	M. R. Hall		2,974	5.48	9.20	16,290
March 26	J. M. Giles		2,104	4.21	5.45	8,861
June 29	do		1,042	1.53	1.48	1,591
July 30	do		704	.71	.37	503
September 30	M. R. Hall		690	.56	.28	387
1904.						
February 11	F. A. Murray	255	1,350	2.29	2.81	3,095
February 23	W. E. Hall	247	1,478	2.78	3.30	4,114
March 30	J. M. Giles	218	757	.82	.74	620
July 7	W. E. Hall	238	694	.37	.00	256
August 25	B. S. Drane	291	745	.51	.30	383
October 4[b]	J. M. Giles	208	345	.51	— .25	178

[a] This is a flood measurement. Stage being high for this station. Results considered fairly accurate.
[b] Taken from boat one-half mile above bridge.

Mean daily gage height, in feet, of Flint River near Woodbury, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.50	0.90	1.20	0.70	0.40	1.10	0.30	0.40	0.20	— .25	—0.35	0.10
2	.50	.90	1.30	.60	.40	1.00	.20	1.30	.10	— .30	— .30	.20
3	.60	.80	1.50	.70	.50	.80	.10	1.10	.10	— .30	— .20	.30
4	.70	.70	1.60	.60	.60	.50	.10	1.20	.50	— .30	.00	.40
5	.60	.80	2.00	.60	.50	.30	.00	2.20	.80	— .30	.00	.50
6	.50	.70	2.50	.70	.50	1.00	.00	2.10	.70	— .35	.10	.90
7	.60	.80	2.30	.80	.40	.80	.00	2.20	.30	— .35	.00	.90
8	.70	2.60	2.20	.90	.30	.60	— .05	8.70	.20	— .40	.00	.70
9	.60	2.50	2.10	1.90	.20	.50	.10	6.50	.20	— .40	— .10	.50
10	.80	2.30	1.90	1.40	.30	.40	.10	5.00	.10	— .40	— .05	.50
11	1.20	2.80	1.50	1.00	.30	.40	.60	5.00	.00	— .35	— .05	.40
12	1.00	2.50	1.30	.80	.30	.00	.30	3.50	.00	— .35	— .05	.30
13	.90	2.20	1.10	.70	.20	.00	.20	3.00	.00	— .40	.10	.30
14	.80	2.00	1.20	.60	.10	.00	.20	1.20	— .05	— .40	.20	.30
15	.70	1.70	1.40	.60	.20	— .05[a]	.00	1.50	— .10	— .40	.20	.30
16	.80	1.40	1.20	.60	.20	— .05	— .05	1.40	— .10	— .40	.10	.30
17	1.30	1.20	1.00	.50	.10	— .05	— .10	.90	— .10	— .45	.10	.30
18	1.50	1.10	1.00	.50	.20	— .05	— .10	.50	— .10	— .45	.10	.20
19	1.40	1.20	.90	.40	.10	— .05	.10	.50	— .15	— .40	.10	.20
20	1.20	1.40	.90	.50	.10	— .05	.10	.40	— .20	— .40	.00	.20
21	1.00	1.50	.80	.40	.10	— .05	— .05	.30	— .15	— .45	.00	.20
22	1.10	2.60	.90	.40	.00	— .05	.20	.30	— .15	— .45	.10	.30
23	3.20	3.00	.90	.50	.00	— .05	.10	.30	— .20	— .45	.10	.20
24	3.00	2.90	.90	.40	.00	— .05	.80	.40	— .25	— .50	.20	.20
25	2.70	2.50	.80	.50	.00	— .05	1.00	.30	— .15	— .45	.20	.40
26	1.90	2.00	.90	.40	.00	.00	.40	.70	— .30	— .40	.10	.50
27	1.50	1.90	.90	.50	.00	.00	.20	.10	— .20	— .35	.10	.60
28	1.20	1.40	.80	.40	.00	.00	.10	.30	— .20	— .40	.10	1.30
29	1.10	1.20	.90	.40	.00	.40	.00	.60	— .25	— .35	.10	1.50
30	1.00	.....	.80	.50	.00	.40	.10	.50	— .25	— .35	.10	1.30
31	.90	.....	.80	.....	1.00	.....	.20	.30	.....	— .40	.....	1.10

[a] June 15 to 25 observer reported "below zero" but stated afterward that he did not think it went as much as 1 tenth below.

Rating table for Flint River near Woodbury, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
—0.50	120	1.00	1,005	3.00	3,410	5.00	6,520
— .45	135	1.10	1,115	3.10	3,545	5.20	6,880
— .40	150	1.20	1,225	3.20	3,680	5.40	7,260
— .35	165	1.30	1,340	3.30	3,820	5.60	7,640
— .30	180	1.40	1,455	3.40	3,960	5.80	8,040
— .25	195	1.50	1,570	3.50	4,100	6.00	8,450
— .20	210	1.60	1,685	3.60	4,240	6.20	8,880
— .15	225	1.70	1,800	3.70	4,390	6.40	9,320
— .10	240	1.80	1,920	3.80	4,540	6.60	9,780
— .05	260	1.90	2,040	3.90	4,690	6.80	10,260
.00	280	2.00	2,160	4.00	4,840	7.00	10,750
.10	320	2.10	2,280	4.10	5,000	7.20	11,250
.20	360	2.20	2,400	4.20	5,160	7.40	11,750
.30	410	2.30	2,520	4.30	5,320	7.60	12,250
.40	470	2.40	2,640	4.40	5,480	7.80	12,750
.50	540	2.50	2,760	4.50	5,650	8.00	13,250
.60	620	2.60	2,890	4.60	5,820	8.50	14,500
.70	705	2.70	3,020	4.70	5,990	9.00	15,750
.80	800	2.80	3,150	4.80	6,160	9.50	17,000
.90	900	2.90	3,280	4.90	6,340	10.00	18,250

The above table is well defined between —0.2 feet and 4.5 feet. Above this point the table is based on one measurement at 9.2 feet. It is based upon discharge measurements made during 1901–1904.

Estimated monthly discharge of Flint River near Woodbury, Ga., for 1904.

[Drainage area, 988 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	3,680	540	1,207	1.22	1.41
February	3,410	705	1,838	1.86	2.01
March	2,760	800	1,326	1.34	1.55
April	2,040	470	687	.695	.775
May	1,005	280	394	.399	.460
June	1,115	260	442	.447	.499
July	1,005	240	368	.372	.429
August	15,000	320	2,198	2.22	2.56
September	800	180	302	.306	.341
October	195	120	155	.157	.181
November	360	165	295	.299	.334
December	1,570	320	586	.593	.684
The year	15,000	120	816	.826	11.23

FLINT RIVER AT ALBANY, GA.

This station was originally established by the United States Weather Bureau on April 10, 1893, and has been maintained from that date to the present. The gage was washed out and replaced in 1898. It was again injured in 1902, and was replaced by a new gage on June 17, 1902, which was read for the first time on June 18. The new gage was set seventy-five hundredths of a foot lower than the old gage. The gage as it existed prior to June 17, 1902, is described in Water-Supply Paper No. 48, page 156. R. V. Watson was employed by the Weather Bureau to make and set the new gage, and it appears from Mr. Watson's description of this gage on June 17, 1902, that a certain bench mark cut in the lower iron pier of the county bridge and described in Paper No. 48, above referred to, as being 10 feet above zero of gage, was in reality only 9 feet and 3 inches above the zero of the old gage. As Mr. Watson set the new gage 10 feet below this bench mark, its zero is 9 inches lower than that of the old gage. The gage heights have been corrected from January 1 to June 17, 1902, inclusive, to correspond with the new gage, so that one rating table will apply to the whole year.

The following is Mr. Watson's description of the United States Weather Bureau gage: The name of the bridge to which the gage is attached is the Dougherty County Flint River Bridge, located at

Albany, Ga., about 700 feet below the Atlantic Coast Line Railway bridge. The gage is in three parts or sections. No. 1 is attached to the crib around the middle piers (the crib is filled with rocks, being 30 by 14 feet), and extends about 3 feet above ordinary low water. This section reads to 4 feet above zero. It is securely spiked to the wooden crib. Section No. 2 is securely spiked to a green cypress tree just above the bridge on the west bank of the river, and reads from 2 to 17 feet above the zero on No. 1. No. 3 is securely spiked to a cedar post 16 feet high, the post being put 3 feet into the firm ground. This section begins at 17 feet above the zero on No. 1 and reads to 32 feet, which is about 2½ feet above any high water known since 1840.

A 24-inch iron top locked box chain gage belonging to the United States Geological Survey was put in by W. E. Hall on April 20, 1904. The box is securely bolted to the iron lattice of the hand railing of the downstream footway of the Dougherty County Bridge, near the middle part of the west span of the bridge. The graduated scale is 24 feet long, and is bolted to the same latticework, the zero end being in contact with the end of the box, and the scale extending west toward the right bank. This gage was accurately set to correspond with the bench marks previously established, and its readings agree with the standard portion of the Weather Bureau gage. The bottom of the box is 45.34 feet above the zero of the gage, and the length of the chain from the bottom of the weight to the marker is 47.34 feet.

Discharge measurements by the Geological Survey were begun at this station in 1901, and the gage height records furnished by the Weather Bureau have been used, except for a portion of the year 1903. The present observer, D. W. Brosnan, is now paid by the United States Weather Bureau.

Discharge measurements are made from the two-span railroad bridge of the Atlantic Coast Line, which is 325 feet long, with 475 feet of trestle approach on the right bank and 240 feet on the left bank.

The initial point for soundings is the center of the tubular iron pier on the upstream side of the bridge on the left bank. The channel above the station is straight for about 1,000 feet and is rough. Below the station the channel is straight for 700 feet. The river overflows both banks, but only under the approaches to the bridge. The bed is constant, but is rough, and the current is irregular.

Bench mark No. 1 is a copper plug set in the downstream corner of the brick abutment on the right bank, under the Dougherty County Bridge. Its elevation is 33.81 feet above the zero of the gage. Bench mark No. 2 is the top of the first crossbeam from the right bank, upstream end of the railroad bridge. Its elevation is 43.20 feet above the zero of the gage. Bench mark No. 3 is a chisel mark on the tubular pier of the wagon bridge on the right bank, downstream side.

Its elevation is 10.00 feet above the zero of the gage. Bench mark No. 4 is the top of the third granite block of the Confederate monument at the center of Jackson and Pine streets. This is at the bottom of the polished block which bears the inscription. Its elevation is 61.09 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Flint River at Albany, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 6	F. A. Murray		4,249	4.38	13.68	18,630
May 21	M. R. Hall		5,352	4.32	16.80	23,120
July 3	F. A. Murray		2,283	3.38	5.65	7,744
September 18	M. R. Hall		4,124	4.03	13.06	16,640
October 14	do		1,488	2.34	1.90	3,484
December 22	F. A. Murray		1,757	2.92	3.25	5,035
1904.						
April 19	W. E. Hall	227	1,677	2.67	2.78	4,474
June 18	B. S. Drane	264	1,373	1.54	.25	2,111
September 22	J. M. Giles	221	1,342	1.52	.20	2,044
September 23	do	221	1,351	1.56	.20	2,104
November 15	B. S. Drane	271	1,455	2.08	1.11	3,030
November 16	do	271	1,428	2.14	1.20	3,056
November 21	do	269	1,384	1.86	.63	2,423
November 21	do	269	1,353	1.88	.61	2,378

Mean daily gage height, in feet, of Flint River at Albany, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.2	6.3	8.2	4.2	2.0	0.9	0.5	1.1	5.3	−0.1	−0.3	0.5
2	4.4	5.9	7.3	3.9	2.0	1.5	1.5	1.6	3.1	− .1	− .3	.6
3	4.2	5.6	6.7	3.7	1.9	2.6	1.5	1.6	2.2	− .1	− .2	.7
4	4.2	5.2	6.4	3.6	1.9	2.7	1.1	2.9	1.8	− .2	.1	1.6
5	4.1	5.0	6.3	3.4	2.4	2.4	.8	5.5	1.6	− .3	.5	2.8
6	4.0	4.7	6.6	3.2	2.5	1.9	.6	5.9	1.5	− .3	.8	3.6
7	3.9	4.8	7.0	3.3	2.2	1.5	.5	5.6	1.7	− .3	.9	3.6
8	4.4	5.2	7.3	4.1	1.9	1.3	.5	6.4	2.3	− .3	.8	3.5
9	4.7	6.4	7.3	5.0	1.7	1.1	.4	7.2	2.3	− .2	.6	3.4
10	5.1	8.8	7.8	5.4	1.6	1.3	.4	7.8	1.9	− .2	.4	3.1
11	6.0	12.9	8.1	5.9	1.6	1.2	.4	8.3	1.5	− .2	.3	2.6
12	6.4	16.9	8.1	5.9	1.6	1.0	.7	9.4	1.1	− .3	.3	2.4
13	7.0	19.2	7.5	5.4	1.5	.8	.9	10.8	1.0	− .3	.4	2.0
14	7.0	18.7	6.8	4.7	1.3	.7	1.1	12.2	.7	− .3	.7	1.8
15	6.8	17.2	6.4	3.8	1.3	.6	1.4	13.1	.6	− .3	1.1	1.6
16	6.4	15.8	6.2	3.4	1.3	.5	1.0	13.2	.6	− .3	1.2	1.5
17	6.0	14.8	6.2	3.2	1.4	.4	.7	12.1	.5	− .3	1.1	1.4
18	5.9	13.3	6.1	3.0	1.5	.3	.5	8.0	.4	− .4	.9	1.4
19	5.8	10.5	5.8	2.7	1.9	.2	.4	4.9	.4	− .4	.8	1.5
20	6.0	8.5	5.2	2.5	1.9	.2	.2	4.7	.3	− .4	.7	1.6
21	6.0	8.4	5.0	2.4	1.7	.2	.2	2.9	.2	− .4	.7	1.6
22	5.8	9.3	4.8	2.4	1.4	.1	.2	2.5	.2	− .4	.6	1.4
23	6.8	10.5	4.5	2.4	1.1	.3	.4	2.1	.2	− .4	.7	1.3
24	8.1	10.9	4.2	2.3	1.0	.5	.9	2.0	.2	− .4	.9	1.2
25	9.5	10.9	4.2	2.3	.8	.5	1.4	2.0	.1	− .4	1.1	1.2
26	9.7	10.6	4.1	2.2	.8	.4	1.2	2.2	.1	− .5	1.1	1.2
27	10.0	10.4	4.5	2.2	.7	.4	1.0	2.8	.1	− .5	1.0	1.2
28	10.4	10.1	5.0	2.1	.6	.3	1.2	4.0	.0	− .5	.9	1.6
29	10.3	9.4	4.9	2.0	.5	.3	1.0	4.1	.0	− .4	.7	2.3
30	9.0	.....	4.8	2.0	.6	.3	.7	6.0	.0	− .4	.6	3.2
31	7.0	.....	4.3	.....	.9	.....	1.0	6.4	.....	− .3	.....	4.1

Rating table for Flint River at Albany, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
—0.50	1,480	1.00	2,780	5.50	7,425	13.00	16,750
— .40	1,560	1.20	2,960	6.00	8,000	13.50	17,525
— .30	1,645	1.40	3,140	6.50	8,575	14.00	18,300
— .20	1,730	1.60	3,330	7.00	9,150	14.50	19,150
— .10	1,815	1.80	3,520	7.50	9,725	15.00	20,000
.00	1,900	2.00	3,710	8.00	10,300	15.50	20,850
.10	1,985	2.20	3,900	8.50	10,900	16.00	21,700
.20	2,070	2.40	4,100	9.00	11,500	16.50	22,550
.30	2,155	2.60	4,300	9.50	12,100	17.00	23,400
.40	2,240	2.80	4,500	10.00	12,700	17.50	24,300
.50	2,330	3.00	4,700	10.50	13,350	18.00	25,200
.60	2,420	3.50	5,225	11.00	14,000	18.50	26,100
.70	2,510	4.00	5,750	11.50	14,675	19.00	27,000
.80	2,600	4.50	6,300	12.00	15,350	19.50	27,950
.90	2,690	5.00	6,850	12.50	16,050	20.00	28,900

The above table is based upon eighteen discharge measurements made during 1902–1904. It is well defined between gage heights 0.0 foot and 6 feet. Above 6 feet the table is approximate.

Estimated monthly discharge of Flint River at Albany, Ga., for 1904.

[Drainage area, 5,000 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	13,220	5,645	8,553	1.71	1.97
February	27,380	6,520	13,550	2.71	2.92
March	10,540	5,860	8,068	1.61	1.86
April	7,885	3,710	5,175	1.04	1.16
May	4,200	2,330	3,215	.643	.741
June	4,400	1,985	2,683	.537	.599
July	3,235	2,070	2,587	.517	.596
August	17,060	2,870	7,949	1.59	1.83
September	7,195	1,900	2,872	.574	.640
October	1,815	1,480	1,629	.326	.376
November	2,960	1,645	2,457	.491	.548
December	5,860	2,330	3,723	.745	.859
The year	27,380	1,480	5,205	1.04	14.10

BIG POTATO CREEK NEAR THOMASTON, GA.

This station was established as a bench-mark station. It is located at the highway bridge, about 5 miles southwest of Thomaston, Ga., 200 yards above Daniel's old gristmill. Discharge measurements are made from the downstream side of the single-span iron bridge, which has trestle approaches of about 100 feet at each end. The initial point for soundings is the left end of the bridge on the downstream side. The channel is curved for about 200 feet above and straight for 300 feet below the station. The current is swift, except at very low stages. Both banks are subject to occasional overflow. The bed of the stream is composed of rock and gravel, free from vegetation, and probably constant. There is but one channel at all stages, broken during the higher water by the piers of the bridge. Bench mark No. 1 is the top of the downstream end of the first floor beam from the left bank. Its elevation is 23.00 feet above datum. Bench mark No. 2 is a chisel mark on the intermediate post at the downstream end of the second floor beam. Its elevation is 28.00 feet above datum.

Discharge measurements of Big Potato Creek near Thomaston, Ga., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 31	J. M. Giles	87	212	0.77	2.32	164
May 24	M. R. Hall	85	165	.36	1.75	60
July 6	W. E. Hall	80	132	.46	1.80	61
September 23	do	75	124	.40	1.74	49
September 23	do	75	124	.38	1.72	47
October 5	J. M. Giles	80	111	.38	1.69	43
October 5	do	40	36	1.41	1.70	50

MUCKALEE CREEK NEAR ALBANY, GA.

This station was established as a temporary station March 9, 1903, by F. A. Murray. It is located at the wagon bridge 3 miles north of Albany, Ga., and a short distance below the mouth of Kinchafoonee Creek. The gage is a vertical rod of 1 by 4 inch board nailed to a scantling, fastened to a tree on the left bank just above the bridge, and reads from zero to 14 feet. During 1903 it was read once each day by T. M. Nelson. Discharge measurements are made from the single-span highway bridge and its approaches. The initial point for soundings is the river side of the iron pier on the right bank, downstream side of the bridge. The channel is straight for 300 feet above the station and for 200 feet below. The current is regular and of

moderate velocity. Both banks are high and will not overflow. The bed is rocky and probably permanent. The river flows in one channel at all stages. Backwater from Flint River affects the discharge at high stages.

Bench mark No. 1 is the top of the upstream pier on the right bank; its elevation is 27.65 feet above the zero of the gage. Bench mark No. 2 is a copper plug set in a rock on the right bank about 40 feet below the bridge. Its elevation is 11.91 feet above the zero of the gage. The station was discontinued December 31, 1903, but has been maintained as a bench-mark station during 1904.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Muckalee Creek near Albany, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 6	F. A. Murray		992	5.18	6.60	5,141
May 22	M. R. Hall		1,005	2.81	7.40	2,829
July 2	F. A. Murray		582	2.53	1.88	1,473
September 19	do		907	4.62	6.22	4,195
October 15	M. R. Hall		364	1.76	.72	644
December 22	F. A. Murray		462	2.90	1 59	1,343
1904.						
April 22	W. E. Hall	80	443	2.37	1.45	1,051
June 18	B. S. Drane	80	350	1.20	.33	419
September 22	J. M. Giles	76	338	1.35	.35	455
November 16	B. S. Drane	90	391	2.13	.95	832

KINCHAFOONEE CREEK NEAR ALBANY, GA.

This station was established as a temporary station March 9, 1903, by F. A. Murray. It is located at the wagon bridge 3 miles north of Albany, Ga., 200 feet below the Central of Georgia Railroad bridge and about one-half mile above the mouth of the creek. The gage is a vertical rod fastened to the cypress tree on the left bank 100 feet above the bridge, and reads from zero to 10 feet. During 1903 it was read once daily by T. M. Nelson. Discharge measurements are made from the single-span highway bridge and its approaches, which cross the river at an angle to the direction of the current. The initial point for soundings is the center of the iron pier on the left bank, downstream side. The channel is curved both above and below the station. Both banks are high and all water passes beneath the bridge and its approaches. The bed is probably somewhat shifting.

Bench mark No. 1 is the top of the crossbeam 30 feet from the initial point for soundings on the upstream side of the bridge. Its elevation is 26.52 feet above the zero of the gage. Bench mark No. 2 is a copper plug set in a rock on the left bank about 25 feet below the bridge. Its elevation is 6.97 feet above the zero of the gage. Bench mark No. 3 is the top of the iron pier on the left bank, upstream side. Its elevation is 26.37 feet above the zero of the gage. The station was discontinued December 31, 1903, but has been maintained as a bench-mark station during 1904.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Kinchafoonee Creek near Albany, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 6	F. A. Murray		973	3.99	4.28	3,886
May 22	M. R. Hall		721	2.33	3.32	1,682
July 2	F. A. Murray		650	1.45	1.84	944
September 19	do		833	2.46	3.29	2,051
October 15	M. R. Hall		581	.73	.98	422
December 22	F. A. Murray		667	1.27	1.76	851
1904.						
June 18	B. S. Drane	88	594	.43	.62	258
September 22	J. M. Giles	66	462	.64	.65	296
November 16	B. S. Drane	89	649	.87	1.12	535

MISCELLANEOUS MEASUREMENTS IN APALACHICOLA RIVER DRAINAGE BASIN

The following is a list of miscellaneous discharge measurements made in Apalachicola River drainage basin during 1904:

Deep Creek near Clarksville, Ga.—This stream is a tributary of Soque River. A measurement was made May 13 from the wooden bridge on Burton road, about 3 miles from Clarksville.

Width, 25 feet; area, 26 square feet; mean velocity, 1.58 feet per second; discharge, 41 second-feet.

Bearerdam Creek near Clarksville, Ga.—This stream is a tributary of Soque River, entering from the right. A measurement was made May 13 from the bridge about 1 mile from Clarksville, on the road to Nacoochee, Ga. The bench mark is the top of the brace from hand-rail to large birch on the upper side of the bridge at the right bank, 12.00 feet above the datum of the gage.

Width, 22 feet; area, 12 square feet; mean velocity, 1.50 feet per second; gage height, 0.45 feet; discharge, 18 second-feet.

Hazel Creek near Demorest, Ga.—This stream is a tributary of Soque River, entering from the left. A measurement was made May 13 from the bridge 1 mile from Demorest, on the road to Porter Mills. The bench mark is the top of the upper end of second floorbeam from the right bank, 15.00 feet above the datum of the gage.

Width, 25 feet; area, 30 square feet; mean velocity, 1.47 feet per second; gage height, 1.85 feet; discharge, 44 second-feet.

Soque River near Clarksville, Ga.—Measurements were made from Wall's bridge, 2⅔ miles above Clarksville. The bench mark is the top of a nail driven into a large leaning birch tree about 20 feet above the bridge on the left bank, 6.00 feet above the datum of the gage.

March 17: Width, 36 feet; area, 65 square feet; mean velocity, 1.83 feet per second; gage height, 1.35 feet; discharge, 119 second-feet.

March 17: Width, 36 feet; area, 63 square feet; mean velocity, 1.82 feet per second; gage height, 1.35 feet; discharge, 115 second-feet.

May 13: Width, 36 feet; area, 62 square feet; mean velocity, 1.92 feet per second; gage height, 1.45 feet; discharge, 119 second-feet.

Soque River near Cornelia, Ga.—Measurements were made at McHalister's bridge, about 7 miles from Cornelia and 1 mile above the mouth of the river. The bench mark is the top of the downstream end of the first wooden floor beam from the left bank, 22.00 feet above the datum of the gage.

March 18: Width, 74 feet; area, 152 square feet; mean velocity, 1.62 feet per second; gage height, 1.85 feet; discharge, 246 second-feet.

July 16: Width, 72 feet; area, 88 square feet; mean velocity, 1.47 feet per second; gage height, 1.25 feet; discharge, 130 second-feet.

Rottenwood Creek near Vinings, Ga.—This stream enters Chattahoochee River from the right. Measurements were made by wading at a point about 200 feet above the old Thornton dam, and 2 miles above the mouth of the creek. The creek was believed to be at its lowest stage. The bench mark is a nail driven into rock on the right bank at the measuring section, marked "B. M." Its elevation is 3.00 feet above the datum of the gage.

October 4: Width, 9 feet; area, 6 square feet; mean velocity, 0.84 foot per second; gage height, 0.26 foot; discharge, 4.8 second-feet.

October 4: Width, 9 feet; area, 6 square feet; mean velocity, 0.82 foot per second; gage height; 0.26 foot; discharge, 4.9 second-feet.

October 4: Width, 9 feet; area, 6 square feet; mean velocity, 0.72 foot per second; gage height, 0.25 foot; discharge, 4.3 second-feet.

North Fork of Peachtree Creek near Armour, Ga.—A measurement was made May 20, from the Cheshire Bridge, 1½ miles above the Southern Railway bridge at Armour, Ga. The bench mark is the top of a bent nail in the bottom of the twelfth rail post from the right end of the bridge, 16.00 feet above the datum of the gage.

Width, 11 feet; area, 14 square feet; mean velocity, 1.71 feet per second; gage height, 0.90 foot; discharge, 24 second-feet.

Peavine Creek near Armour, Ga.—This stream is the South Fork of Peachtree Creek. A measurement was made May 20, from the wooden bridge on the Cheshire Bridge road, about 1 mile east of Armour, Ga. The bench mark is the top of the head of the upper bolt used to bolt the second rail post from the right end of the bridge to the stringer at the lower side of the bridge. Its elevation is 16.00 feet above the datum of the gage.

Width, 14 feet; area, 13 square feet; mean velocity, 1.23 feet per second; gage height, 0.85 foot; discharge, 16 second-feet.

Peachtree Creek at Armour, Ga.—This stream is a tributary of Chattahoochee River. A measurement was made May 20 from the Southern Railway bridge. The bench mark is the top of the middle stringer at its center on the downstream side of the bridge, 15.00 feet above the datum of the gage.

Width, 27 feet; area, 27 square feet; mean velocity, 1.22 feet per second; gage height, 0.17 foot; discharge, 33 second-feet.

Peachtree Creek near Brookwood, Ga.—Measurements were made at the wagon bridge 1 mile north of Brookwood, on the Peachtree road, and 6 miles north of Atlanta, Ga. The bench mark is the top of the iron plate on the first upright from the right end of the bridge, downstream side, 28.00 feet above the datum of the gage.

May 20: Width, 43 feet; area, 25 square feet; mean velocity, 1.52 feet per second; gage height, 0.68 foot; discharge, 38 second-feet.

April 9: Width, 44 feet; area, 37 square feet; mean velocity, 1.54 feet per second; gage height, 1.12 feet; discharge, 57 second-feet.

Nickajack Creek near Nickajack, Ga.—This stream enters Chattahoochee River from the right, about 1 mile below the old gaging station at Oakdale, Ga. The bench mark is the top of the second upstream iron girder from the left end of the bridge, 12 feet from the end which rests on the center pier, 15.00 feet above the datum of the gage. Measurements were made by wading about 100 feet above the Southern Railway bridge.

October 8: Width, 16 feet; area, 10 square feet; mean velocity, 1.00 foot per second; gage height, 0.92 foot; discharge, 10 second-feet.

October 8: Width, 16 feet; area, 11 square feet; mean velocity, 1.19 feet per second; gage height, 0.94 foot; discharge, 12.6 second-feet.

Sweetwater Creek near Lithia Springs, Ga.—This stream enters Chattahoochee River from the right below the old station at Oakdale, Ga. A measurement was made March 15 at Adair's bridge, 2 miles north of Lithia Springs, and above the regular station on Sweetwater Creek near Austell, Ga. The bench mark is the top of the downstream end of the cap of first wooden bent from the left end of the bridge, 10.00 feet above the datum of the gage.

Width, 66 feet; area, 295 square feet; mean velocity, 1.37 feet per second; gage height, 1.50 feet; discharge, 404 second-feet.

Sweetwater Creek near Austell, Ga.—A measurement was made March 15 at Ferguson's mill bridge 5 miles from Austell. The bench mark is a nail driven into the river side of a birch tree on the right bank 12 feet below the bridge, 5.00 feet above the datum of the gage.

Width, 129 feet; area, 484 square feet; mean velocity, 1.67 feet per second; gage height, 1.50 feet; discharge, 807 second-feet.

Flint River near Montezuma, Ga.—A measurement was made September 21 at the highway bridge, about 1 mile northwest of Montezuma. The bench mark is the top of the upstream pier at the left bank, which was 26.15 feet above the water surface. The gage height given is that taken from the temporary gage belonging to the United States Weather Bureau.

Width, 188 feet; area, 1,300 square feet; mean velocity, 0.75 foot per second; gage height, 10.63 feet; discharge, 971 second-feet.

Flint River near Concord, Ga.—A measurement was made September 24 from the wooden bridge 5 miles from Concord. The bench mark is the top of the first post from the right bank on the downstream side of the bridge, 12.00 feet above the datum of the gage.

Width, 92 feet; area, 184 square feet; mean velocity, 0.43 foot per second; gage height, 2.05 feet; discharge, 79 second-feet.

Flint River near Woodbury, Ga.—Measurements were made at Powell's bridge, 3 miles above the regular gaging station at Woodbury. The bench mark is the top of the right upstream post of first pier from the right bank, 15.00 feet above the datum of the gage.

January 16: Width, 139 feet; area, 527 square feet; mean velocity, 1.39 feet per second; gage height, 5.88 feet; discharge, 730 second-feet.

September 22: Width, 116 feet; area, 332 square feet; mean velocity, 0.43 foot per second; gage height, 4.54 feet; discharge, 144 second-feet.

October 4: Width, 115 feet; area, 314 square feet; mean velocity, 0.34 foot per second; gage height, 4.40 feet; discharge, 107 second-feet.

White Oak Creek near Riverview, Ga.—This stream enters Flint River from the right, about 13 miles above the regular gaging station on Flint River at Woodbury, Ga. A measurement was made March 29 at the double bridges one-half mile from Riverview. The bench mark is the top of the first post, 9.00 feet above the datum of the gage.

Width, 61 feet; area, 222 square feet; mean velocity, 0.50 feet per second; gage height, 2.36 feet; discharge, 112 second-feet.

White Oak Creek near Warnersville, Ga.—A measurement was made March 29 at the wagon bridge one-half mile west of Warnersville. The bench mark is the top of the first post on the downstream side of the bridge, 13.00 feet above the datum of the gage.

Width, 38 feet; area, 163 square feet; mean velocity, 0.71 foot per second; gage height, 1.25 feet; discharge, 115 second-feet.

Red Oak Creek near Woodbury, Ga.—This stream is tributary to Flint River, from the right, 3 miles above the regular gaging station

on Flint River at Woodbury. The bench mark is the top of the first post from the right-bank edge, downstream side, 15 feet from a large white oak tree. Its elevation is 20.00 feet above the datum of the gage. Measurements have been made from the wagon bridge on the road to Concord, about 4 miles from Woodbury, 1 mile above the mouth of the creek, as follows:

January 16: Width, 68 feet; area, 134 square feet; mean velocity, 1.24 feet per second; gage height, 4.12 feet; discharge, 166 second-feet.

October 4: Width, 18 feet; area, 27 square feet; mean velocity, 0.68 foot per second; gage height, 2.65 feet; discharge, 18 second-feet.

Big Potato Creek near Thomaston, Ga.—Before the section now adopted as a regular bench-mark station was found, two measurements of Big Potato Creek were made at the covered wagon bridge, 2½ miles from Thomaston, just below the Macon and Birmingham Railroad trestle. The bench mark is the top of the downstream lower stringer at sounding point 80. The elevation above gage zero is 15.00 feet.

January 15: Width, 82 feet; area, 188 square feet; mean velocity, 0.85 feet per second; gage height, 3.30 feet; discharge, 160 second-feet.

March 31: Width, 72; area, 175 square feet; mean velocity, 0.74 feet per second; gage height, 3.25 feet; discharge, 130 second-feet.

Blue Spring near Albany, Ga.—This spring is of considerable local note. It is about one-half mile from the left bank of Flint River, and about 4 miles below Albany, Ga. Measurements were made from the foot log over the outlet of the main spring as follows:

April 19: Width, 25 feet; area, 45 square feet; mean velocity, 3.00 feet per second; gage height, 3.29 feet; discharge, 135 second-feet.

September 23: Width, 28 feet; area, 30 square feet; mean velocity, 1.47 feet per second; gage height, 2.85 feet; discharge, 44 second-feet.

November 16: Width, 22 feet; area, 21 square feet; mean velocity, 1.24 feet per second; gage height, 2.77 feet; discharge, 26.4 second-feet.

CHOCTAWHATCHEE DRAINAGE BASIN.

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 the Choctawhatchee Bay to the Gulf of Mexico. Pea River is the principal tributary and enters from the west at Geneva, Ala. This branch is the longer of the two, measured above their junction, having its head in Bullock County near Union Springs, Ala. Double Bridges Creek is an important but small tributary lying between the main branches, and entering Choctawhatchee River just above the mouth of Pea River. These are all moderately swift streams, even at low water, and at places the fall is sufficient to make considerable shoals or rapids, and offer practicable sites for water-power developments. During 1904 the

United States Geological Survey established and maintained gaging stations on Choctawhatchee River near Geneva, Ala.; on Pea River at Pera, Ala., and on Double Bridges Creek at Geneva, Ala.

CHOCTAWHATCHEE RIVER NEAR GENEVA, ALA.

This station was established August 26, 1904, by M. R. Hall. It is located at a wagon bridge about 1 mile from Geneva and one-fourth mile from Eunola, Ala. The gage is an 8-foot vertical scale, graduated to feet and tenths, reading from 1 to 9 feet, and continued on the 2 by 6 inch scantling to which it is attached. This scantling is fastened to the upstream side of a heavy pile, which was a part of the right bent of the old bridge which occupied the same site as the new one. This pile is the second from the downstream end of a line of 5 set up and down stream. The gage is read once each day by James McGowan. Discharge measurements are made from the downstream side of the three-span iron drawbridge, having about 50 feet of trestle approach on either end. The initial point for soundings is the left end of the iron bridge on the downstream side. The channel is straight for 200 feet above and for one-half mile below the bridge. The current has a fair velocity. The right bank is a sand bluff about 27 feet high. There are a few trees on the face of the bluff and the top is wooded. The left bank is an overhanging rock cliff to a height of about 10 feet, above which it is sandy and slopes gradually to a total height of about 27 feet. Both banks are subject to overflow. The bed of the stream is composed of firm sand for the greater part, there being some rock at the left bank, and is clean and permanent. There is one channel at all but very high stages, when both banks overflow, and a second channel is formed by lower ground some distance from river on the right bank. The station is about three-fourths mile above the mouth of Double Bridges Creek and is also near the junction with Pea River. Backwater from both of these streams will affect the gage heights during times of unequal rise, and the station is maintained only temporarily for low-water measurements. Bench mark No. 1 is the top of the downstream end of the fourth floor beam from the right end of the bridge, this being the first beam from the left end of the span. Its elevation is 32.00 feet above the zero of the gage. Bench mark No. 2 is a large wire nail in the river side of a cypress tree on the right bank, about 140 feet below the bridge. Its elevation is 12.07 feet above the zero of the gage.

The station was discontinued on December 31, 1904.

Discharge measurements of Choctawhatchee River near Geneva, Ala., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
May 27	M. R. Hall	111	418	1.54	2.07	642
June 21	B. S. Drane	117	369	1.26	1.63	464
August 26	M. R. Hall	120	801	1.34	4.18	1,073
September 26	J. M. Giles	102	322	1.50	1.38	483
September 26	do	102	313	1.47	1.36	461
November 18	B. S. Drane	118	395	1.62	1.81	643
November 18	do	118	397	1.60	1.81	635

Mean daily gage height, in feet, of Choctawhatchee River near Geneva, Ala., for 1904.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.50	1.40	1.25	1.85	17	.....	1.70	1.15	1.85	2.70
2	.....	3.30	1.50	1.40	2.40	18	.....	1.70	1.20	1.90	2.90
3	.....	2.85	1.30	2.05	6.10	19	.....	1.65	1.30	1.75	2.80
4	.....	2.45	1.25	2.40	5.50	20	.....	1.65	1.25	1.80	2.70
5	.....	2.50	1.30	2.10	4.95	21	.....	1.60	1.25	1.70	2.70
6	.....	2.75	1.30	1.80	6.65	22	.....	1.50	1.30	1.85	2.60
7	.....	2.80	1.45	1.75	5.75	23	.....	1.50	1.25	2.40	2.50
8	.....	3.20	1.55	1.70	4.45	24	.....	1.60	1.10	2.30	2.50
9	.....	2.90	1.45	1.75	3.85	25	.....	1.55	1.10	2.10	2.50
10	.....	2.60	1.30	1.60	3.50	26	4.20	1.40	1.25	2.00	2.55
11	.....	2.45	1.30	1.65	3.40	27	4.30	1.45	1.30	1.90	4.40
12	.....	2.10	1.30	1.50	3.20	28	5.80	1.50	1.30	1.75	6.90
13	.....	2.00	1.35	1.95	2.90	29	6.20	1.45	1.30	1.80	5.50
14	.....	1.90	1.30	2.20	2.85	30	4.50	1.45	1.30	1.80	5.40
15	.....	1.80	1.25	1.95	2.80	31	3.90	.....	1.25	.....	5.45
16	.....	1.80	1.25	1.90	2.50						

DOUBLE BRIDGES CREEK AT GENEVA, ALA.

This station was established August 26, 1904, by M. R. Hall. It is located at the wagon bridge on the outskirts of Geneva, Ala., about three-fourths mile above the mouth of the creek. The gage is a vertical scale 9 feet long graduated to feet and tenths bolted to a 2-inch by 6-inch scantling which is spiked to the upstream side of a cypress tree on the left bank about 100 feet below the bridge. It is read once each day by James McGowan. Discharge measurements are made from the upstream side of the single span, iron bridge to which the gage is attached. The initial point for soundings is the upstream side of the left end of the iron bridge. The channel is curved for about 200 feet above, and straight for about 600 feet below the station. The current has a good velocity. Both banks are about 15 or 17 feet high, wooded except at bridge, and are subject to overflow. The bed of

the stream is composed of sand, and is clean except near the right bank where a half buried tree forms an obstruction. There is but one channel at all stages.

During high water the gage heights are affected by back water from Choctawhatchee River, and the station is maintained only temporarily for low-water measurements. Bench mark No. 1 is the bottom of the upstream end of the first floor beam from the left end of the bridge. Its elevation is 19.80 feet above the zero of the gage. Bench mark No. 2 is a chisel cut and white paint mark on the intermediate post 6 feet above bench mark No. 1. Its elevation is 25.80 feet above the zero of the gage.

Discharge measurements of Double Bridges Creek at Geneva, Ala., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
May 27	M. R. Hall	45	90	1.38	1.61	124
June 21	B. S. Drane	45	81	1.22	1.24	99
August 26	M. R. Hall	62	244	2.59	4.63	633
September 26	J. M. Giles	47	78	1.08	1.45	84
September 26	do	47	94	1.22	1.82	115
November 18	B. S. Drane	49	83	1.22	1.52	101
November 18	do	49	94	1.22	1.60	115

Mean daily gage height, in feet, of Double Bridges Creek at Geneva, Ala., for 1904.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.10	1.35	1.45	1.40	17	.....	1.40	.90	1.60	2.35
2	.....	2.50	1.25	1.80	3.35	18	.....	1.65	1.10	1.70	2.60
3	.....	2.20	1.00	2.70	5.90	19	.....	1.75	1.20	1.40	2.30
4	.....	2.10	1.00	2.70	4.80	20	.....	1.30	1.05	1.60	2.00
5	.....	2.10	1.30	2.10	5.25	21	.....	1.30	.85	1.60	1.95
6	.....	2.40	1.05	1.70	5.40	22	.....	1.20	.90	1.70	2.05
7	.....	2.50	1.45	1.65	4.30	23	.....	1.55	1.10	2.45	1.90
8	.....	2.85	1.70	1.40	2.95	24	.....	1.35	.90	2.30	2.10
9	.....	1.85	1.05	1.30	2.50	25	.....	1.45	1.00	1.90	1.90
10	.....	1.90	1.15	1.15	2.75	26	.....	1.25	.90	1.45	2.05
11	.....	1.80	1.15	1.40	2.60	27	4.90	1.40	1.05	1.75	2.05
12	.....	1.60	1.05	1.45	2.50	28	5.50	1.30	1.10	1.15	4.80
13	.....	1.40	1.15	2.40	2.00	29	4.60	1.30	1.30	1.70	4.80
14	.....	1.50	1.10	2.05	2.10	30	3.00	1.35	1.40	1.60	3.30
15	.....	1.30	.85	1.75	2.15	31	3.00	.....	1.10	.....	2.60
16	.....	1.40	1.10	1.60	2.05						

PEA RIVER AT PERA, ALA.

This station was established August 27, 1904, by M. R. Hall. It is located at the Elton wagon bridge, about one-half mile west of Pera,

Ala., a station on the Georgiana and Graceville Branch of the Louisville and Nashville Railroad. A chain gage is fastened to the top plank of the upstream fencing of the bridge, with the pulley end of the box abutted against the intermediate post over the second floor beam from the right bank. The scale is attached to the top of the plank. The length of the chain from the end of the weight to the marker is 48.20 feet. The gage is read once each day by W. G. Early, who is paid by the Alabama Geological Survey. Discharge measurements are made from the downstream side of the single-span bridge to which the gage is attached. The initial point for soundings is the outside of the down stream tubular iron pier at the right bank. The channel curves to the left about 150 feet above the station, which tends to throw the greatest current velocity along the right bank, and is straight below the station for about 1,000 feet. The current has a fair velocity. The right bank is composed of rock, vertical for about 20 feet from low-water level, and is free from vegetation. The left bank is composed of sand and mud, rising gradually. It is wooded above and below, but cleared at the bridge. Both banks are subject to overflow during extreme high water. The bed of the stream is composed of smooth rock toward the right bank and sand toward the left. There is one channel at all stages. Bench mark No. 1 is the top of the downstream end of the first floor beam from the right pier. Its elevation is 42.00 feet above gage datum. Bench mark No. 2 is a chisel mark on the intermediate post at downstream end of the first floor beam from right bank, 5 feet above bench mark No. 1. Its elevation is 47.00 feet above the datum of the gage. Bench mark No. 3 is the top of the upstream end of the second floor beam from the right bank. Its elevation is 42.03 feet above the datum of the gage. Bench mark No. 4 is a chisel mark on the post 4.97 feet above bench mark No. 3. Its elevation is 47.00 feet above gage datum.

Discharge measurements of Pea River at Pera, Ala., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
May 26	M. R. Hall	68	319	0.89	2.47	285
June 22	B. S. Drane	67	263	.74	1.80	194
August 27	M. R. Hall	81	446	1.77	4.66	790
September 27	J. M. Giles	64	161	1.18	1.59	190
September 27	do	64	157	1.20	1.60	189
November 17	B. S. Drane	70	204	1.50	2.32	307
November 17	do	70	206	1.49	2.34	308

Mean daily gage height, in feet, of Pea River at Pera, Ala., for 1904.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5.3	1.6	1.3	2.2	17	.....	2.3	1.3	2.2	3.3
2	.....	4.5	1.4	1.4	3.2	18	.....	2.1	1.3	2.2	3.4
3	.....	3.9	1.4	2.0	5.3	19	.....	1.9	1.4	2.1	3.5
4	.....	3.3	1.4	2.2	4.4	20	.....	1.5	1.4	2.2	3.4
5	.....	3.5	1.4	2.1	6.1	21	.....	1.6	1.4	2.1	3.3
6	.....	3.6	1.4	2.2	7.6	22	.....	1.8	1.4	2.3	3.3
7	.....	4.6	2.1	2.1	6.1	23	.....	1.5	1.3	2.6	3.2
8	.....	4.8	1.7	2.0	5.4	24	.....	1.4	1.2	2.4	3.1
9	.....	3.7	1.6	2.0	5.0	25	.....	1.6	1.2	2.4	3.0
10	.....	3.4	1.5	1.9	4.5	26	.....	1.5	1.3	2.4	3.2
11	.....	3.0	1.6	2.0	4.2	27	4.7	1.6	1.4	2.3	4.9
12	.....	2.8	1.6	1.8	4.0	28	6.9	1.6	1.3	2.3	7.6
13	.....	2.6	1.5	2.2	3.7	29	7.5	1.6	1.4	2.3	8.0
14	.....	2.4	1.5	2.3	3.6	30	7.1	1.6	1.4	2.2	7.0
15	.....	2.2	1.4	2.4	3.4	31	6.2	.....	1.4	.....	6.5
16	.....	2.3	1.5	2.3	3.3						

ESCAMBIA RIVER DRAINAGE BASIN.

Escambia River drains the south-central portion of Alabama and empties 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, and flows southwesterly throughout its 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 or rapids. During 1904 the United States Geological Survey established and maintained a gaging station on Conecuh River at Beck, near Andalusia, Ala.

CONECUH RIVER AT BECK, ALA.

This station was established August 24, 1904, by M. R. Hall. It is located at Simmons Bridge at Beck, Ala., and 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 railways. A chain gage is fastened to the channel-iron fencing post which is riveted to the upstream end of the first floor beam of the main span, 72 feet from the initial point for soundings. The gage box and scale are bolted to a 2-inch by 6-inch scantling, which is bolted horizontally to this post and the main end post. The length of the chain from the end of the weight to the marker is 53.50 feet. The gage is read once each day by W. R. Duggan, who is paid by the Ala-

bama Geological Survey. Discharge measurements are made from the upstream side of the iron bridge to which the gage is attached. The bridge consists of a main span 125 feet long with a 50-foot span at each end. The approach on the right bank is 50 feet of wooden and 90 feet of iron trestle; on the left bank, 20 feet of wooden trestle. The initial point for soundings is the end of the iron bridge at the left bank on the upstream side. The channel is straight for 600 feet above and for about one-half mile below the station. The current is fairly swift. Both banks are steep. The right bank is composed of rock to a height of about 8 feet, then earth covered with bushes to a total height of about 30 feet, and is subject to overflow. The left bank is composed of rock to a height of from 15 to 20 feet, then earth covered with bushes to a total height of about 35 feet, and overflows only at extreme high water. The bed of the stream is composed of fine sand, there being some smooth rock along the left bank. There are some sunken logs in the section which obstruct the current to some extent. There is one channel at all stages. Bench mark No. 1 is the top of the upstream end of the first iron floor beam of the main span from the left pier. Its elevation is 47.50 feet above gage datum. Bench mark No. 2 is the top of the iron channel-bar post to which the gage is fastened. Its elevation is 52.17 feet above the zero of the gage.

Discharge measurements of Conecuh River at Beck, Ala., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
May 26	M. R. Hall	110	274	1.17	1.67	320
June 24	B. S. Drane	109	231	1.03	1.18	238
August 24	M. R. Hall	115	392	1.50	2.63	588
September 28	J. M. Giles	108	232	1.06	1.20	245
September 28	do	108	237	1.03	1.20	244
November 19	B. S. Drane	111	245	1.19	1.40	292
November 19	do	111	245	1.18	1.40	290

Mean daily gage height, in feet, of Conecuh River at Beck, Ala., for 1904.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.50	1.10	0.80	1.50	17	.....	1.30	0.85	1.40	2.20
2	.....	2.80	1.00	.90	2.30	18	.....	1.40	.90	1.40	2.20
3	.....	2.90	1.00	1.45	2.60	19	.....	1.20	.95	1.40	2.10
4	.....	5.35	.70	1.40	2.65	20	.....	1.20	.95	1.35	2.00
5	.....	4.10	.80	1.25	4.00	21	.....	1.00	.80	1.35	2.00
6	.....	3.40	.85	1.25	3.70	22	.....	1.40	.80	1.70	1.80
7	.....	2.90	1.30	1.30	3.35	23	.....	1.30	.80	1.85	1.75
8	.....	2.30	1.00	1.35	3.30	24	3.60	1.20	.85	1.50	1.75
9	.....	2.20	1.00	1.35	3.00	25	4.70	1.20	.90	1.80	1.80
10	.....	2.20	1.05	1.30	2.90	26	3.10	1.00	.90	1.85	1.85
11	.....	2.00	.85	1.30	2.80	27	2.90	1.00	.90	1.70	1.95
12	.....	1.70	1.00	1.15	2.50	28	5.70	1.05	.90	1.70	4.40
13	.....	1.80	.95	1.35	2.40	29	4.50	1.05	.90	1.60	3.50
14	.....	1.60	.95	1.40	2.35	30	4.00	1.10	.85	1.60	3.60
15	.....	1.60	.80	1.20	2.20	31	3.50	.....	.85	.....	3.50
16	.....	1.50	.80	1.20	2.20						

MOBILE RIVER DRAINAGE BASIN.

This is the largest drainage basin in Georgia and Alabama, and is designated the Mobile basin because its waters all enter the Gulf through Mobile River at Mobile, Ala. It is formed as follows: Beginning at the headwaters, Cartecay and Ellijay rivers unite at Ellijay, Ga., to form Coosawattee River. Just above Resaca, Ga., this unites with the Conasauga to form Oostanaula River. At Rome, Ga., the Oostanaula and the Etowah unite to form Coosa River. Six miles above Montgomery, Ala., the Coosa and the Tallapoosa unite to form Alabama River; and not far from the coast the Tombigbee unites with the Alabama to form Mobile River, which flows into Mobile Bay, an arm of the Gulf of Mexico.

Cahaba River is the principal tributary of the Alabama and joins it about 10 miles below Selma. Hillabee Creek flows into Tallapoosa River just above Sturdevant and near Alexander. Talladega Creek is a tributary of the Coosa.

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 following pages give the results of the data collected in this drainage during 1904:

ALABAMA RIVER AT SELMA, ALA.

This station, which was originally established by the United States Engineer Corps, is now maintained by the United States Weather

Bureau. The station is at the iron highway bridge one block from Water street, Selma, Ala. The gage is in two sections. The first section, reading from − 3 to + 5.1 feet, is fastened to the lower side of the cofferdam on the second pier; the upper section, reading from 5.1 to 55 feet, is bolted to the draw pier. Discharge measurements are made from the bridge and the trestle approach on the left bank. The initial point for soundings is the end of the drawbridge on the right bank, upstream side. The channel above the station is slightly curved for 1,000 feet and straight for 2,000 feet below the station. The velocity is good and the current is regular. The right bank is high and rocky and will not overflow. The left bank is high, but overflows at extreme high water. The bed is mostly soft blue rock, and the water is confined to one channel. Bench mark No. 1 is an iron bolt driven into the rock bluff 182 feet from the first pier on the road leading up from the boat landing; its elevation is 26.00 feet above the zero of the gage and 88 feet above mean sea level. Bench mark No. 2 is the top of the capstone of the pivot pier. Its elevation is 56.00 feet above the zero of the gage. Bench mark No. 3 is the edge of the coping on the right bank abutment, just under the downstream side of the drawbridge; its elevation is 59.51 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Alabama River at Selma, Ala., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
April 10 [a]	J. M. Giles	497	12,600	4.69	22.35	59,100
June 19 [a]	do	401	5,461	3.44	6.45	18,820
November 11 [a]	do	258	3,298	2.51	1.00	8,290
1904.						
January 22 [b]	J. M. Giles	397	4,864	3.33	5.20	16,200
January 23 [b]	do	402	5,059	3.37	5.55	17,050
April 8 [b]	do	386	4,746	2.74	4.20	13,010
August 5 [b]	do	391	5,131	2.85	4.60	14,600
August 5 [b]	do	391	5,100	2.74	4.30	13,970
November 1 [a]	do	235	2,473	1.08	−2.20	2,665
November 1 [a]	do	235	2,492	1.12	−2.20	2,786

[a] Wagon bridge. [b] Measured at Louisville and Nashville Railroad bridge.

Mean daily gage height, in feet, of Alabama River at Selma, Ala., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.6	4.7	8.3	7.4	2.0	0.0	0.5	1.5	2.9	−1.3	−1.8	−0.9
2	1.1	4.0	7.0	6.5	2.1	1.3	3.9	2.0	2.0	−1.4	−1.8	− .9
3	1.0	3.8	6.1	5.7	2.1	2.8	2.8	3.6	1.6	−1.4	−1.8	− .9
4	1.0	3.8	5.7	5.1	2.0	3.0	2.6	4.5	1.2	−1.4	−1.6	− .8
5	1.0	3.6	5.5	4.6	1.9	2.8	2.6	4.8	1.2	−1.5	−1.6	− .6
6	.9	3.5	5.4	4.2	1.6	2.6	1.9	3.5	.9	−1.6	−1.6	− .1
7	.9	4.0	5.4	4.0	1.4	2.7	2.0	4.8	.6	−1.6	−1.6	.4
8	1.0	6.8	6.1	4.2	1.2	2.3	1.7	8.7	.3	−1.7	−1.6	.7
9	1.0	11.0	9.7	5.1	1.2	2.0	1.5	16.4	.3	−1.8	−1.8	2.0
10	1.9	15.6	11.0	6.5	1.2	2.2	.8	22.5	.4	−1.8	−1.8	3.4
11	2.6	19.6	10.8	7.4	1.1	2.2	1.3	22.9	.3	−1.8	−1.6	4.0
12	3.9	21.0	10.0	7.0	1.1	1.4	1.3	20.3	.2	−1.8	−1.6	4.5
13	5.2	21.5	9.0	7.2	1.1	.8	1.3	17.5	− .2	−1.8	−1.4	4.5
14	4.0	19.9	7.9	7.2	.8	.7	.9	15.6	− .4	−1.8	−1.4	4.0
15	3.6	17.0	7.0	6.4	1.4	.5	1.7	11.0	− .8	−1.8	−1.4	3.0
16	2.7	13.0	7.3	5.2	1.6	.2	2.0	9.1	− .9	−1.8	−1.4	2.5
17	2.8	9.9	9.4	4.1	1.6	.0	.8	7.5	− .9	−1.8	−1.4	2.0
18	3.7	7.6	11.0	3.8	1.4	− .3	.5	6.6	−1.0	−1.8	−1.4	1.5
19	4.1	6.1	11.3	3.1	1.0	− .3	− .1	5.8	−1.0	−1.8	−1.4	1.0
20	5.1	5.7	10.1	2.9	1.0	− .4	− .3	5.2	−1.2	−1.8	−1.4	1.0
21	4.5	6.0	8.9	2.8	.8	− .5	− .1	4.0	−1.2	−1.8	−1.4	.5
22	4.7	7.0	7.5	2.5	.5	− .6	.0	3.5	−1.3	−1.8	−1.4	.5
23	5.6	8.3	6.5	2.3	.5	−1.1	.1	2.7	−1.3	−1.8	−1.2	− .5
24	10.9	10.0	5.7	2.1	.2	−1.1	.6	2.0	−1.3	−1.8	−1.0	−1.4
25	12.9	11.8	5.1	2.1	.0	−1.1	.8	1.8	−1.4	−1.8	− .6	−1.6
26	12.0	12.0	5.8	2.0	.0	−1.1	.8	2.5	−1.4	−1.8	− .6	−1.6
27	10.9	12.6	8.0	1.9	− .2	−1.0	.7	3.0	− .9	−1.8	− .6	−1.6
28	9.7	10.8	9.4	1.9	− .4	− .6	.5	4.0	− .4	−1.8	− .6	.0
29	8.1	9.7	9.7	1.9	− .5	− .3	.4	3.7	− .7	−1.8	− .8	1.0
30	6.6	.....	9.2	1.9	− .5	− .3	.8	4.0	−1.2	−1.8	− .9	6.4
31	5.4	.....	8.3	.....	− .2	.....	.9	3.8	.....	−1.8	.....	6.7

Rating table for Alabama River at Selma, Ala., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
−2.20	2,700	−0.80	4,820	1.00	7,800	7.50	20,700
−2.10	2,850	− .70	4,980	1.50	8,700	8.00	21,800
−2.00	3,000	− .60	5,140	2.00	9,600	8.50	22,900
−1.90	3,150	− .50	5;300	2.50	10,550	9.00	24,000
−1.80	3,300	− .40	5,460	3.00	11,500	10.00	26,300
−1.70	3,450	− .30	5,620	3.50	12,450	11.00	28,600
−1.60	3,600	− .20	5,780	4.00	13,400	12.00	31,000
−1.50	3,750	− .10	5,940	4.50	14,400	13.00	33,450
−1.40	3,900	0.00	6,100	5.00	15,400	14.00	36,000
−1.30	4,050	.20	6,440	5.50	16,450	15.00	38,600
−1.20	4,200	.40	6,780	6.00	17,500	16.00	41,300
−1.10	4,350	.60	7,120	6.50	18,550	17.00	44,000
−1.00	4,500	.80	7,460	7.00	19,600	18.00	46,700
− .90	4,660						

The preceding table is fairly well defined to gage height 3.4 feet. The table has been extended beyond this limit. It is based upon discharge measurements made during 1900–1904. Above gage height 18 feet the rating curve is a tangent, the difference being 275 per tenth.

Estimated monthly discharge of Alabama River at Selma, Ala., for 1904.

[Drainage area, 15,400 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	33,200	7,630	14,830	0.963	1.11
February	56,320	12,450	27,160	1.76	1.90
March	29,320	15,610	21,890	1.42	1.64
April	20,480	9,420	14,130	.918	1.02
May	9,790	5,300	7,726	.502	.579
June	11,500	4,350	7,259	.471	.526
July	13,210	5,620	8,088	.525	.605
August	60,180	8,700	21,510	1.40	1.61
September	11,310	3,900	5,865	.381	.425
October	4,050	3,300	3,421	.222	.256
November	5,140	3,300	3,981	.258	.288
December	18,970	3,600	8,467	.550	.634
The year	60,180	3,300	12,030	.781	10.59

ETOWAH RIVER AT CANTON, GA.

This station was established in 1892 by the United States Weather Bureau. Measurements were begun in 1896 by the United States Geological Survey. It is located at the wagon bridge in Canton, Ga., one-half mile above the mouth of Canton Creek and 1,000 feet upstream from the Atlanta, Knoxville and Northern Railway station. The gage is a heavy vertical timber, bolted to the edge of the left-bank pier, on the upstream side. The foot marks are numbered with brass figures. The gage is read once each day by J. M. McAfee, who is paid by the United States Weather Bureau for six months of the year and by the Georgia Geological Survey for the other six months. Discharge measurements are made from the upstream side of the iron highway bridge, which is about 25 feet above low water, and to which the gage is attached. The initial point for soundings is the river side of the right-bank pier at the end of the main span. The channel is straight for 1,000 feet above and 500 feet below the bridge. The current is affected by a fish-trap dam about 1 foot high, which was constructed in 1902, and which has since caused some trouble by being occasionally washed away and built

up again. Up to 3 feet gage height the river is only 116 feet wide and flows between the piers on its lower banks. Up to about 14 feet it is confined between its upper banks, which are the abutments at the outer end of the approaches. Above this point it begins to overflow the bottom lands. The bed is fairly constant.

Bench mark No. 1 is a cut on a silver maple tree on the east side of the road, 20 feet from the end of the bridge on the south or left bank of the river; its elevation is 20.36 feet above the zero of the gage. Bench mark No. 2 is a cut on a persimmon tree 4 feet from the upper side of the bridge and 10 feet toward the river from the south end of the bridge; its elevation is 16.88 feet above the zero of the gage. Bench mark No. 3 is the center of the head of a large wire nail, driven horizontally in the side (toward the river) of a walnut tree on the east side of the road, 25 feet north of the north end of the bridge; its elevation is 18.52 feet above the zero of the gage. Bench mark No. 4 is the top of the iron bar on the top of the left-bank pier at the end of the center span of the bridge; its elevation is 23.39 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Etowah River at Canton, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
January 28	M. R. Hall		568	1.62	1.07	922
March 27	O. P. Hall		765	3.35	2.50	2,562
April 27	E. C. Murphy		669	2.80	1.80	1,873
June 25	M. R. Hall		563	2.07	.94	1,166
June 25	do		563	1.99	.93	1,119
September 4	do		520	1.10	.51	570
September 4	do		523	1.10	.51	575
October 10	do		525	.98	.60	513
1904.						
January 15	M. R. Hall	114	531	1.02	.50	542
March 3	O. P. Hall	113	529	1.55	.78	821
May 17	do	108	460	1.08	.18	497
July 26	M. R. Hall	105	437	.75	.04	328
July 26	do	105	438	.74	.04	324
September 1	O. P. Hall	109	437	.86	.06	374
October 8	M. R. Hall	105	398	.50	— .38	197
October 8	do	105	414	.55	— .25	227
October 13	O. P. Hall	107	385	.45	— .38	171

Mean daily gage height, in feet, of Etowah River at Canton, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.4	0.6	0.7	0.6	0.5	1.3	0.5	0.5	0.1	−0.4	0.0	0.4
2	.4	.6	.7	.6	.4	.6	.4	1.2	.1	− .4	.1	.4
3	.4	.6	.9	.6	.3	.3	.3	1.2	.1	− .3	.2	.4
4	.4	.6	.7	.4	.3	.1	.2	.5	.3	− .3	.3	.5
5	.4	.6	.7	.4	.3	.0	.6	2.5	.3	− .4	.4	.8
6	.4	.6	.7	.4	.2	.0	.4	.8	.3	− .3	.3	2.0
7	.5	.7	2.1	.7	.2	.5	.2	.4	.1	− .3	.2	.8
8	.5	1.6	1.7	1.0	.8	.2	.3	8.0	.0	− .3	.2	.6
9	.5	1.0	.9	.9	1.1	.0	.1	4.0	.0	− .4	.2	.6
10	.5	.6	.8	.8	.6	− .1	.0	1.0	.0	− .4	.2	.5
11	.6	.6	.8	.7	.3	− .1	.0	.8	− .1	− .3	.2	.6
12	.6	.6	.8	.7	.3	− .1	.2	1.1	− .1	− .3	.2	.5
13	.6	.7	.8	.6	.3	− .1	.8	.8	− .2	− .4	.4	.4
14	.6	.7	2.0	.5	.3	− .1	.3	.5	− .1	− .3	.6	.4
15	.5	.7	1.2	.5	.3	− .2	.1	.4	− .2	− .4	.4	.4
16	.5	.7	.8	.5	.2	− .2	.0	.3	− .3	− .3	.3	.4
17	1.1	.7	.8	.5	.2	− .2	.5	.3	− .3	− .3	.3	.4
18	.9	.6	.7	.5	.2	− .2	.2	.2	− .3	− .3	.3	.4
19	.7	.8	.7	.5	.2	− .3	.4	.1	− .3	− .3	.3	.4
20	.6	2.5	.6	.5	.1	− .3	.0	.2	− .3	− .3	.3	.4
21	.5	1.2	.6	.5	.1	.2	.0	.2	− .3	− .3	.3	.4
22	.7	2.6	1.2	.6	.0	.1	− .1	.0	− .3	− .2	.4	.5
23	1.7	1.0	.6	.5	.0	− .2	.1	.1	− .3	− .1	.7	.5
24	1.0	1.0	.6	.4	.0	− .3	.1	.7	− .4	− .2	.5	.5
25	.7	.8	.8	.4	.0	.1	.0	.5	− .4	− .1	.4	.6
26	.7	.8	.8	.5	− .1	.0	.1	.3	− .4	.0	.3	.6
27	.7	.7	.8	.5	− .1	− .1	− .1	.4	− .4	.0	.3	.6
28	.7	.6	.7	.5	− .2	.1	.0	.3	− .2	.0	.3	2.5
29	.8	.6	.7	.5	− .3	.6	.0	.1	− .2	.0	.3	1.0
30	.7	.....	.7	.5	− .3	3.8	.0	.1	− .3	.0	.3	.7
31	.6	.....	.6	.....	1.3	.....	.0	.0	.....	.0	.....	.6

Rating table for Etowah River at Canton, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
−0.50	170	−0.10	280	0.30	470	0.70	755
− .40	190	.00	320	.40	532	.80	840
− .30	215	.10	365	.50	600	.90	930
− .20	245	.20	415	.60	675	1.00	1,020

The above table is based upon discharge measurements made during 1902 to 1904. It is well defined between gage heights −0.5 foot and 1 foot. Estimates above 1-foot gage height are based on a tangent, the difference being 90 per tenth.

Estimated monthly discharge of Etowah River at Canton, Ga., for 1904.

[Drainage area, 604 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	1,650	532	720	1.19	1.37
February	2,460	675	916	1.52	1.64
March	2,010	675	914	1.51	1.74
April	1,020	532	650	1.08	1.20
May	1,290	215	469	.776	.895
June	3,540	215	479	.793	.885
July	840	280	418	.692	.798
August	7,320	320	979	1.62	1.87
September	470	190	278	.460	.513
October	320	190	236	.391	.451
November	755	320	480	.795	.887
December	2,370	532	724	1.20	1.38
The year	7,320	190	605	1.00	13.63

ETOWAH RIVER NEAR ROME, GA.

This station was established August 17, 1904, by M. R. Hall. It is located at Freeman's ferry, about 5 miles above Rome, Ga. The gage is in three sections. The first section is the original gage, reading from zero to 7 feet, securely attached to a sycamore tree at left edge of river, about 250 feet below the ferry. The second section, reading from 7 to 20 feet, is attached to a chestnut post located 10 feet upstream from the first section and 10 feet from the edge of the river (low water); post about 10 inches in diameter and 21 feet long, the bottom of the post extending to firm gravel, 1.50 feet below low-water surface. The hole is filled with stone and about one-third concrete, the concrete being at the bottom and near the surface of ground, 7 feet above the bottom of the post. The third section, reading from 20 to 30 feet, is attached to a maple tree opposite post, and 15 feet farther from the water's edge. Each section of the gage is of $1\frac{1}{4}$ by $2\frac{1}{2}$ inch heart pine, well painted, and graduated by V-shaped grooves, which are painted black. The gage is made up in 5-foot lengths, all of which are securely fastened to substantial supports. The gage is read once each day by Frank B. Freeman, who is paid by the Georgia Geological Survey. Discharge measurements are made from a small boat, the meter being suspended from the ferry cable. Measurements can be

made from the bridge at Rome, as no large quantity of water enters the river between the ferry and that place. Gage heights may be obtained at Rome by telephoning the observer. The initial point for soundings is the center of the windlass for the ferry cable on the left bank of the river. The channel is straight for about 3,000 feet above and for 1,000 feet below the station. The current is swift. There is a small shoal of rock about 50 feet below the gaging section. About 1,000 feet below there is an old fish-trap dam, but this has not been used for years and is probably constant. Both banks are high, but are subject to overflow during high water. The bed of the stream is composed of small rock and pebbles, and is uniform and permanent. There is but one channel at all stages, the water being about 2.5 feet deep at low water.

Bench mark No. 1 is head of lag screw driven in root of maple to which gage 20 to 30 feet is attached; elevation is 19.26 above datum. Bench mark No. 2 is head of nail driven in root at base of maple tree, 100 feet up river from gage; elevation, 22.18 feet. Bench mark No. 3 is center mark on copper plug set horizontally in brick wall of F. B. Freeman's residence, on east end of house, near northeast corner, just below floor level; elevation, 27.99 feet above datum.

Discharge measurements of Etowah River near Rome, Ga., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
August 18[a]	M. R. Hall	156	752	1.40	2.00	1,049
August 18[b]	do	295	748	1.42	2.03	1,064
September 27[b]	W. E. Hall	290	552	.85	1.37	470
October 15[b]	do	285	510	.78	1.26	397
November 8[b]	do	291	588	.98	1.50	574

[a] At Rome, Second Avenue Bridge.
[b] At Freeman's ferry, 5 miles above Rome.

Mean daily gage height, in feet, of Etowah River near Rome, Ga., for 1904.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.75	1.30	1.30	1.55	17	2.10	1.40	1.30	1.60	1.70
2	.....	1.75	1.30	1.30	1.55	18	2.05	1.40	a1.30	1.55	1.75
3	.....	1.70	1.25	1.50	1.60	19	2.10	1.40	1.25	1.55	1.70
4	.....	1.70	1.35	1.40	1.70	20	1.85	1.40	1.35	1.55	1.70
5	.....	1.75	1.30	1.50	1.80	21	1.80	1.40	1.30	1.55	1.65
6	.....	1.80	1.30	1.60	3.10	22	2.50	1.40	1.30	1.55	1.60
7	.....	1.70	1.30	1.55	3.00	23	1.70	1.40	1.30	1.60	1.60
8	.....	1.65	1.30	1.55	2.20	24	3.40	1.40	1.20	1.90	1.60
9	.....	1.60	1.25	1.55	1.90	25	a3.00	1.35	1.25	1.75	1.60
10	.....	a1.60	1.20	1.55	1.80	26	2.10	1.35	1.30	1.60	1.70
11	.....	1.60	1.35	1.40	1.90	27	a2.50	1.35	1.30	1.60	1.70
12	.....	1.60	1.35	1.40	1.95	28	2.80	1.35	1.30	1.55	3.00
13	.....	1.50	1.40	a1.50	1.80	29	2.30	1.35	1.30	1.55	3.40
14	.....	1.50	1.30	1.60	1.70	30	1.90	1.35	1.30	1.55	2.50
15	.....	1.50	1.30	1.75	1.70	31	1.90	.....	1.30	.....	2.00
16	.....	1.45	1.30	1.60	1.65						

a Interpolated (no record).

Rating table for Etowah River near Rome, Ga., from August 17 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.20	360	1.80	830	2.40	1,500	3.00	2,320
1.30	425	1.90	930	2.50	1,625	3.10	2,470
1.40	495	2.00	1,035	2.60	1,755	3.20	2,625
1.50	570	2.10	1,145	2.70	1,890	3.30	2,785
1.60	650	2.20	1,260	2.80	2,030	3.40	2,950
1.70	735	2.30	1,380	2.90	2,175		

The above table is based upon 5 discharge measurements made during 1904 and 1 made February, 1905. It is well defined.

Estimated monthly discharge of Etowah River near Rome, Ga., for 1904.

[Drainage area, 1,854 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
August (17–31)	2,950	735	1,384	0.746	0.416
September	830	460	588	.317	.354
October	495	360	423	.228	.263
November	930	425	614	.331	.369
December	2,950	610	1,027	.554	.639

COOSA RIVER AT RIVERSIDE, ALA.

This station was established September 25, 1896, by M. R. Hall. It is located at the Southern Railway bridge, Riverside, Ala., about 4 miles below Lock No. 4. The 24-inch boxed chain gage is fastened to the downstream guard rail at a point 570 feet from the initial point for soundings. The length of the chain from the marker to the end of the weight is 35.02 feet. The gage is read once each day by S. T. Waits. Discharge measurements are made from the railway bridge to which the gage is attached. The initial point for soundings is the water face of the abutment on the left bank, downstream side. Distances are marked on the guard rail with white paint. The channel is straight above the station for about 400 feet and below for about 3,000 feet. The current is swift, but is broken by a ledge of rock 300 feet above the bridge. The channel is 614 feet between bridge abutments and is broken by four piers. The width at ordinary stages is about 575 feet. Both banks are high; the left bank is liable to overflow, but all water passes beneath the bridge. The bed of the stream is rocky and permanent and not very rough.

Bench mark No. 1 is the capstone on the circular pier of the turn span, the elevation of which is 26.80 feet above gage datum. Bench mark No. 2 is a copper plug set in solid rock on the right bank, about 100 feet above the bridge. Its elevation is 11.95 feet above gage datum. The observer is paid by the Alabama Geological Survey.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Coosa River at Riverside, Ala., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Sec. feet.*
March 16	J. M. Giles	570	8,977	4.46	10.75	40,070
April 11	do	566	7,680	4.00	8.80	30,710
June 20	do	500	4,120	1.79	2.87	7,374
July 22	do	492	3,871	1.43	2.30	5,549
August 26	do	429	3,234	1.24	1.64	4,001
October 1	do	405	2,865	.94	1.05	2,687
November 13	do	430	3,113	1.01	1.37	3,136
1904.						
January 19	J. M. Giles	446	3,444	1.16	1.88	3,999
February 11	M. R. and W. E. Hall.	528	4,785	2.27	4.10	10,880
May 26	J. M. Giles	409	2,895	.94	1.25	2,714
June 27	do	407	2,861	.90	1.15	2,582
August 23	do	497	3,268	.97	1.45	3,174
September 20	A. T. Mitchelson.	488	2,947	.57	.60	1,681
September 21	do	485	2,788	.56	.53	1,557
November 2	J. M. Giles	433	2,625	.48	.38	1,250

Mean daily gage height, in feet, of Coosa River at Riverside, Ala., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.35	2.10	2.90	4.00	2.30	2.30	2.60	1.15	1.20	0.50	0.35	0.70
2	1.30	2.05	2.60	3.60	2.15	2.70	2.55	1.35	1.20	.50	.40	.80
3	1.30	2.05	2.45	3.40	2.10	2.80	2.30	1.50	1.20	.50	.45	.80
4	1.25	2.00	2.60	3.10	1.90	3.00	2.15	2.60	1.10	.50	.60	1.00
5	1.25	2.00	2.85	3.00	1.90	2.55	1.90	2.80	1.00	.50	.65	1.70
6	1.20	1.90	3.05	2.75	1.80	2.05	1.45	3.00	1.00	.55	.70	2.75
7	1.20	1.95	3.90	2.70	1.75	1.70	2.10	3.80	1.00	.60	.75	3.20
8	1.20	2.75	4.30	3.20	1.80	1.65	2.15	4.20	1.00	.60	.75	3.75
9	1.20	3.35	4.80	3.80	1.90	1.65	1.55	3.80	1.00	.55	.75	3.50
10	1.20	3.55	5.20	5.10	1.80	1.95	1.40	4.35	1.00	.50	.70	3.20
11	1.25	4.05	4.80	5.20	1.80	2.00	1.40	6.25	.95	.50	.70	3.00
12	1.30	3.95	4.30	4.90	2.60	1.70	1.40	5.40	.95	.50	.70	2.85
13	1.30	3.70	4.30	4.20	2.20	1.50	1.40	4.15	.85	.50	.65	2.60
14	1.30	3.35	4.30	3.50	2.10	1.30	1.25	3.20	.80	.45	.55	2.40
15	1.40	3.05	4.05	3.00	2.00	1.15	1.25	2.70	.70	.40	.55	2.00
16	1.45	2.90	4.00	2.80	1.70	1.15	1.25	2.55	.60	.40	.60	1.60
17	1.50	2.30	3.90	2.70	1.60	1.05	1.30	2.30	.60	.40	.70	1.30
18	1.80	2.35	3.70	2.60	1.50	1.05	1.30	2.15	.60	.40	.70	1.25
19	1.90	2.50	3.80	2.40	1.55	1.05	1.40	1.95	.60	.40	.65	1.20
20	2.10	2.90	3.80	2.40	1.50	1.00	1.65	1.75	.60	.35	.65	1.10
21	2.25	3.25	3.50	2.35	1.40	1.00	1.50	1.65	.75	.35	.65	1.10
22	2.50	3.80	3.20	2.25	1.35	1.00	1.30	1.50	.90	.35	.70	1.10
23	4.45	4.90	3.30	2.20	1.30	1.00	1.10	1.45	.90	.35	.75	1.10
24	5.10	5.45	5.30	2.20	1.30	1.40	1.10	1.35	.90	.35	.75	1.10
25	5.00	6.05	6.10	2.15	1.20	1.50	1.10	1.30	.75	.35	.75	1.10
26	4.30	5.80	6.85	2.15	1.20	1.40	1.15	1.25	.60	.35	.75	1.10
27	4.00	4.80	6.20	2.15	1.15	1.20	1.20	1.25	.60	.35	.75	1.70
28	3.70	3.80	5.90	2.40	1.15	1.00	1.20	2.00	.55	.35	.80	2.90
29	3.30	3.30	5.50	2.50	1.20	1.50	1.20	1.90	.55	.35	.80	3.75
30	2.55	.....	4.90	2.60	1.20	2.25	1.10	1.55	.55	.35	.80	5.00
31	2.30	.....	4.40	.....	1.80	.....	1.15	1.40	.....	.35	.....	5.20

Rating table for Coosa River at Riverside, Ala., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
.30	1,150	1.40	3,010	2.40	5,425	3.80	9,780
.40	1,300	1.50	3,215	2.50	5,695	4.00	10,480
.50	1,450	1.60	3,430	2.60	5,970	4.20	11,200
.60	1,605	1.70	3,655	2.70	6,250	4.40	11,920
.70	1,760	1.80	3,890	2.80	6,540	4.60	12,640
.80	1,920	1.90	4,130	2.90	6,835	4.80	13,360
.90	2,085	2.00	4,380	3.00	7,135	5.00	14,080
1.00	2,255	2.10	4,635	3.20	7,750	5.50	15,900
1.10	2,435	2.20	4,895	3.40	8,400	6.00	17,750
1.20	2,620	2.30	5,160	3.60	9,080	6.50	19.600
1.30	2,810						

The preceding table is based upon seven discharge measurements made during 1904 and several older measurements. It is well defined between gage heights 0.4 feet and 4 feet. The table has been extended beyond these limits.

Estimated monthly discharge of Coosa River at Riverside, Ala., for 1904.

[Drainage area, 7,065 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	14,440	2,620	5,228	0.740	0.853
February	17,940	4,130	8,391	1.19	1.28
March	20,900	5,560	11,370	1.61	1.86
April	14,800	4,765	7,462	1.06	1.18
May	5,970	2,527	3,676	.520	.600
June	7,135	2,255	3,598	.509	.568
July	5,970	2,435	3,314	.469	.541
August	18,680	2,527	6,118	.866	.998
September	2,620	1,528	1,987	.281	.314
October	1,605	1,225	1,351	.192	.221
November	1,920	1,225	1,713	.242	.270
December	14,800	1,760	5,127	.726	.837
The year	20,900	1,225	4,945	.700	9.52

OOSTANAULA RIVER AT RESACA, GA.

This station was maintained by the United States Geological Survey from August 1, 1896, to April 30, 1899. During this time it was also maintained by the United States Weather Bureau as a half-year station. The gage height records are now taken for the Weather Bureau during the entire year by their local observer, G. A. Norton. The station is located at the bridge of the Western and Atlantic Railway, which is in the town of Resaca, 800 feet south of the depot. A heavy timber gage is attached vertically to the downstream side of the center pier. Discharge measurements are made from the downstream side of the iron through bridge to which the gage is attached. The bridge consists of three spans of 120 feet each, and 480 feet of trestle approach at the left bank. The left bank span of the bridge is entirely outside of the river, except at high water. Measurements are also made from a boat at the ferry about 200 feet above the bridge, where the section is somewhat better. The initial point for soundings is the end of the bridge at the right bank, downstream side. The channel is slightly curved, the same curve extending about 300 feet above and below the bridge. The current is moderate, becoming rather sluggish at low water. The right bank is rock at the edge of water, and has solid stone abutment and railroad embankment, which is above high-water level. The left bank

is low, cultivated, and overflows during high water 480 feet to the end of the trestle. The bed of the stream is composed of rock near the right bank, but other parts appear to be sandy. To the left of the pier it is nearly filled up with logs and brush. There is one channel broken by one pier at ordinary water. Bench mark No. 1 is the top of the downstream end of the second crossbeam from the right bank. Its elevation is 28.94 feet above the datum of the gage. Bench mark No. 2, established March 14, 1905, is a cross mark on the top of the limestone bowlder on the north side of the river, about 130 feet from the end of the railroad bridge and 40 feet west of the railroad track. Its elevation is 34.23 feet above the datum of the gage.

COOSAWATTEE RIVER AT CARTERS, GA.

This river is formed by the junction of Ellijay and Cartecay rivers at Ellijay, Ga., and flows in a southwesterly direction, joining the Conasauga to form the Oostanaula. Its drainage area is for the most part mountainous and covered with forest growth. This station was established August 15, 1896, by M. R. Hall, at the iron highway bridge at Carters, Murray County, Ga., about 20 miles northeast of Calhoun, the most convenient railroad station. Carters is at the head of navigation, small boats running to Rome, Ga., and the Coosa River below. It is at the foot of the great shoals made by this stream in cutting through the Cohutta Mountains.

A standard chain gage is attached to the downstream side of the bridge in the third panel from the right bank. The original length of the chain before it was boxed was 37.08 feet from the end of the weight to the marker. On March 17, 1905, the gage was replaced by a boxed gage of the 24-inch iron top type, and the length of the chain was made 36.57 feet from the end of the weight to the marker, the datum remaining the same. The observer is R. P. Messer, a merchant at Carters, Ga., who is paid by the Georgia Geological Survey.

Discharge measurements are made from the single-span highway bridge and its approaches. The initial point for soundings is land side of the pier on the right bank. The channel is curved for 1,000 feet above and 500 feet below the station. The current is swift and broken. Both banks are high, but overflow at flood stages. The bed of the stream is of gravel, and is not liable to change.

Bench mark No. 1 is the top of the cylindrical iron pier at the right bank, downstream side. Its elevation is 30.35 feet above gage datum. Bench mark No. 2, established March 17, 1905, is a stone post set into the ground on the north side of the river about 300 feet from the end of the iron bridge and on the west side of the road leading toward Carter's mill. The elevation of the top of the post is 22.15 feet above the datum of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Coosawattee River at Carters, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 18	O. P. Hall		518	3.06	3.56	1,588
July 22	do		580	2.53	2.35	963
September 8	do		265	1.67	1.22	444
September 8	M. R. Hall		265	1.72	1.22	456
October 16	O. P. Hall		242	1.55	1.07	374
December 31	do		247	1.68	1.26	416
1904.						
March 15	O. P. Hall	118	418	2.50	2.60	1,045
May 26	do	107	252	1.70	1.30	427
June 25	do	107	220	1.46	.99	322
August 23	do	104	203	1.54	.85	312
September 27	do	83	181	1.12	.50	202
December 21	do	102	191	1.44	.82	275
December 21	M. R. Hall	100	186	1.26	.73	235

Mean daily gage height, in feet, of Coosawattee River at Carters, Ga., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.20	1.50	1.70	2.20	1.70	2.00	1.10	5.00	0.80	0.50	0.40	2.00
2	1.10	1.50	1.70	2.20	1.70	1.80	1.00	2.00	.70	.50	.40	2.20
3	1.40	1.50	1.70	2.10	1.70	1.50	1.00	1.50	.70	.50	.40	1.80
4	1.10	1.50	3.50	2.00	2.00	1.30	1.00	1.30	.70	.45	.70	1.60
5	1.10	1.40	3.75	1.90	1.80	1.20	1.00	1.60	.90	.45	.60	1.80
6	1.10	1.30	3.00	1.90	1.70	3.10	1.40	1.20	.80	.45	.60	1.60
7	1.10	1.40	3.00	1.90	1.70	3.00	1.30	1.10	.70	.45	.50	1.40
8	1.10	2.80	2.50	4.00	4.45	2.00	1.80	1.60	.70	.45	.50	1.30
9	1.10	2.60	2.20	3.00	3.00	1.80	1.50	2.00	.60	.40	.50	1.20
10	1.10	1.80	2.10	2.50	2.00	1.60	1.20	1.50	.60	.40	.50	1.10
11	1.30	1.60	2.00	2.30	1.80	1.30	1.00	1.40	.60	.40	.40	1.00
12	1.30	1.50	1.90	2.20	1.70	1.30	2.05	1.30	.60	.40	.40	1.00
13	1.30	1.50	1.80	2.00	1.70	1.20	1.70	1.10	.50	.40	.40	1.00
14	1.30	1.40	4.80	1.90	1.70	1.20	1.20	1.00	.50	.40	.40	.90
15	1.20	1.70	2.80	1.90	1.60	1.20	1.00	1.00	.70	.40	.40	.90
16	1.30	1.70	2.20	1.90	1.60	1.20	1.00	1.00	.60	.40	.40	.90
17	2.80	1.60	2.10	1.80	1.60	1.10	1.80	1.00	.60	.40	.40	.85
18	1.90	1.60	2.00	1.80	1.60	1.10	1.30	1.00	.50	.40	.40	.85
19	1.50	3.40	1.80	1.80	1.50	1.10	1.00	.90	.50	.40	.40	.85
20	1.40	3.00	1.80	1.80	1.50	1.00	1.00	.90	.40	.40	.40	.85
21	1.40	2.30	1.80	1.80	1.50	3.00	.90	.90	.40	.40	.40	.85
22	4.35	4.80	2.00	1.80	1.50	2.00	1.80	.80	.40	.40	.50	.85
23	3.00	3.50	5.20	1.80	1.40	1.50	1.50	.80	.50	.40	.60	.80
24	2.30	2.40	3.80	1.70	1.40	1.20	1.00	.80	.50	.40	.60	.80
25	2.00	2.20	2.90	1.70	1.30	1.00	1.00	.90	.50	.40	.60	1.00
26	1.70	2.10	2.80	4.00	1.30	1.00	1.00	1.00	.45	.40	.60	1.30
27	1.60	2.00	2.80	2.50	1.30	1.00	.90	.90	.50	.40	.60	3.90
28	1.50	1.80	2.60	2.00	1.20	1.20	1.10	1.00	.50	.40	.50	4.00
29	1.50	1.80	2.50	1.80	1.20	1.20	1.00	.90	.50	.40	.50	2.00
30	1.50	.....	2.40	1.70	1.20	1.80	1.00	.90	.50	.40	1.80	1.80
31	1.50	.....	2.30	.....	3.70	.....	.90	.80	.....	.40	.....	1.80

Rating table for Coosawattee River at Carters, Ga., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.40	184	1.80	650	4.20	2,000	9.50	5,790
.50	202	1.90	698	4.40	2,130	10.00	6,150
.60	222	2.00	747	4.60	2,270	11.00	6,870
.70	244	2.20	848	4.80	2,410	12.00	7,590
.80	269	2.40	952	5.00	2,550	13.00	8,310
.90	296	2.60	1,058	5.50	2,910	14.00	9,030
1.00	326	2.80	1,166	6.00	3,270	15.00	9,750
1.10	358	3.00	1,275	6.50	3,630	16.00	10,470
1.20	393	3.20	1,385	7.00	3,990	17.00	11,190
1.30	430	3.40	1,500	7.50	4,350	18.00	11,910
1.40	470	3.60	1,620	8.00	4,710	19.00	12,630
1.50	512	3.80	1,740	8.50	5,070	20.00	13,350
1.60	557	4.00	1,870	9.00	5,430	21.00	14,070
1.70	603						

The above table is based upon seventeen discharge measurements made during 1902, 1903, and 1904. It is well defined between gage heights 0.5 foot and 4.5 feet. The table has been extended beyond these limits to gage height 5.5. Above gage height 4.8 feet the rating curve is a tangent, the difference being 73 per tenth.

Estimated monthly discharge of Coosawattee River at Carters, Ga., for 1904.

[Drainage area, 531 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	2,097	358	575	1.08	1.24
February	2,410	430	791	1.49	1.61
March	2,694	603	1,063	2.00	2.31
April	1,870	603	823	1.55	1.73
May	2,165	393	659	1.24	1.43
June	1,330	326	549	1.03	1.15
July	772	296	408	.768	.885
August	2,550	269	453	.853	.983
September	296	184	220	.414	.462
October	202	184	187	.352	.406
November	650	184	215	.405	.452
December	1,870	269	524	.987	1.14
The year	2,694	184	539	1.01	13.80

CARTECAY RIVER NEAR CARTECAY, GA.

This station was established June 27, 1904, by M. R. Hall. It is located at the Cartecay Bridge on the public road 6 miles southeast (upstream) from Ellijay, Ga., and 1½ miles northwest from Cartecay, Ga. Turkey Creek enters from the south side and Owltown Creek from the north side between this point and Ellijay. There is probably no considerable interference from dams above the station. The gage is a vertical 10-foot timber, graduated to feet and tenths, fastened to a 2-inch by 4-inch oak scantling, which is spiked to the sill and downstream post of trestle bent at the right bank. The gage is read once each day by S. A. Burrell, who is paid by the Georgia Geological Survey. Discharge measurements are made from the downstream side of the single 60-foot span wooden bridge to which the gage is attached. The bridge has an approach on the right bank of 24 feet and on the left bank of 26 feet. The floor is about 16 feet above low water. The initial point for soundings is the edge of the abutment on the right bank, downstream side. The channel is straight for about 500 feet above and below the station. The current is swift. Both banks are high, but are subject to overflow. The bed of the stream is composed of rock and is permanent, the water flowing in one channel. The bench mark is the top of the downstream end of the first floor beam from the right bank, marked by nails and white paint. Its elevation is 16.50 feet above the zero of the gage.

Discharge measurements of Cartecay River near Cartecay, Ga., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
May 9	O. P. Hall	55	78	2.26	1.30	176
June 27	do	53	50	1.72	.90	86
August 31	do	53	50	1.88	.85	94
October 12	do	48	38	1.84	.65	70
December 13	M. R. Hall	52	46	1.70	.80	78

Mean daily gage height, in feet, of Cartecay River near Cartecay, Ga., for 1904.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.10	1.10	0.80	0.90	0.75	1.15	17	1.30	1.30	1.30	0.70	0.75	0.90
2	1.10	1.20	.85	(a)	.80	.90	18	1.50	1.25	2.10	.70	.80	.85
3	1.30	2.40	1.20	(a)	.80	1.10	19	3.05	3.55	.90	.75	.85	.80
4	1.50	1.65	1.10	(a)	.85	1.00	20	3.05	2.15	.90	.60	.90	.75
5	1.70	2.30	.90	(a)	.90	1.50	21	2.20	1.90	.85	.65	.80	.75
6	1.75	2.85	.90	(a)	.80	1.20	22	1.70	1.70	.80	.75	.95	.70
7	3.30	1.90	.85	(a)	.85	1.20	23	1.60	1.30	2.30	.75	.95	.70
8	2.20	1.70	.80	(a)	.90	1.10	24	2.20	1.25	2.15	.75	.90	.90
9	1.40	1.50	1.40	(a)	.95	1.00	25	1.95	3.35	.95	.65	.85	1.10
10	1.30	1.45	.85	(a)	.90	1.00	26	1.30	2.70	1.90	.60	.80	.90
11	1.35	1.40	.80	(a)	1.20	.90	27	1.25	1.60	.80	.65	.80	.90
12	3.50	2.65	.80	.65	1.30	.90	28	1.70	1.15	.80	.70	.85	2.50
13	5.40	2.10	.85	(a)	1.10	.80	29	1.25	1.10	1.20	.75	.85	2.20
14	2.30	1.70	.80	(a)	.95	.80	30	1.10	.90	.90	.70	1.30	1.20
15	2.10	1.50	.75	(a)	.90	.85	31	.....	.85	.....	.70	.....	.90
16	1.30	1.35	.80	(a)	.80	.85							

a Missing.

ELLIJAY RIVER NEAR ELLIJAY, GA.

This station was established June 28, 1904, by M. R. Hall for the purpose of making a series of miscellaneous measurements. It is located at a wagon bridge about one-half mile east of Ellijay, Ga., and about the same distance above the junction of Ellijay and Cartecay rivers. A section of gage staff, graduated by feet and tenths from 2 to 6 feet, is nailed to the downstream vertical post at the right bank, and a bench mark established for reference. Regular gage readings are not maintained. Discharge measurements are made from the open wooden wagon bridge, having two 40-foot spans and 50-foot approaches on each bank. The initial point for soundings is the end of the bridge at right bank, on the downstream side. Both banks are straight for about 500 feet above and below the station. The right bank is about 12 feet high and the left bank is about 10 feet high. Both banks are bordered by fields and are subject to overflow. There is one channel broken by one wooden pier. The bed of the stream is composed of rock, partly sloping, and the current ranges from very swift above the station to sluggish below. The bench mark is a small nail and white paint mark in downstream vertical post at right bank. Its elevation is 7.00 feet above the gage datum.

Discharge measurements of Ellijay River near Ellijay, Ga., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
December 9	O. P. Hall	65	56	1.36		76
1904.						
May 10	O. P. Hall	74	90	1.71	1.80	154
June 28	do	66	61	1.54	1.35	94
August 30	do	68	56	1.22	1.22	68
October 12	do	56	41	1.03	1.07	42
December 14	M. R. Hall	66	50	1.32	1.20	66

MOUNTAINTOWN CREEK NEAR ELLIJAY, GA.

This station was established as a bench-mark station May 10, 1904, by O. P. Hall. It is located at the covered bridge known as Charles Bridge, about 4 miles west of Ellijay, Ga., and about the same distance above the mouth of the creek. The bridge consists of a single span of 54 feet, with short trestle approaches at either end. Discharge measurements are made from the bridge, the meter being lowered through holes in the floor, or from a foot log a half mile below the bridge. The initial point for soundings is the end of the trestle approach at the right bank. The channel is straight for about 500 feet above and 100 feet below the station and the current is swift. Both banks are high and not liable to overflow. The bed of the stream is rocky. The water is shallow and swift at the bridge, the better section being at the foot log below the bridge. The bench mark is a nail driven into the vertical post of the main bent under the right end of the bridge, 6 feet above the top of the mud sill of the bent. Its elevation is 7.00 feet above datum.

Discharge measurements of Mountaintown Creek near Ellijay, Ga., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
May 10	O. P. Hall	60	51	3.08	1.17	157
August 31	do	52	34	2.32	.85	79
October 12	do	26	44	.70	.75	31

TALKING ROCK CREEK NEAR CARTERS, GA.

This station was established as a bench-mark station May 26, 1904, by O. P. Hall, though numerous measurements of the creek have pre-

viously been made by M. R. Hall and O. P. Hall in connection with measurements of the Coosawattee River station. It is located about 3 miles above the mouth of Talking Rock Creek and about the same distance east of Carters, Ga. Discharge measurements are made from a boat just above R. L. Hill's boat landing or by wading at a shoal a short distance below. Both banks are high and will probably not overflow. There is one channel at all stages. The section is a good one. The bench mark is a nail in a large elm tree on the left bank at R. L. Hill's boat landing. Its elevation is 7.50 feet above datum.

Discharge measurements of Talking Rock Creek near Carters, Ga., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
May 26	O. P. Hall	59	103	0.48	1.24	49
June 25	do	58	97	.35	1.08	34
August 23	do	22	18	2.22	1.07	40

CHOCCOLOCCO CREEK NEAR JENIFER, ALA.

The gage at this station was established August 20, 1902, by J. M. Giles. Measurements were first made by J. R. Hall in 1900. It is located at the Louisville and Nashville Railroad bridge, 1¼ miles north of Jenifer, Ala. There are small shoals both above and below the bridge. The gage consists of a vertical 1 by 4 inch pine plank, nailed to a 3 by 8 inch pine timber which is spiked to a birch tree 20 feet upstream from the bridge on the left bank. It reads from 0.30 to 10 feet. The observer is W. J. Tolbert, who is paid by the Alabama Geological Survey. Discharge measurements are made from the single-span bridge and its trestle approach on the right bank. The initial point for soundings is the end of the bridge on the left bank, and distances are marked with white paint on the upstream guard rail. The channel is straight for 1,500 feet above and below the station and has a width between abutments of 145 feet and 100 feet at low water. The right bank overflows at a gage reading of about 6 feet. The left bank is high and will not overflow except under the bridge. The bed is rocky and not likely to change.

Bench mark No. 1 is the top of a crossbeam at a point 50 feet from the initial point for soundings. Its elevation is 23.00 feet above the zero of the gage. Bench mark No. 2 is a copper plug in the upstream wing of the left abutment; its elevation is 14.19 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Choccolocco Creek near Jenifer, Ala., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
July 23	J. M. Giles	96	158	1.17	2.25	186
July 23	do	96	157	1.14	2.25	180
August 20	do	98	158	1.16	2.26	183
August 25	do	99	174	.84	2.12	146
October 2	do	85	115	.78	1.82	90
November 14	do	96	125	1.04	2.08	130
1904.						
January 20	J. M. Giles	95	144	.97	2.09	139
February 12	W. E. Hall	105	228	1.71	2.82	391
February 12	M. R. Hall	105	219	1.75	2.85	383
February 20	Murphy and Giles	100	220	1.74	2.72	382
March 10	W. E. Hall	100	183	1.29	2.40	236
May 27	J. M. Giles	85	115	.72	1.80	83
July 20	W. E. Hall	85	128	.94	1.99	120
August 24	J. M. Giles	90	134	.92	1.94	123
August 30	do	90	135	.92	1.95	124
September 22	A. T. Michelson	90	116	.79	1.71	92
October 12	J. M. Giles	86	128	.81	1.83	103
October 12	do	86	127	.78	1.80	99
November 26	do	86	128	.73	1.75	93
November 26	do	86	129	.79	1.86	102

Mean daily gage height, in feet, of Choccolocco Creek near Jenifer, Ala., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.90	2.10	2.30	2.10	2.10	2.20	2.10	1.90	1.80	1.65	1.40	1.50
2	1.90	2.10	2.30	2.10	2.00	2.20	2.00	2.00	1.80	1.70	1.40	1.60
3	1.90	2.10	2.30	2.15	2.00	2.10	2.20	2.00	1.80	1.70	1.60	1.70
4	2.00	2.10	2.20	2.10	2.00	1.90	1.90	2.00	1.80	1.60	1.70	1.70
5	1.90	2.10	2.20	2.10	2.00	1.85	1.80	2.80	2.10	1.60	1.70	1.80
6	1.90	2.10	2.20	2.15	2.00	1.85	1.80	2.20	2.00	1.60	1.80	2.00
7	1.90	2.30	2.60	2.10	2.00	1.80	1.80	3.50	1.90	1.60	1.70	2.20
8	1.90	3.30	2.60	2.60	2.00	1.80	1.80	3.60	1.80	1.50	1.70	1.90
9	1.90	3.40	2.50	2.80	2.15	1.90	1.90	3.40	1.75	1.60	1.65	1.85
10	1.90	2.80	2.40	2.50	2.15	1.80	2.00	2.70	1.75	1.50	1.60	1.80
11	1.90	2.90	2.30	2.40	2.00	1.80	2.10	2.70	1.80	1.50	1.50	1.80
12	2.00	2.80	2.30	2.30	1.90	1.80	1.90	4.00	1.80	1.50	1.40	1.80
13	2.00	2.60	2.30	2.20	1.90	1.80	1.80	3.00	1.80	1.50	1.70	1.80
14	2.00	2.50	3.00	2.20	1.90	1.80	1.80	2.50	1.70	1.50	1.70	1.70
15	1.90	2.40	3.00	2.20	2.00	1.75	1.80	2.30	1.70	1.50	1.60	1.70
16	1.90	2.30	2.85	2.10	1.90	1.75	1.80	2.40	1.70	1.50	1.60	1.70
17	2.20	2.30	2.60	2.10	1.80	1.75	1.80	2.20	1.65	1.60	1.60	1.70
18	2.30	2.20	2.50	2.10	1.80	1.70	1.80	2.20	1.70	1.50	1.60	1.90
19	2.20	2.20	2.40	2.10	1.80	1.70	1.70	2.00	1.70	1.50	1.60	1.75
20	2.00	2.60	2.35	2.10	1.80	1.70	2.00	2.00	1.65	1.50	1.60	1.70
21	1.90	2.80	2.30	2.10	1.80	1.75	1.80	1.95	1.70	1.50	1.70	1.60
22	2.40	2.80	2.30	2.10	1.80	1.80	1.75	1.95	1.65	1.50	1.70	1.60
23	3.40	3.30	2.30	2.00	1.80	1.75	1.80	1.95	2.10	1.50	1.80	1.60
24	2.80	3.20	2.25	2.00	1.75	1.80	1.75	1.90	2.20	1.40	2.00	1.60
25	2.40	2.80	2.20	2.00	1.80	2.00	1.70	1.90	2.00	1.40	1.80	1.70
26	2.20	2.60	2.20	2.05	1.80	1.90	1.65	1.90	1.80	1.40	1.75	1.80
27	2.10	2.50	2.20	2.20	1.75	1.80	1.70	2.75	1.80	1.40	1.70	1.80
28	2.10	2.50	2.25	2.25	1.80	1.80	1.70	2.10	1.70	1.40	1.70	2.70
29	2.10	2.40	2.20	2.15	1.80	2.50	1.70	2.00	1.70	1.40	1.70	2.60
30	2.10	.....	2.10	2.00	1.80	2.60	2.25	1.95	1.65	1.50	1.60	2.10
31	2.10	.....	2.15	.....	2.00	.....	1.90	1.95	.....	1.50	.....	2.00

Rating table for Choccolocco Creek near Jenifer, Ala., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.40	62	1.90	113	2.40	230	2.80	383
1.50	68	2.00	130	2.50	263	2.90	430
1.60	76	2.10	150	2.60	300	3.00	480
1.70	86	2.20	173	2.70	340	3.10	530
1.80	98	2.30	200				

The above table is based upon twenty discharge measurements made during 1903–4. It is well defined between gage heights 1.70 feet and 2.80 feet. Estimates above 3.1 feet are based upon a tangent with a difference of 55 per tenth.

Estimated monthly discharge of Choccolocco Creek near Jenifer, Ala., for 1904.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
January	695	113	165
February	695	150	307
March	480	150	231
April	383	130	173
May	161	92	116
June	300	86	118
July	186	81	109
August	1,025	113	270
September	173	81	101
October	86	62	70.0
November	130	62	82.7
December	340	68	112
The year	1,025	62	155

TALLADEGA CREEK AT NOTTINGHAM, ALA.

This station was established August 16, 1900, by J. R. Hall. It is located on the Southern Railway bridge, a fourth of a mile from the depot at Nottingham, Ala., and 1 mile north of Alpine, Ala. The gage, which is graduated to feet and tenths and is 20 feet long, is fastened vertically to a tree on the right bank, about 50 feet upstream from the bridge. The observer is R. M. McClatchy, station agent at Nottingham, who is paid by the Alabama Geological Survey.

The initial point for soundings is end of iron bridge, upstream, right bank. The channel is straight for about 500 feet above and below the station and the current is sluggish at low stages. The right bank is high and does not overflow; the left bank is lower than the right and overflows at high stages; but all water passes beneath the bridge. The bed of the stream is of sand and silt and is fairly constant.

Bench mark No. 1 is a nail on the upstream corner of the right bank abutment; its elevation is 14.25 feet above the zero of the gage. Bench mark No. 2 is a copper plug set in the limestone rock at a large spring 335 feet above the railway track on the right bank; its elevation is 6.28 feet above the zero of the gage. The station was discontinued on December 31, 1904.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Talladega Creek at Nottingham, Ala., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
May 25	J. M. Giles		285	0.85	2.05	243
July 27	do		267	.42	1.37	111
August 20	do		254	.46	1.30	116
October 2	do		228	.25	1.00	57
November 14	do		243	.33	1.21	80
1904.						
January 20	J. M. Giles	70	259	.41	1.30	105
January 21	do	70	257	.39	1.27	100
February 20	Giles and Murphy.	70	295	.79	2.02	233
March 10	W. E. Hall	70	264	.55	1.51	145
May 27	J. M. Giles	55	188	.23	1.00	44
May 27[a]	do	27	48	1.04	1.00	50
August 24	do	69	225	.38	1.15	86
September 22	A. T. Michelson	70	222	.32	1.03	72
December 13	J. M. Giles	66	214	.24	1.05	52
December 13[a]	do	32	56	.88	1.05	49

[a] Wagon bridge below mill, one-half mile above railroad bridge.

Mean daily gage height, in feet, of Talladega Creek at Nottingham, Ala., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.10	1.30	1.60	1.30	1.15	1.20	1.70	1.75	1.00	1.00	0.90	1.10
2	1.10	1.60	1.50	1.30	1.10	1.40	1.20	2.45	1.00	1.00	1.00	1.10
3	1.10	1.70	1.50	1.35	1.10	1.20	1.20	1.35	1.00	1.00	1.10	1.10
4	1.10	1.70	1.50	1.35	1.10	1.10	1.10	2.10	1.05	1.00	1.10	1.05
5	1.10	1.60	1.40	1.35	1.10	1.00	1.10	5.60	1.00	1.00	1.10	1.20
6	1.10	1.60	1.40	1.40	1.00	1.00	1.10	3.20	1.00	1.10	1.10	1.20
7	1.10	2.70	2.00	1.40	1.00	1.00	1.05	2.65	1.00	1.10	1.10	1.15
8	1.30	3.80	1.80	1.50	1.10	1.00	1.00	5.70	1.00	1.00	1.05	1.10
9	1.20	2.40	1.65	1.40	1.00	1.00	1.00	4.10	1.00	1.00	1.05	1.10
10	1.50	2.40	1.55	1.35	1.00	1.00	1.10	3.00	1.00	1.00	1.05	1.10
11	1.40	3.20	1.50	1.35	1.00	1.00	1.00	3.10	1.00	1.00	1.05	1.05
12	1.30	2.40	1.50	1.40	1.00	1.00	1.80	2.40	1.00	1.00	1.05	1.05
13	1.30	2.10	1.60	1.35	1.00	1.00	1.80	2.00	1.00	1.00	1.10	1.05
14	1.30	1.80	2.50	1.30	1.00	1.00	1.25	1.70	1.00	1.00	1.20	1.05
15	1.30	1.70	2.20	1.30	1.00	1.00	1.10	1.65	1.00	1.00	1.20	1.05
16	1.30	1.70	1.80	1.30	1.00	.90	1.05	2.10	.95	1.00	1.20	1.05
17	2.50	1.60	1.65	1.30	1.00	.85	1.00	1.55	.95	1.00	1.15	1.10
18	1.80	1.60	1.65	1.30	1.00	.80	1.00	1.40	.95	1.00	1.15	1.00
19	1.60	1.80	1.55	1.30	1.00	1.00	1.00	1.35	.95	1.00	1.10	1.00
20	1.40	2.10	1.50	1.30	1.00	1.00	1.00	1.30	.95	1.00	1.05	1.00
21	1.30	1.80	1.50	1.30	1.00	.90	1.00	1.20	1.00	1.00	1.05	1.00
22	4.00	2.00	1.45	1.30	1.00	.90	1.00	1.15	1.05	1.00	1.20	1.00
23	3.20	2.40	1.40	1.30	1.00	.90	1.00	1.10	1.40	1.00	1.45	1.00
24	2.00	2.10	1.40	1.30	1.00	.85	1.10	1.00	1.20	1.00	1.30	1.00
25	1.70	1.90	1.40	1.25	1.00	.85	1.20	1.00	1.00	.95	1.20	1.20
26	1.50	1.80	1.40	1.25	1.00	1.00	1.10	1.50	1.00	.95	1.15	1.50
27	1.40	1.70	1.40	1.25	1.00	.90	1.05	1.40	1.00	.90	1.10	2.50
28	1.40	1.60	1.40	1.20	1.00	.90	1.10	1.20	1.00	.90	1.10	2.90
29	1.40	1.60	1.35	1.20	1.00	2.15	1.05	1.10	1.00	.90	1.10	1.70
30	1.40	.....	1.35	1.20	1.00	2.20	1.40	1.10	1.00	.90	1.10	1.40
31	1.40	.....	1.35	.....	1.20	.....	1.60	1.00	.....	.90	.....	1.20

Rating table for Talladega Creek at Nottingham, Ala., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.80	20	1.70	172	2.60	374	3.40	588
.90	34	1.80	192	2.70	400	3.50	616
1.00	50	1.90	213	2.80	426	3.60	644
1.10	66	2.00	235	2.90	452	3.70	672
1.20	82	2.10	257	3.00	478	3.80	700
1.30	98	2.20	279	3.10	504	3.90	730
1.40	116	2.30	302	3.20	532	4.00	760
1.50	134	2.40	326	3.30	560	4.10	790
1.60	152	2.50	350				

The above table is poorly defined. It is based upon discharge measurements made during 1903 and 1904. The table has been extended beyond gage height 3 feet.

Estimates of discharges above 4 feet by logarithmic diagram.

Estimated monthly discharge of Talladega Creek at Nottingham, Ala., for 1904.

[Drainage area, 156 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	760	66	152	0.974	1.12
February	700	98	239	1.53	1.65
March	350	107	150	.962	1.11
April	134	82	101	.647	.722
May	82	50	54.4	.349	.402
June	279	20	63.3	.406	.453
July	192	50	78.1	.501	.578
August	1,320	50	278	1.78	2.05
September	116	42	52.5	.337	.376
October	66	34	47.9	.307	.354
November	125	34	69.0	.442	.493
December	452	50	91.7	.588	.678
The year	1,320	20	115	.735	9.99

TALLAPOOSA RIVER AT BUCHANAN BRIDGE, NEAR TALLAPOOSA, GA.

This station was established as a bench-mark station October 21, 1901, by M. R. Hall. It is located at Buchanan Bridge, about 4 miles north

of Tallapoosa, Ga., and about 2 miles above the station on Tallapoosa River at Adderhold Bridge. Discharge measurements are made from the single-span iron highway bridge, having trestle approach of 100 feet on the right bank and 50 feet on the left bank. The initial point for soundings is the end of the bridge at the right bank, downstream side. The channel is straight for about 800 feet above and 1,000 feet below the station. The current is moderate above and swift below the measuring section. The banks rarely overflow. The bed of the stream is composed of rock and gravel, free from vegetation, and is probably constant. There is but one channel at all stages, broken at the higher levels by the piers and trestlework of the bridge. The bench mark is the top of the downstream end of the center floor beam, the third from either end. Its elevation is 25.25 feet above gage datum.

Discharge measurements of Tallapoosa River at Buchanan Bridge, near Tallapoosa, Ga., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 26	W. E. Hall	71	161	1.12	1.55	180
May 14	J. M. Giles	39	96	.41	.83	39
July 19	W. E. Hall	39	89	.25	.65	22
August 31	J. M. Giles	38	99	.59	.81	59
September 26	A. T. Mitchelson	40	90	.37	.71	33

TALLAPOOSA RIVER AT ADDERHOLD BRIDGE, NEAR TALLAPOOSA, GA.

This station was established as a bench-mark station January 7, 1901, by M. R. Hall. It is located at Adderhold Bridge, about 2 miles north of Tallapoosa, Ga., and about 2 miles below the station on Tallapoosa River at Buchanan Bridge. Discharge measurements are made from the downstream side of the single-span iron highway bridge, which has trestle approaches at either end. The initial point for soundings is the end of the bridge at the left bank, downstream side. The channel is straight for about 300 feet above and 500 feet below the station. The current is swift above and sluggish below. Both banks are wooded and are subject to overflow under the trestle approaches during high water. The bed of the stream is composed of sand, and probably constant. There is but one channel at all stages, broken during the higher levels by the piers and trestlework of the bridge. The bench mark is the top of the downstream end of the first floor beam from the left bank. Its elevation is 22.00 feet above gage datum.

Discharge measurements of Tallapoosa River at Adderhold Bridge, near Tallapoosa, Ga., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 9	W. E. Hall	78	250	1.10	1.20	274
March 26	M. R. and W. E. Hall.	75	232	.94	1.22	218
May 14	J. M. Giles	65	168	.35	.60	59
July 19	W. E. Hall	75	159	.20	.30	32
August 31	J. M. Giles	78	205	.39	.65	80
September 26	A. T. Mitchelson	78	181	.27	.39	50

TALLAPOOSA RIVER NEAR HEFLIN, ALA.

This station was established as a bench-mark station. It is located at Denman's wagon bridge, about 7 miles southwest of Heflin, Ala., on the road to Wedowee, Ala. The elevation of the water surface at the time of each discharge measurement is referred to a common datum. Discharge measurements are made from the downstream side of the two-span wooden bridge resting upon three trestle bents and short trestle approaches on each side. The floor of the bridge is about 20 feet above low water. The initial point for soundings is at the center of the trestle bent at the left end of the bridge on the downstream side. The channel is straight for about 800 feet above and 500 feet below the station. The current is moderate above and sluggish below the measuring section. The right bank is high, but is subject to overflow during high stages. The left bank is high and overflows only at extreme high water. The bed of the stream is composed of gravel, free from vegetation. There is but one channel at all stages, broken by the pile supports of the bridge. The section is a fairly good one. At an old ford a short distance below, the section is good for wading. The bench mark is the top of the downstream end of the cap beam of the center pile bent of the bridge. Its elevation is 24.00 feet above gage datum.

Discharge measurements of Tallapoosa River near Heflin, Ala., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Foot per sec.*	*Feet.*	*Second-feet.*
September 24	A. T. Mitchelson	107	201	0.68	1.18	137
November 3	J. M. Giles	90	142	.44	.80	62
November 4	do	98	173	.53	1.15	92
December 14	do	114	267	.68	1.67	181
December 15	do	114	249	.65	1.60	162

TALLAPOOSA RIVER AT STURDEVANT, ALA.

This station was established July 19, 1900, by J. R. Hall. It is located at the Columbus and Western Railroad bridge, a fourth of a mile west of Sturdevant. This railroad belongs to the Central of Georgia Railway. This station, being above the big new dams at Tallassee, is intended to replace Milstead station. Map and profile of Tallapoosa River is published in Twenty-second Annual Report, part 4. The gage is a vertical timber in two sections. The first section, reading from zero to 5.2 feet, is fastened to a post on the east bank about 20 feet below the bridge. The second section, reading from 5 to 20 feet, is fastened to the east side of the first pier in the water on the east bank. The gage is read once each day by C. J. Stowe, who is paid by the Alabama Geological Survey. At ordinary stages discharge measurements are made from a footway supported by the bracing of the lower chord of the deck bridge. At low stages measurements are made from a boat or by wading about 2,000 feet upstream or about 500 feet below the bridge. The initial point for soundings is the end of the iron bridge on the east or left bank, downstream side. Distances are marked in white paint along the hand rail of the footway.

The channel is slightly curved directly above the bridge and for about one-half mile below. The current is swift and much broken by shoals below the bridge, but is sluggish at low stages at and near the station. Both banks are high, the right overflowing for about 150 feet and the left for about 200 feet. The bed is of rock and gravel and is probably permanent.

Bench mark No. 1 is a wire nail driven in the southwest corner of the second pier on the east bank. Its elevation is 14.20 feet above the zero of the gage. Bench mark No. 2 is a copper plug set in solid rock in the bed of the river about 80 feet below the bridge, at a point 400 feet from the end of the bridge at the left bank. This is solid bed rock projecting above the water at ordinary stages. Its elevation is 4.89 feet above the zero of the gage. Bench mark No. 3 is a white paint mark on the top of the downstream end of the lower crossbeam at a point 278 feet from the initial point for soundings. Its elevation is 27.65 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Tallapoosa River at Sturdevant, Ala., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
May 22	J. M. Giles	378	3,274	1.40	4.00	4,580
July 25[a]	do	228	1,068	2.10	2.45	2,247
August 22[a]	do	236	1,096	1.68	2.20	1,837
August 24	do	269	2,070	.71	1.88	1,485
August 24[a]	do	190	831	1.94	1.86	1,616
October 3[a]	do	165	650	1.28	1.05	834
October 3	do	181	646	1.29	1.05	835
November 24[a]	do	190	806	1.42	1.58	1,148
1904.						
January 25	J. M. Giles	389	2,894	1.28	3.57	3,718
March 11	W. E. Hall	370	2,742	1.04	3.05	2,866
April 12	J. M. Giles	321	2,310	.87	2.40	2,011
May 28[a]	do	165	553	1.08	.65	599
May 28[a]	do	165	558	1.06	.65	592
August 25	do	317	2,219	.74	2.12	1,643
August 26	do	375	2,626	1.13	3.14	2,978
August 27	do	399	3,505	2.37	5.50	8,292
October 13[a]	do	135	422	.77	.03	324
October 13[b]	do	67	305	1.07	.03	326
October 13[c]	do	60	242	1.25	.03	303
October 18[b]	do	66	309	.91	— .10	282
October 18[b]	do	66	301	.91	— .10	273
October 18[b]	do	66	300	.90	— .10	270
December 12[a]	do	180	671	1.47	1.45	984

[a] At shoal one-third mile above Central of Georgia Railroad bridge.
[b] From boat 150 yards below bridge.
[c] From boat 200 yards below bridge.

Main daily gage height, in feet, of Tallapoosa River at Sturdevant, Ala., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.7	2.6	2.8	2.2	1.8	3.2	2.3	3.0	1.6	0.5	−0.1	0.9
2	1.7	2.8	2.9	2.2	1.9	2.5	2.0	2.8	1.4	.4	.0	1.0
3	1.8	2.6	3.3	2.1	1.8	2.1	1.9	2.3	1.3	.3	.1	1.4
4	1.8	2.7	2.9	2.1	1.7	1.8	1.8	3.1	1.2	.2	.3	1.5
5	1.7	2.7	2.8	2.0	1.6	1.6	1.5	5.4	1.1	.2	.7	1.9
6	1.7	2.9	2.6	2.0	1.5	1.5	1.1	5.1	1.1	.1	.9	2.5
7	1.8	3.4	4.9	2.2	1.5	1.4	1.4	5.6	1.6	.1	.9	2.5
8	1.9	5.8	4.2	3.4	1.5	1.2	1.2	13.4	1.6	.1	.8	2.3
9	2.4	5.1	3.9	3.4	1.4	1.1	.6	9.1	1.3	.1	.8	2.0
10	3.3	4.4	3.5	2.9	1.4	1.0	.6	8.5	1.1	.0	.8	1.7
11	2.8	5.3	3.1	2.7	1.4	.9	.8	7.1	1.0	.0	.7	1.5
12	2.5	4.8	2.9	2.4	1.3	.9	1.3	6.0	.9	.0	.6	1.4
13	2.3	4.1	2.7	2.2	1.3	.7	3.0	4.3	.8	.0	.7	1.4
14	2.3	3.6	3.4	2.1	1.5	.6	1.6	3.5	.8	.0	.7	1.3
15	2.1	3.3	3.3	2.0	1.4	.6	1.0	3.0	.7	.0	.8	1.2
16	2.0	3.0	3.3	2.0	1.3	.5	.7	4.5	.7	.0	.9	1.2
17	3.9	2.9	3.0	2.0	1.3	.5	.6	3.2	.6	.0	.8	1.3
18	3.4	2.8	2.9	1.9	1.2	.4	.5	3.8	.6	−.1	.9	1.3
19	3.2	2.8	2.8	1.9	1.2	.3	1.5	3.0	.6	−.1	.8	1.2
20	3.0	3.6	2.7	1.9	1.1	.2	.6	2.5	.5	.0	.9	1.1
21	2.6	3.7	2.6	1.9	1.1	.2	.3	2.2	.5	.0	1.0	1.1
22	3.8	4.6	2.5	1.9	1.0	.4	.6	2.0	.9	−.1	1.2	1.1
23	5.4	5.1	2.5	1.9	.9	1.2	1.3	1.8	2.0	−.1	2.0	1.1
24	4.3	4.8	2.5	1.9	.9	1.4	2.8	1.5	2.6	−.1	1.9	1.1
25	3.6	4.1	2.4	1.8	.8	1.3	1.5	2.1	1.7	−.2	1.5	1.7
26	3.1	3.6	2.4	2.0	.7	1.0	1.0	3.5	1.0	−.2	1.3	1.8
27	2.8	3.2	2.4	1.9	.7	.9	.7	5.0	.8	−.2	1.1	3.4
28	2.5	3.1	2.4	2.0	.6	.8	.7	3.5	.7	−.2	1.0	4.8
29	2.5	2.9	2.4	2.1	.6	4.4	1.2	2.6	.6	−.2	.9	4.0
30	2.4	.....	2.3	2.0	.6	2.3	2.5	2.3	.5	−.1	.9	2.9
31	2.4	.....	2.2	.....	2.8	.....	2.6	1.9	.....	−.1	.....	2.5

Rating table for Tallapoosa River at Sturdevant, Ala., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
−0.20	250	1.00	774	2.40	1,985	4.80	6,250
−.10	275	1.10	834	2.60	2,230	5.00	6,740
.00	305	1.20	897	2.80	2,495	5.20	7,240
.10	339	1.30	963	3.00	2,780	5.40	7,760
.20	377	1.40	1,032	3.20	3,085	5.60	8,300
.30	418	1.50	1,105	3.40	3,410	5.80	8,860
.40	462	1.60	1,182	3.60	3,755	6.00	9,430
.50	509	1.70	1,264	3.80	4,120	7.00	12,380
.60	558	1.80	1,352	4.00	4,500	8.00	15,480
.70	609	1.90	1,446	4.20	4,900	9.00	18,690
.80	662	2.00	1,545	4.40	5,330		
.90	717	2.20	1,757	4.60	5,780		

The preceding table is based upon fifteen discharge measurements made during 1904 and some during 1903. Above 6 feet it is based on four measurements made in 1905.

Estimated monthly discharge of Tallapoosa River at Sturdevant, Ala., for 1904.

[Drainage area, 2,500 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	7,760	1,264	2,500	1.00	1.15
February	8,860	2,230	4,089	1.64	1.77
March	6,490	1,757	2,749	1.10	1.27
April	3,410	1,352	1,757	.703	.784
May	2,495	558	991	.396	.456
June	5,330	377	1,084	.434	.484
July	2,780	418	1,086	.434	.500
August	34,200	1,105	5,855	2.34	2.70
September	2,230	509	850	.340	.379
October	509	250	314	.126	.145
November	1,545	275	722	.290	.324
December	6,250	717	1,562	.625	.721
The year	34,200	250	1,966	.786	10.68

LITTLE TALLAPOOSA RIVER 3 MILES NORTH OF WEDOWEE, ALA.

This station was established as a bench-mark station. It is located at "Iron" highway bridge, 3 miles north of Wedowee, Ala., on the Wedowee-Heflin road. Discharge measurements are made from the downstream side of the single-span bridge, the floor of which is 26 to 28 feet above low-water surface. The initial point for soundings is the end of the bridge at the left bank, downstream side. The channel is straight for about 1,000 feet above and 800 feet below the station. The current is moderate. The right bank is fairly high, fringed with trees, and overflows during high water. The left bank is high, wooded above, and cultivated below the bridge, and not subject to overflow. The bed of the stream is composed of clean gravel. There is but one channel at all stages. There is a small sand reef just above the bridge near the right bank; otherwise, this is a good section. Bench mark No. 1 is the top of the large nut on pin connecting eyebars of lower chord at end of first floor beam from the left bank on the downstream side of the bridge. Its elevation is 25.00 feet above gage datum. Bench mark No. 2 is a chisel mark on the intermediate post above the same, downstream end of first floor beam. Its elevation is 32.00 feet above gage datum.

Discharge measurements of Little Tallapoosa River 3 miles north of Wedowee, Ala., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
September 23 ..	A. T. Mitchelson	130	431	0.54	1.48	236
November 3 ...	J. M. Giles	115	385	.26	1.20	102

LITTLE TALLAPOOSA RIVER 6 MILES NORTHWEST OF WEDOWEE, ALA.

This station was established as a bench-mark station. It is located at the highway bridge about 6 miles northwest of Wedowee and several miles above the mouth of the river. Discharge measurements are made from the downstream side of the iron bridge, which consists of a single span of 140 feet with trestle approaches 100 feet long at each end. The floor of the bridge is about 28 feet above low water. The initial point for soundings is the center of the pier at the left bank, downstream side. The channel is straight for about 500 feet above and 1,000 feet below the station. The current is swift. Both banks are clean, and overflow only under the trestle approach. The bed of the stream is composed of rock and gravel, free from vegetation, and is constant. There is but one channel at low water, broken at high water by the piers and trestle approach of the bridge. Bench mark No. 1 is the downstream end of the second floor beam from the left bank. Its elevation is 27.00 feet above gage datum. Bench mark No. 2 is a chisel mark on the intermediate post at this floor beam. Its elevation is 32.00 feet above gage datum.

Discharge measurements of Little Tallapoosa River 6 miles northwest of Wedowee, Ala., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage. height.	Discharge.
		Feet.	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
November 4 ...	J. M. Giles	120	283	0.44	0.70	124
December 14...	.....do	125	329	.64	1.02	211
December 15...	.....do	125	327	.65	1.02	214

CAHABA RIVER AT CENTERVILLE, ALA.

The station was established on August 7, 1901, and is situated at the iron highway bridge one-fourth mile west of Centerville, Ala., one-half mile above the Mobile and Ohio Railroad bridge. The bridge is a single span supported by tubular iron piers.

The chain gage is fastened to the timber fencing along the downstream side of the bridge. The pulley is 100 feet from the initial

point, which is the end of the iron bridge on the left bank, downstream side. The length of the chain from the end of the weight to the marker is 51.35 feet. The observer is Clyde Lowrey, who is paid by the Alabama Geological Survey.

The channel is straight for 1,500 feet above the station and for one-half mile below. The current is swift. The right bank overflows at extreme high water. The left bank overflows only under the approach to the bridge. The bed is nearly all rock, and there is but one channel.

Bench mark No. 1 is the downstream end of the floor beam 100 feet from the initial point for soundings and is 42.85 feet above gage datum. Bench mark No. 2 is a copper plug set in a solid rock about 6 feet from the edge of the water and 250 feet below the bridge on the left bank. Its elevation is 6.44 feet above gage datum.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Cahaba River at Centerville, Ala., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
April 8 [a]	J. M. Giles	161	906	1.80	5.15	1,637
April 9 [b]	do	180	1,834	1.21	6.65	2,225
June 17 [a]	do	125	416	1.00	2.05	416
June 18 [a]	do	125	414	.95	2.00	394
July 20 [a]	do	140	591	1.28	3.23	757
July 21 [a]	do	127	482	1.07	2.36	516
September 28 [a]	do	107	311	.68	1.31	212
September 29 [a]	do	100	314	.69	1.30	218
November 8 [a]	do	110	338	.60	1.32	203
November 10 [a]	do	100	329	.68	1.40	223
1904.						
February 22	Murphy & Giles	145	556	1.54	3.47	856
June 25 [c]	J. M. Giles	100	207	1.00	1.29	208
August 3	do	128	315	1.33	1.97	419
August 4	do	128	304	1.25	1.88	381
October 31	do	113	189	.54	.86	103
October 31	do	113	196	.55	.88	108

[a] Measurement taken at wagon bridge.
[b] Measurement taken at Mobile and Ohio Railroad bridge.
[c] Channel silted badly.

Mean daily gage height, in feet, of Cahaba River at Centerville, Ala., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.5	2.9	2.6	2.2	1.6	1.5	1.3	1.6	1.2	1.0	0.9	1.1
2	1.5	2.9	2.5	2.3	1.6	1.4	1.4	1.6	1.2	1.0	.9	1.1
3	1.6	2.9	2.4	2.2	1.6	1.2	1.3	2.0	1.1	.9	1.3	1.1
4	1.5	2.7	2.3	2.1	1.6	1.2	1.5	2.2	1.7	.9	1.3	1.1
5	1.5	2.6	2.2	2.1	1.5	1.2	1.4	2.0	1.5	.9	1.1	2.0
6	1.5	2.8	3.0	2.1	1.5	1.2	1.3	2.0	1.4	.9	1.1	2.2
7	1.8	6.7	6.4	2.2	1.4	1.3	1.8	7.1	1.2	.9	1.0	2.0
8	1.9	11.5	7.0	2.6	1.5	2.5	1.2	5.5	1.3	.9	1.0	1.9
9	2.2	6.0	5.4	3.1	1.5	1.7	1.6	5.1	1.3	1.0	1.0	1.7
10	2.8	6.4	4.2	2.6	1.6	1.6	1.7	4.7	1.2	1.0	1.0	1.5
11	3.1	10.0	3.8	2.4	1.6	1.6	1.5	3.7	1.1	1.0	1.0	1.4
12	2.2	7.2	3.4	2.3	1.7	1.4	1.3	3.7	1.2	.9	1.0	1.4
13	2.0	5.5	3.1	2.2	1.6	1.3	1.2	3.8	1.1	.9	1.0	1.4
14	1.8	5.4	3.8	2.1	1.6	1.3	1.3	2.8	1.1	.9	1.0	1.3
15	1.8	4.6	5.4	2.1	1.5	1.2	1.2	5.6	1.1	.9	1.0	1.3
16	1.8	4.1	4.3	2.0	1.4	1.2	1.2	3.6	1.0	.9	1.0	1.2
17	2.9	3.3	3.9	2.0	1.4	1.1	1.3	2.5	1.0	.9	1.0	1.2
18	2.6	3.1	3.6	2.0	1.3	1.1	1.3	2.0	1.0	.9	1.0	1.2
19	2.4	3.0	3.5	1.9	1.3	1.1	1.2	1.8	1.0	.9	1.0	1.2
20	2.1	3.8	3.3	1.9	1.3	1.1	1.1	1.6	1.1	.9	1.0	1.2
21	2.0	3.3	3.0	1.8	1.3	1.0	1.1	1.4	1.1	.9	1.2	1.2
22	10.2	3.5	2.9	1.7	1.3	1.0	1.1	1.4	1.0	.9	1.2	1.1
23	8.8	3.3	2.8	1.7	1.2	1.0	1.6	1.3	1.0	.9	1.3	1.1
24	4.8	3.2	2.8	1.6	1.2	1.2	1.3	1.3	1.0	.8	1.3	1.1
25	3.4	3.1	2.7	1.6	1.2	1.3	1.3	1.2	1.0	.8	1.3	1.7
26	3.0	3.0	2.6	1.7	1.2	1.2	1.2	1.5	1.0	.8	1.2	2.0
27	2.4	2.9	2.4	1.7	1.2	1.3	1.4	1.3	1.0	.8	1.1	3.1
28	2.6	2.8	2.3	1.6	1.3	1.2	2.1	1.3	1.0	.8	1.1	4.7
29	2.7	2.7	2.2	1.6	1.2	1.1	1.7	1.2	1.0	.8	1.1	6.0
30	2.9	.....	2.1	1.6	1.4	1.0	1.7	1.5	1.0	.9	1.1	5.1
31	2.8	.....	2.0	.....	1.6	.....	1.6	1.3	.....	.9	.....	2.6

Rating table for Cahaba River at Centerville, Ala., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.80	90	1.70	318	2.50	560	3.60	911
.90	111	1.80	348	2.60	591	3.80	982
1.00	133	1.90	378	2.70	622	4.00	1,056
1.10	156	2.00	408	2.80	653	4.20	1,131
1.20	180	2.10	438	2.90	684	4.40	1,207
1.30	205	2.20	468	3.00	715	4.60	1,285
1.40	232	2.30	498	3.20	779	4.80	1,366
1.50	260	2.40	529	3.40	844	5.00	1,450
1.60	289						

The above table is based upon discharge measurements made during 1903 and 1904. It is fairly well defined between gage heights 0.8 foot and 3.5 feet. Above 3.5 feet the curve is uncertain, as the high-water measurements are inconsistent.

Estimated monthly discharge of Cahaba River at Centerville, Ala., for 1904.

[Drainage area, 1,040 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maxium.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	4,215	260	721	0.693	0.799
February	5,060	591	1,290	1.24	1.34
March	2,395	408	866	.833	.960
April	747	289	419	.403	.450
May	318	180	241	.232	.268
June	560	133	205	.197	.220
July	438	156	233	.224	.258
August	2,445	180	623	.599	.691
September	318	133	165	.159	.177
October	133	90	110	.106	.122
November	205	111	153	.147	.164
December	1,900	156	397	.382	.440
The year	5,060	90	452	.435	5.89

TOMBIGBEE RIVER AT COLUMBUS, MISS.

The gage is located about 1,000 feet below the county highway bridge, 1 mile from the Southern Railway station at Columbus, Miss. A vertical 3 by 10 inch pine timber is fastened to the blue-rock bluff on the left bank and is marked with brass figures and brass nails from −5 to +43 feet. Discharge measurements are made from the county highway bridge at the south end of Main street. The initial point for soundings is the end of the iron bridge on the right bank, downstream side. The channel is slightly curved for 500 feet above and 1,000 feet below the station. The current is sluggish at low stages and very swift above a gage height of 12 feet. The right bank is high and seldom overflows. The left bank overflows from gage height 18 to 22 feet. The bed of the stream is of soft blue rock.

Bench mark No. 1 is the top of the downstream girder at a point 250 feet from the initial point for soundings. Its elevation is 39.88 feet above the zero of the gage. This point is on the movable portion of the drawbridge and may vary in elevation. Bench mark No. 2 is a copper plug in a tree at the southeast corner of First street and Second avenue. Its elevation is 17.94 feet above the zero of the gage. This tree has boards nailed to it, showing the names of the streets. Bench mark No. 3 is the top of the rail at the depot of the Southern Railway and is 55.20 feet above gage datum and 191 feet above mean sea level.

The observer, J. J. Richards, is paid by the United States Weather Bureau.

The width of the river at low water is 160 feet. The maximum recorded height of the river was on April 8, 1892, when the gage registered 42 feet. The lowest recorded height was on October 26, 1893, when the gage reading was −3.9 feet. The danger line is at 33 feet.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Tombigbee River at Columbus, Miss., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 9	J. M. Giles	307	5,884	4.49	15.50	26,450
March 12	do	317	6,586	4.40	17.30	29,020
May 18	do	297	4,655	3.82	12.50	17,800
July 16	do	88	1,040	1.29	− 1.70	1,340
July 17	do	88	1,034	1.24	− 1.80	1,278
September 22	do	55	805	.31	− 3.70	252
September 25[a]	do	116	187	1.40	− 3.70	263
1904.						
January 13	J. M. Giles	104	1,072	1.06	− 1.80	1,137
January 16	do	105	1,107	.97	− 2.00	1,072
February 25	J. M. Giles and E. C. Murphy.	119	1,230	1.86	− .30	2,290
March 23	W. E. Hall	133	1,359	2.14	.30	2,913
August 13	J. M. Giles	120	1,216	1.87	− .50	2,270
October 29[b]	do	66	128	1.27	− 3.80	162
October 29[b]	do	66	128	1.23	− 3.80	158

[a] Measured 1 mile below wagon bridge, which is about one-third mile below the Mobile and Ohio Railroad bridge.
[b] From boat at shoal, one-third mile below Mobile and Ohio Railroad bridge.

Mean daily gage height, in feet, of Tombigbee River at Columbus, Miss., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	−1.8	1.6	−1.3	4.6	−1.3	−2.3	−1.6	−1.8	−3.3	−2.8	−3.1	−2.2
2	−1.9	1.0	− .8	5.3	−1.3	−2.4	−1.6	−1.8	−3.3	−2.8	−3.0	−2.2
3	−1.6	.4	− .6	6.0	−1.3	−2.4	−1.7	−1.2	−3.2	−2.9	−2.8	−1.8
4	−1.4	.0	− .6	6.2	−1.5	−2.3	−1.5	−1.2	−3.2	−2.9	−2.4	−1.6
5	−1.4	− .4	− .8	6.0	−1.6	−2.3	−1.7	−1.1	−3.2	−2.9	−2.4	−1.6
6	−1.6	− .4	− .5	6.0	−1.6	−2.4	−1.7	−1.0	−3.2	−2.9	−2.4	−1.6
7	−1.4	− .3	− .1	5.5	−1.6	−1.8	−1.9	− .9	−3.3	−2.9	−2.4	−1.6
8	−1.4	− .3	− .2	5.2	−1.6	−1.5	−1.9	− .7	−3.3	−2.9	−2.4	−1.6
9	−1.6	− .6	− .1	5.0	−1.6	−1.5	−1.8	− .7	−3.3	−2.9	−2.4	−1.6
10	−1.6	− .4	− .1	4.6	−1.6	−1.6	−1.9	− .6	−3.4	−2.9	−2.4	−1.6
11	−1.6	− .2	1.0	4.2	−1.8	−1.8	−1.9	− .6	−3.4	−2.9	−2.4	−1.7
12	−1.6	− .2	1.0	4.0	−1.8	−1.8	−1.8	.0	−3.5	−2.9	−2.4	−1.8
13	−1.5	− .5	1.0	3.7	−1.9	−1.9	−1.8	− .4	−3.5	−2.9	−2.5	−1.8
14	−1.6	− .7	1.2	2.4	−2.0	−1.9	−2.0	− .8	−3.5	−2.9	−2.6	−1.8
15	−1.7	− .8	1.3	3.0	−2.2	−2.0	−2.2	−1.0	−3.5	−2.9	−2.6	−1.8
16	−1.7	−1.0	1.3	2.8	−2.3	−2.0	−2.6	−2.0	−3.5	−3.0	−2.6	−1.8
17	−2.0	−1.1	1.0	2.0	−2.3	−2.0	−2.6	−2.5	−3.5	−3.0	−2.6	−1.8
18	−1.9	−1.2	1.7	1.6	−2.3	−2.0	−2.7	−2.9	−3.5	−3.0	−2.6	−1.8
19	−1.9	−1.2	1.6	.8	−2.4	−2.1	−2.8	−2.9	−3.5	−3.0	−2.6	−1.8
20	−1.9	−1.1	1.4	.4	−2.4	−2.2	−2.9	−2.9	−3.5	−3.0	−2.6	−1.8
21	−2.0	−1.0	1.7	.1	−2.4	−2.2	−2.9	−3.1	−3.5	−3.0	−2.6	−1.8
22	−1.6	− .8	1.7	.0	−2.4	−2.2	−2.8	−3.2	−3.2	−3.0	−2.4	−1.8
23	−1.6	−1.0	1.7	− .3	−2.4	−2.3	−2.2	−3.2	−3.2	−3.0	−2.4	−1.8
24	.0	− .9	1.4	− .5	−2.4	−2.3	−2.0	−3.1	−2.8	−3.0	−2.4	−1.9
25	1.0	− .9	1.4	− .6	−2.5	−2.3	−1.9	−3.1	−2.8	−3.0	−2.4	−1.8
26	.....	− .3	2.6	− .6	−2.5	−2.3	−1.9	−3.1	−2.8	−3.0	−2.5	−1.7
27	1.7	− .7	2.8	− .8	−2.5	−2.3	−1.5	−3.1	−2.8	−3.0	−2.5	−1.5
28	1.9	− .9	2.9	− .9	−2.5	−1.8	− .8	−3.2	−2.8	−3.0	−2.5	−1.4
29	2.0	−1.3	3.5	−1.0	−2.5	−2.0	− .8	−3.2	−2.8	−3.0	−2.5	−1.0
30	1.4	.....	3.5	−1.2	−2.5	−1.8	−1.2	−3.3	−2.8	−3.1	−2.2	1.5
31	1.6	.....	3.5	.....	−2.3	.....	−1.5	−3.3	.....	−3.1	.....	2.5

Rating table for Tombigbee River at Columbus, Miss., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
−4.00	100	−2.80	620	−0.60	2,120	1.60	4,210
−3.90	130	−2.60	720	− .40	2,290	1.80	4,430
−3.80	160	−2.40	830	− .20	2,470	2.00	4,650
−3.70	190	−2.20	950	.00	2,650	2.50	5,200
−3.60	230	−2.00	1,070	.20	2,830	3.00	5,800
3.50	270	−1.80	1,200	.40	3,010	3.50	6,400
−3.40	320	−1.60	1,340	.60	3,200	4.00	7,050
−3.30	370	−1.40	1,480	.80	3,400	4.50	7,700
−3.20	420	−1.20	1,640	1.00	3,600	5.00	8,350
−3.10	470	−1.00	1,800	1.20	3,800	5.50	9,000
−3.00	520	− .80	1,960	1.40	4,000	6.00	9,700

The above table is based upon discharge measurements made from 1901 to 1904. It is fairly well defined. Above 7 feet the 1903 and 1904 rating tables are identical.

Estimated monthly discharge of Tombigbee River near Columbus, Miss., for 1904.

[Drainage area, 4,440 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	4,650	1,070	1,991	0.448	0.516
February	4,210	1,560	2,209	.498	.537
March	6,400	1,560	3,785	.852	.982
April	9,980	1,640	5,456	1.23	1.37
May	1,560	770	1,059	.239	.276
June	1,410	830	1,041	.234	.261
July	1,960	570	1,135	.256	.295
August	2,650	370	1,175	.265	.306
September	620	270	402	.091	.102
October	620	470	544	.123	.142
November	950	470	765	.172	.192
December	5,200	950	1,475	.332	.383
The year	9,980	270	1,753	.395	5.36

BLACK WARRIOR RIVER NEAR CORDOVA, ALA.

This station is located at the Kansas City, Memphis and Birmingham Railroad bridge, which crosses the river below the junction of the Mulberry and Sipsey forks, and about three-fourths of a mile from Cordova, Ala. The gage was established by the United States Weather Bureau, but observations by that bureau have been discontinued. From 12 to 55 feet the gage is a vertical timber bolted to the inside of the bridge pier on the left bank of the river. Below 12 feet the gage was sloping, but it was out of position and could not be used when the station was established by the United States Geological Survey on May 21, 1900, so a short new section was put in at that time. This section is a 2 by 10 inch plank, graduated to feet and tenths, from −1.5 to +12.5 feet, and spiked to a willow tree on the right bank of the river about 200 feet below the bridge.

Measurements are made from the downstream side of the railroad bridge, which is a two-span iron through bridge. The span across the river is 300 feet long. A pier is being built in the river, and the long span will be replaced by two shorter ones. The span on the left bank is about 150 feet long. At low stages discharge measurements are made from a boat or by wading at a point some distance below the bridge. The channel is curved for 500 feet above and straight for 1,000 feet below the station. The right bank is a rock bluff and will not overflow. The left bank overflows only under the second span of the bridge. The bed of the stream is of rock and is permanent. The

channel has a width of about 180 feet at low water and about 450 feet at high stages.

Bench mark No. 1 is the top of the fourth crossbeam from the right bank, on the downstream side. Its elevation is 60.09 feet above the zero of the gage. Bench mark No. 2 is a copper plug in the solid rock about 110 feet above the bridge, 50 feet from the initial point for soundings. Its elevation is 32.12 feet above the zero of the gage. The top of the pier at the left bank is 55.10 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Black Warrior River near Cordova, Ala., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 6	J. M. Giles	240	4,225	4.56	13.90	19,250
March 13	do	220	2,625	3.61	6.90	9,486
May 19	do	206	1,991	2.59	4.34	5,159
June 15	do	184	1,261	.82	.50	1,036
July 17 [a]	do	178	576	.53	— .30	306
August 27 [b]	do	182	546	.38	— .48	208
August 29 [b]	do	181	501	.28	— .65	142
September 25 [c]	do	137	134	.58	— .90	78
1904.						
January 16 [a]	J. M. Giles	182	554	.39	— .40	216
February 24	J. M. Giles and E. C. Murphy.	181	1,200	.65	.28	785
March 23	M. R. and W. E. Hall.	191	1,638	1.88	2.65	3,086
May 25 [b]	J. M. Giles	180	509	.34	— .50	171
August 10	do	185	1,263	.80	.49	1,011
October 26 [d]	do	48	75	.34	— 1.00	25
October 26 [d]	do	48	72	.34	— 1.00	24

[a] One-fourth mile below Frisco System Railroad bridge.
[b] One-third mile below Frisco System Railroad bridge.
[c] At fish trap 3 miles below bridge.
[d] Boat 100 yards above Southern Railway bridge.

Mean daily gage height, in feet, of Black Warrior River near Cordova, Ala., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	−0.4	−0.1	0.0	2.6	−0.5	1.2	1.8	−0.5	−0.8	−1.0	−0.9	0.8
2	− .4	.0	.0	2.4	− .5	.4	.2	− .3	− .8	−1.0	− .9	.9
3	− .5	.1	.0	3.2	− .5	− .1	− .3	.6	− .8	−1.0	− .9	1.3
4	− .5	.0	.0	3.1	− .4	− .6	− .1	.4	− .5	−1.0	− .3	2.2
5	− .5	− .1	.0	2.8	− .4	− .4	− .3	.4	− .5	−1.0	.1	3.8
6	− .5	− .1	.0	2.4	− .5	− .3	− .3	.6	− .6	−1.0	− .3	5.5
7	− .5	− .1	3.2	3.7	− .5	− .2	.2	.6	− .7	−1.0	− .3	2.7
8	− .4	.3	5.4	5.2	.3	− .1	− .1	1.2	− .8	−1.0	− .4	1.3
9	− .4	.1	3.5	7.2	.4	− .3	− .3	1.0	− .8	−1.0	− .4	1.1
10	− .5	.4	2.3	4.3	.6	− .4	− .4	.9	− .8	−1.0	− .5	1.2
11	− .5	.7	2.0	4.0	.5	− .5	− .2	1.1	− .8	− .9	− .5	.9
12	− .5	.6	2.0	3.2	.4	− .5	.3	1.1	− .8	− .9	− .5	.7
13	− .5	.4	2.4	2.5	.2	− .5	2.7	1.2	− .8	− .9	− .5	.4
14	− .5	.4	5.5	2.1	.0	− .5	.6	.8	− .8	− .9	− .5	.2
15	− .5	.3	6.8	1.6	− .1	− .5	− .1	.3	− .8	− .9	− .5	.1
16	− .5	.2	4.5	1.5	− .2	− .5	− .4	.1	− .8	− .9	− .6	.0
17	− .3	.1	3.2	1.2	− .2	− .6	− .3	.1	− .8	− .9	− .6	− .1
18	− .3	.1	2.5	1.1	− .3	− .6	− .5	.0	− .8	− .9	− .6	− .1
19	− .2	.0	2.2	1.0	− .4	− .6	− .3	− .1	− .9	− .9	− .6	.0
20	− .2	.0	1.4	1.0	− .5	− .6	− .5	− .2	− .9	− .9	− .6	.0
21	− .2	.3	.5	1.0	− .6	− .7	− .4	− .2	− .9	− .9	− .6	− .1
22	1.3	.3	.3	1.1	− .6	− .7	− .4	− .3	− .9	− .9	− .6	− .1
23	2.9	.4	.3	1.5	− .6	− .8	− .5	− .4	− .9	− .9	− .1	− .2
24	2.0	.3	5.5	1.4	− .6	− .8	− .4	− .5	− .9	− .9	.1	− .2
25	1.6	.3	5.5	− .1	− .6	− .5	− .3	− .6	− .9	− .9	.1	− .2
26	.6	.2	4.1	− .1	− .6	− .5	− .3	− .7	− .9	− .9	.0	.0
27	.3	.1	6.5	− .1	− .6	− .5	− .4	− .7	− .9	− .9	.0	.2
28	.1	.1	8.6	− .2	− .6	− .5	− .5	− .7	− .9	− .9	− .1	12.4
29	.1	.0	5.7	− .4	− .6	− .4	− .5	− .7	−1.0	− .9	− .1	6.5
30	.0	.....	4.3	− .5	− .6	2.6	− .5	− .8	−1.0	− .9	− .1	3.8
31	.0	.....	2.8	.....	1.3	.....	− .5	− .8	.....	− .9	.....	2.4

Rating table for Black Warrior River near Cordova, Ala., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
—1.00	28	0.00	560	1.00	1,450	3.00	3,540
— .90	53	.10	645	1.20	1,630	3.20	3,780
— .80	80	.20	730	1.40	1,820	3.40	4,030
— .70	110	.30	820	1.60	2,010	3.60	4,290
— .60	145	.40	910	1.80	2,210	3.80	4,550
— .50	190	.50	1,000	2.00	2,410	4.00	4,820
— .40	250	.60	1,090	2.20	2,615	4.50	5,520
— .30	320	.70	1,180	2.40	2,830	5.00	6,230
— .20	400	.80	1,270	2.60	3,060	5.50	6,955
— .10	480	.90	1,360	2.80	3,300	6.00	7,700

The above table is based upon twenty-six discharge measurements made during 1900–1904. It is well defined between gage heights —1.0 feet and 6.0 feet. The table has been extended beyond these limits, being based on three high-water measurements. Above gage height 6 feet the rating curve is a tangent, the difference being 150 per tenth.

Estimated monthly discharge of Black Warrior River near Cordova, Ala., for 1904.

[Drainage area, 1,900 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	3,420	190	613	0.323	0.372
February	1,180	480	720	.379	.409
March	11,600	560	3,818	2.01	2.32
April	9,500	190	2,606	1.37	1.53
May	1,725	145	409	.215	.248
June	3,060	80	378	.199	.222
July	3,180	190	516	.272	.314
August	1,630	80	693	.365	.421
September	190	28	78.0	.041	.046
October	53	28	44.9	.024	.028
November	645	53	298	.157	.175
December	17,300	400	2,277	1.20	1.38
The year	17,300	28	1,038	.546	7.46

BLACK WARRIOR RIVER AT TUSCALOOSA, ALA.

A continuous record of gage heights at Tuscaloosa since 1889 has been kept by the United States Engineer Corps. During 1895 and 1896 a number of discharge measurements were also made, from which a rating table was obtained, and since that time measurements of flow have been made by the United States Geological Survey. The station is located about one-fourth of a mile above Mobile and Ohio Railroad bridge. There are three locks and dams within about 3 miles above the station.

The gage is located about three-fourths of a mile from tne business center of Tuscaloosa, Ala. It is reached by passing down Bridge street to the river, thence down the east bank 1,800 feet. There is also a vertical iron gage on the downstream side of the second pier from the left bank of the highway bridge, from which the discharge measurements are made. Discharge measurements are made from the iron highway bridge above the gage. The initial point for soundings is the end of the iron bridge on the left bank, downstream side. The channel is straight for 15,000 feet above and below the station; its width at low water is 280 feet and at high stages 625 feet. The current is sluggish at low stages. Both banks are high and steep and overflow only at extreme stages. The greater part of the bed is of rock and is permanent. There is but one channel, broken by the three bridge piers.

Bench mark No. 1 is on a willow tree 10 feet west of the gage; its elevation is 10.54 feet above the zero of the gage and 97.34 feet above the Mobile datum. Bench mark No. 2 is on a small hackberry tree 30 feet south of the upper end of the gage; its elevation is 52.06 feet above the zero of the gage and 139.36 feet above the Mobile datum. Daily gage heights are furnished to the Geological Survey by the United States engineers.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Mean daily gage height, in feet, of Clear Creek near Elk, Ala., for 1904.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.80	0.75	0.85	0.65	0.65	0.90
2	.....	.80	.75	.70	.65	.65	1.00
3	.....	.80	.80	.70	.65	.80	1.00
4	.....	.80	1.10	.70	.65	.80	1.30
5	.....	.90	.95	.70	.65	.75	1.60
6	.....	.90	.95	.65	.70	.75	1.60
7	.....	.95	.90	.65	.70	.75	1.50
8	.....	1.00	1.10	.70	.70	.75	1.20
9	.....	1.10	.80	.70	.70	.80	.90
10	.....	1.00	.80	.70	.65	.90	.90
11	.....	.90	.75	.70	.65	.80	.90
12	.....	1.10	.80	.65	.65	.75	.90
13	.....	1.10	.80	.65	.65	.70	.85
14	.....	.90	1.00	.65	.60	.70	.85
15	.....	.90	1.00	.65	.60	.70	.80
16	.....	.90	1.00	.60	.60	.70	.75
17	.....	.85	1.00	.60	.60	.70	.75
18	.....	.85	1.10	.60	.60	.70	.75
19	.....	.85	1.00	.60	.60	.70	.75
20	.....	.85	1.00	.60	.60	.70	.75
21	.....	.95	1.00	.65	.60	.70	.75
22	.....	1.60	1.00	.60	.60	.75	.75
23	0.65	1.20	.90	.60	.60	.80	.75
24	.65	1.10	.90	.65	.60	.80	.75
25	.65	1.00	1.00	.65	.60	.85	.80
26	.70	.95	1.00	.65	.60	.85	.85
27	.80	.95	.90	.70	.60	.85	1.80
28	.80	.95	.90	.65	.60	.85	1.70
29	2.60	.80	.90	.70	.60	.90	1.65
30	1.20	.80	.90	.70	.60	.90	1.40
31	.....	.80	.85	.....	.60	.....	1.20

BLACK WATER CREEK NEAR JASPER, ALA.

This station was established as a bench-mark station. It is located 100 yards below the dam at Camack's mill, 6 miles north of Jasper, Ala. Discharge measurements are made from the single-span iron highway bridge with short trestle approaches at either end. The initial point for soundings is the end of the bridge at the right bank, upstream side. The channel is straight for about 200 feet above and 500 feet below the station. The current is swift. Both banks are wooded, and liable to overflow under the trestle approaches. The bed of the stream is rocky and permanent. There is but one channel at all stages, broken during high water by the piers and trestle work of the bridge. The bench mark is the top of the upstream eyebar, 49 feet from the right-bank end of the bridge. Its elevation is 20.00 feet above the gage datum.

Discharge measurements of Black Water Creek near Jasper, Ala., in 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Foot per sec.*	*Feet.*	*Second-feet.*
May 24	J. M. Giles	42	35.6	0.63	1.10	22.5
August 9	do	41	40.0	.97	1.27	39
October 25[a]	do	3.5	2.3	.91	.75	2.1

[a] Mill not running, water being stored in pond.

BLACK WARRIOR RIVER (LOCUST FORK) AT PALOS, ALA.

Locust Fork of Black Warrior River rises in Blount County, Ala., and, flowing in a southwesterly course, enters Black Warrior River a short distance above Wilmington, Ala. Its drainage basin is hilly, and only a small part of its area is in cultivation. Palos station was established November 26, 1901, by R. C. McCalla, United States assistant engineer, who furnishes the daily gage heights to the United States Geological Survey. It is maintained by the United States Engineer Corps. The gage is a 4 by 8 inch timber, on the right bank of the river, just below the Kansas City, Memphis and Birmingham Railroad bridge. One section follows the slope of the bank from low water to a tree on top of the bank, and from there up a vertical section is fastened to the tree. The slope is 17 feet in elevation, measured vertically, and the vertical section of the rod is 15 feet. The rod is graduated to feet and tenths, with copper figures at the 5-foot points and roundhead tacks at intermediate foot marks. The total height is 32 feet. The datum of gage (about 251.71 feet above Mobile datum) is supposed to be extreme low water. High water, April, 1900, was about 37 feet.

Measurements are made from the Drennan Bridge, which is about a quarter of a mile below the Kansas City, Memphis and Birmingham Railroad bridge. The Drennan Bridge is the property of the Drennan Coal Mining Company. It is a mining railroad bridge, having width for a double-track tramway of 3 feet gage. One track is laid and in operation. The bridge has two iron spans of 100 feet each and trestle approaches at both ends.

Low-water measurements are made by wading at a shoal one-third mile below the bridge. The initial point for soundings is the left-bank end of the iron bridge on the downstream side. The channel is curved for 1,500 feet above the station and is straight for 3,000 feet below. At low water the channel is 180 feet wide. There is a ledge of rock about 200 feet below the station with about 3 feet fall. Both banks are high and wooded. The right bank overflows at flood stages, but only under the approach to the bridge. The bed is mainly of rock and is permanent.

Bench mark No. 1 is the top of the crossbeam at a point 80 feet from the left end of the bridge on the downstream side. Its elevation is 46.70 feet above the surface of the water, less the reading of the gage. It was established by measuring down to water surface with a steel tape. Bench mark No. 2 is a copper plug in a water-oak tree on the right hand, 20 feet downstream from the gage. Its elevation is 21.68 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of M. R. Hall, district hydrographer.

Discharge measurements of Black Warrior River (Locust Fork) at Palos, Ala., in 1903 and 1904.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1903.		*Feet.*	*Square feet.*	*Feet per sec.*	*Feet.*	*Second-feet.*
March 7 [a]	J. M. Giles	172	1,937	3.85	4.75	7,450
March 14 [a]	do	168	1,735	3.08	3.55	5,342
May 20 [a]	do	156	1,358	1.58	1.75	2,148
June 16 [a]	do	130	1,065	.40	.62	431
June 16 [a]	do	130	1,041	.39	.62	404
July 18 [b]	do	96	249	.91	.40	228
August 28 [b]	do	77	195	.43	.13	84
August 28 [c]	do	100	246	.38	.13	93
September 26 [d]	do	88	93	.50	.02	47
1904.						
January 18 [b]	J. M. Giles	93	243	.62	.38	151
March 24 [a]	M. R. and W. E. Hall.	156	1,305	1.28	1.58	1,680
May 23 [b]	J. M. Giles	82	197	.43	.16	86
May 23 [b]	do	82	204	.45	.16	91
August 8 [a]	do	152	1,225	.94	1.27	1,156
August 8 [b]	do	178	496	2.28	1.25	1,132
October 24 [e]	do	90	74	.32	— .04	24

[a] Drennan bridge.
[b] Frisco System Railroad bridge.
[c] Boat below Frisco bridge.
[d] Wading, one-third mile below Drennan Bridge.
[e] Wading, one-half mile below Drennan Bridge.

Mean daily gage height, in feet, of Black Warrior River (Locust Fork) at Palos, Ala., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.2	0.6	0.7	1.2	0.7	0.7	1.4	0.4	0.3	0.0	0.0	0.2
2	.2	.6	.7	1.2	.7	.8	.9	.4	.3	.0	.0	.3
3	.2	.5	.6	1.1	.6	.7	.5	.7	.3	.0	.2	.4
4	.1	.5	.6	1.1	.6	.5	.7	.6	.2	.0	.4	.6
5	.1	.5	.6	1.0	.5	.4	.5	1.0	.2	.0	.4	.1
6	.1	.5	.6	.9	.5	.4	.3	1.4	.2	.0	.3	1.4
7	.1	.6	1.9	1.2	.4	.3	.6	1.6	.2	.4	.2	1.3
8	.1	1.1	2.2	2.1	.7	.3	2.1	1.3	.1	.3	.2	1.1
9	.1	1.6	1.9	2.5	.7	.3	1.3	1.0	.1	.2	.2	1.9
10	.2	1.4	1.5	2.1	.6	.2	1.0	.8	.1	.1	.1	.9
11	.2	1.5	1.3	1.7	.7	.2	.8	1.3	.1	.1	.1	.8
12	.2	1.3	1.3	1.4	.6	.2	1.1	2.5	.1	.0	.1	.7
13	.2	1.3	1.3	1.3	.5	.2	1.2	2.1	.1	.0	.1	.7
14	.2	1.2	2.2	1.1	.4	.1	1.2	1.6	.0	.0	.1	.7
15	.2	1.0	5.0	1.0	.4	.1	.8	1.2	.0	.0	.1	.6
16	.2	.8	2.9	.9	.3	.1	.6	1.0	.0	.0	.1	.6
17	.3	.8	2.0	.9	.3	.0	.5	1.3	.0	.0	.1	.6
18	.4	.7	1.7	.9	.3	.0	.4	.9	.0	.0	.1	.5
19	.4	.7	1.5	.9	.2	.0	.4	.8	.0	.0	.1	.5
20	.4	.8	1.3	.8	.2	.0	.3	.6	.0	.0	.1	.5
21	.4	.8	1.2	.8	.2	.0	.3	.5	.0	.0	.1	.5
22	.6	.9	1.1	.8	.2	.0	.2	.4	.0	.0	.1	.4
23	1.3	.9	1.1	.8	.2	.0	.4	.4	.0	.0	.3	.4
24	2.3	.9	1.5	.7	.2	.0	.3	.4	.0	.0	.3	.4
25	1.1	.9	1.5	.7	.2	.6	.3	.3	.0	.0	.2	.8
26	.9	.8	1.3	.8	.2	.4	.3	.3	.0	.0	.2	.9
27	.8	.8	1.4	1.2	.1	.2	.4	1.0	.0	.0	.2	1.1
28	.7	.8	1.7	1.1	.1	.1	.4	.7	.0	.0	.2	2.9
29	.7	.7	1.6	.9	.1	.4	.5	1.0	.0	.0	.2	2.5
30	.6	.....	1.4	.8	.2	1.8	.3	.7	.0	.0	.2	1.7
31	.6	.....	1.3	.....	.5	.....	.2	.5	.....	.0	.....	1.3

Rating table for Black Warrior River (Locust Fork) at Palos, Ala., from January 1 to December 1, 1904.

Gage height	Discharge.	Gage height	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet*	*Second-feet*	*Feet*	*Second-feet.*	*Feet.*	*Second-feet.*
.00	34	0.90	690	1.80	2,020	3.40	4,940
.10	67	1.00	810	1.90	2,190	3.60	5,320
.20	110	1.10	935	2.00	2,360	3.80	5,700
.30	165	1.20	1,070	2.20	2,710	4.00	6,100
.40	230	1.30	1,210	2.40	3,070	4.20	6,500
.50	305	1.40	1,360	2.60	3,430	4.40	6,900
.60	390	1.50	1,515	2.80	3,800	4.60	7,300
.70	480	1.60	1,680	3.00	4,180	4.80	7,700
.80	580	1.70	1,850	3.20	4,560	5.00	8,100

The above table is based upon twenty-one discharge measurements made during 1902, 1903, and 1904. It is well defined between gage heights —0.1 foot and 5 feet.

Estimated monthly discharge of Black Warrior River (Locust Fork) at Palos, Ala., for 1904.

[Drainage area, 1,020 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	2,890	67	356	0.349	0.402
February	1,680	305	705	.691	.745
March	8,100	390	1,649	1.62	1.87
April	3,250	480	1,032	1.01	1.13
May	480	67	244	.239	.276
June	2,020	34	225	.221	.247
July	2,530	110	511	.501	.578
August	3,250	165	818	.802	.925
September	165	34	63.8	.063	.070
October	230	34	49.1	.048	.055
November	230	34	99.8	.098	.109
December	3,990	67	805	.789	.910
The year	8,100	34	546	.536	7.32

MISCELLANEOUS MEASUREMENTS IN MOBILE RIVER DRAINAGE BASIN.

The following is a list of miscellaneous discharge measurements made in Mobile River drainage basin during 1904:

Pinelog Creek near Cash, Ga.—This stream flows into Sallacoa Creek, a tributary of Coosawattee River. A measurement was made May 5 at Butler's bridge, about 1 mile above the mouth, near Cash. The bench mark is the top of the downstream end of the cross timber on first bent from the left bank, 17.00 feet above the datum of the gage.

Width, 54 feet; area, 150 square feet; mean velocity, 0.27 foot per second; gage height, 2.80 feet; discharge, 41 second-feet.

Sallacoa Creek near Cash, Ga.—This stream is a tributary of Coosawattee River. A measurement was made May 5 at Covington's bridge, about 4 miles above the mouth of Pinelog Creek and 4 miles east of Cash, Ga. The bench mark is the upstream end of the top of cross timber over the first bent from the left bank, 16.00 feet above the datum of the gage.

Width, 42 feet; area, 164 square feet; mean velocity, 0.15 foot per second; gage height, 2.60 feet; discharge, 24 second-feet.

Jack River near Alaculsy, Ga.—A measurement was made October 5 just above the falls, about 5 miles above the mouth of the river and 23 miles from Blue Ridge, Ga.

Width, 7 feet; area, 7 square feet; mean velocity, 1.86 feet per second; discharge, 13 second-feet.

Oothcaloga Creek near Calhoun, Ga.—This stream is a tributary of Oostanaula River. A measurement was made May 6 at a bridge about 1 mile from the mouth of the creek and 1 mile west of Calhoun. The bench mark is the downstream end of the top of cross timber on middle bent, 16.00 feet above the datum of the gage.

Width, 45 feet; area, 50 square feet; mean velocity, 0.64 foot per second; gage height, 2.15 feet; discharge, 32 second-feet.

Connasauga River near Resaca, Ga.—This stream is a tributary of Oostanaula River. A measurement was made November 25 from a boat at Fite's ferry, 2 miles from Resaca, Ga. The bench mark is a small nail in a large leaning willow tree on the left bank, about 200 feet below the ferry, 5.00 feet above the datum of the gage.

Width, 130 feet; area, 219 square feet; mean velocity, 0.74 foot per second; gage height, 2.65 feet; discharge, 163 second-feet.

Etowah River near Kingston, Ga.—Measurements were made at Hardin's bridge, 4 miles south of Kingston, Ga., as follows:

January 24: Width, 188 feet; area, 1,178 square feet; mean velocity, 1.60 feet per second; gage height, 3.45 feet; discharge, 1,894 second-feet.

April 14: Width, 188 feet; area, 1,154 square feet; mean velocity, 1.21 feet per second; gage height, 3.27 feet; discharge, 1,401 second-feet.

July 29: Width, 185 feet; area, 1,007 square feet; mean velocity, 0.62 foot per second; gage height, 2.56 feet; discharge, 625 second-feet.

A 5-foot section of gage rod is fastened to a tree on the left bank.

Etowah River near Canton, Ga.—A measurement was made July 27 at Field's bridge, about 6 miles below Canton. The bench mark is a chisel cut and white paint mark at intermediate post, the second floor beam of the main span from the left end of the bridge, downstream side, 36.00 feet above the datum of the gage.

Width, 89 feet; area, 307 square feet; mean velocity, 1.05 feet per second; gage height, 2.67 feet; discharge, 322 second-feet.

Cave Spring at Cavespring, Ga.—This spring is tributary to Little Cedar Creek. A measurement was made January 21 at the footbridge at Cave Spring. The water surface was 16½ inches below the upstream side of the bridge floor, 6 inches from the right end of the bridge.

Width, 13 feet; area, 5.6 square feet; mean velocity, 0.94 foot per second; discharge, 5.3 second-feet.

Little Cedar River near Cavespring, Ga.—This stream enters Big Cedar Creek about 2 miles north of Cavespring, Ga. A measurement was made September 28 from the bridge near Cavespring. The bench mark is the top of the first floor beam from the right bank, downstream end, 9.00 feet above the datum of the gage.

Width, 30 feet; area, 18 square feet; mean velocity, 1.00 foot per second; gage height, 1.27 feet; discharge, 18 second-feet.

Big Cedar Creek near Cavespring, Ga.—This stream enters Coosa River about 6 miles northwest of Cavespring. Measurements were made at the bridge 2½ miles northeast of Cavespring. The bench mark is the top of the second iron floor beam from the right end of the bridge, upstream side, 17.00 feet above the datum of the gage.

January 21: Width, 62 feet; area, 207 square feet; mean velocity, 0.37 foot per second; gage height, 3.13 feet; discharge, 78 second-feet.

September 28: Width, 67 feet; area, 177 square feet; mean velocity, 0.29 foot per second; gage height, 3.00 feet; discharge, 51 second-feet.

Hatchet Creek near Goodwater, Ala.—This stream enters Coosa River about 10 miles east of Clanton, Ala. A measurement was made October 17 by wading 200 yards below bridge on the road to Hanover, Ala., 8 miles from Goodwater, Ala. The bench mark is the downstream end of the first floor beam from the left bank, 21.00 feet above the datum of the gage.

Width, 26 feet; area, 19 square feet; mean velocity, 0.96 foot per second; gage height, 1.05 feet; discharge, 18 second-feet.

Tallapoosa River near Tallapoosa, Ga.—A measurement was made March 9 from the wooden bridge near the Southern Railway and one-half mile below Bentley's dam, below the mouth of Walkers Creek. The bench mark is the top of the upper end of the floor beam on top of wooden pier, 106 feet from the initial point for soundings, 25.00 feet above the datum of the gage.

Width, 89 feet; area, 517 square feet; mean velocity, 0.74 foot per second; gage height, 6.25 feet; discharge, 381 second-feet.

Tallapoosa River near Heflin, Ala.—A measurement was made September 23 from Ross's bridge near Heflin, Ala. The bench mark is three tacks in first beam from the left bank, downstream side, 17.00 feet above the datum of the gage.

Width, 90 feet; area, 245 square feet; mean velocity, 0.77 foot per second; gage height, 2.22 feet, discharge, 189 second-feet.

Cedar Creek near Wedowee, Ala.—A measurement was made September 24 at the bridge 12 miles north of Wedowee. The bench mark is bolt which holds the bridge to maple tree on the left bank, upstream side, 7.00 feet above the datum of the gage.

Width, 25 feet; area, 42 square feet; mean velocity, 0.53 foot per second; gage height, 1.25 feet; discharge, 22 second-feet.

Hillabee Creek near Alexander City, Ala.—A gaging station was for a while maintained on this tributary of Tallapoosa River; the gage height below is from the old gage. A measurement made October 14 gave the following results:

Width, 87 feet; area, 96 square feet; mean velocity, 0.53 foot per second; gage height, 0.73 foot; discharge, 51 second-feet.

Tallapoosa River at Milstead, Ala.—A measurement was made April 14 at the old gaging station on Tallapoosa River at Milstead, which was abandoned April 30, 1903.

Width, 230 feet; area, 1,587 square feet; mean velocity, 2.44 feet per second; gage height, 2.93 feet; discharge, 3,871 second-feet.

Blackwater Creek near Jasper, Ala.—This stream is a tributary of Mulberry Fork of Black Warrior River. A measurement was made May 24 from the wagon bridge about 5 miles below Carmack's mill, near Jasper, Ala. The bench mark is the top of the downstream end of the floor beam 34 feet from the initial point for soundings, 36.00 feet above the datum of the gage.

Width, 34 feet; area, 41 square feet; mean velocity, 0.42 foot per second; gage height, 1.40 feet, discharge, 17 second-feet.

East Cahaba River near Birmingham, Ala.—A measurement was made August 6 from the foot log at the ford on the road to Columbiana, 10 miles from Birmingham. The bench mark is two copper nails in the downstream side of an ash tree on the left bank, 50 feet below the ford, 8.00 feet above the datum of the gage.

Width, 34 feet; area, 40 square feet; mean velocity, 1.67 feet per second; gage height, 2.00 feet; discharge, 66 second-feet.

East Cahaba River near Bridgeton, Ala.—A measurement was made August 6 at the ford below Deshazo's mill near Bridgeton.

Width, 49 feet; area, 57 square feet; mean velocity, 1.37 feet per second; discharge, 79 second-feet.

PEARL RIVER DRAINAGE BASIN.

Pearl River rises in the eastern part of Mississippi. It flows south into Lake Borgne, an arm of the Gulf of Mexico, forming part of the boundary between Louisiana and Mississippi. The United States Geological Survey maintains one station on this river. It is located at Jackson, Miss.

PEARL RIVER AT JACKSON, MISS.

This station was established June 24, 1901, by K. T. Thomas. It is located 2 miles from the Union station at Jackson, Miss., one-eighth mile above the Alabama and Vicksburg Railroad, and two blocks east from the end of the South State street car line. The chain gage is fastened to the downstream side of the bridge at a point 130 feet from the initial point for soundings. The length of the chain from the end of the weight to the marker is 41.91 feet. The gage is read once each day by James Hurst. Discharge measurements are made from the single-span highway bridge and from an approach of 680 feet of iron trestle on the left bank. The initial point for soundings is the end of

The preceding table is based upon fourteen discharge measurements made during 1901–1904. It is well defined between gage heights 0.30 foot and 8.30 feet. The table has been extended beyond these limits.

Estimated monthly discharge of Pearl River at Jackson, Miss., for 1904.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
January	407	216	310
February	3,080	375	1,059
March	4,575	475	1,747
April	5,295	407	2,372
May	982	178	382
June	1,078	133	224
July	2,915	216	972
August	3,495	668	1,518
September	511	162	242
October	288	80	125
November	133	80	100
December	548	133	222
The year	5,295	80	773

MINOR EASTERN GULF OF MEXICO DRAINAGE BASINS.

MISCELLANEOUS MEASUREMENTS.

Conecuh River near River Falls, Ala.—A measurement was made May 24 at a bridge 8 miles above the regular gaging station on Conecuh River at Beck, Ala. The water surface was 46.69 feet below the top of the downstream end of second floor beam from the left end of the bridge.

Width, 120 feet; area, 372 square feet; mean velocity, 1.05 feet per second; discharge, 391 second-feet.

Patsaliga Creek near Gantt, Ala.—This stream is practically the North Fork of Conecuh River, entering from the right about 4 miles north of Andalusia, Ala. A measurement was made June 24 at Parker Bridge, near Gantt. The water surface was 28.07 feet below the head of a nail driven into the top of the downstream end of the wooden floor beam under the middle of the truss.

Width, 65 feet; area, 48 square feet; mean velocity, 1.89 feet per second; discharge, 91 second-feet.

Yellow River near Oak Grove, Fla.—A measurement was made June 23 at Richburg Bridge, about 7 miles east of Laurel Hill, Fla. The bench mark is the top of the upstream end of the first floor beam from the left pier of the bridge, 20.00 feet above the datum of the gage.

Width, 107 feet; area, 190 square feet; mean velocity, 1.20 feet per second; gage height, 2.19 feet; discharge, 227 second-feet.

Choctawhatchee River near Elba Junction, Ala.—A measurement was made September 24 from the Atlantic Coast Line Railway bridge, near Elba Junction. The water surface was 35.85 feet below the top of the first floor beam from the right bank.

Width, 95 feet; area, 471 square feet; mean velocity, 0.26 foot per second; discharge, 124 second-feet.

Choctawhatchee River near Newton, Ala.—A measurement was made September 24 at the wagon bridge 1 mile west of Newton and 2 miles below the gaging made the same day near Elba Junction. The water surface was 36.70 feet below the top of reinforcing plate at the bottom of the fourth intermediate post from the left bank, downstream side.

Width, 55 feet; area, 99 square feet; mean velocity, 1.27 feet per second; discharge, 125 second-feet.

Choctawhatchee River near Bellwood, Ala.—A measurement was made June 20 from the wagon bridge 2 miles from Bellwood. The water surface was 20.45 feet below the top of the downstream lower chord, at a point 1 foot to the right of the first intermediate post from the left bank.

Width, 151 feet; area, 456 square feet; mean velocity, 0.90 foot per second; discharge, 411 second-feet.

Suwanee River at railway bridge, near Suwanee, Fla.—Measurements were made from the Atlantic Coast Line Railway bridge near Suwanee, Fla. The bench mark is the top of the downstream end of the second floor beam from the right bank, 45.00 feet above the datum of the gage.

December 20—Width, 79 feet; area, 397 square feet; mean velocity, 0.74 foot per second; gage height, 2.85 feet; discharge, 295 second-feet.

December 20—Width, 79 feet; area, 394 square feet; mean velocity, 0.73 foot per second; gage height, 2.85 feet; discharge, 290 second-feet.

Suwanee River at wagon bridge, near Suwanee, Fla.—A measurement was made December 21 from the wagon bridge at Suwanee Sulphur Spring. The bench mark is a chisel mark on the first intermediate post from the right bank, 6 feet above the top of the floor beam, 41.00 feet above the datum of the gage.

Width, 89 feet; area, 249 square feet; mean velocity, 0.95 foot per second; gage height, 1.57 feet; discharge, 237 second-feet.

Suwanee River near Ellaville, Fla.—A measurement was made December 22 from the Seaboard Air Line Railway bridge. The bench mark is the downstream end of the first floor beam from the left bank, 37.00 feet above the datum of the gage.

Width, 231 feet; area, 1,798 square feet; mean velocity, 1.01 feet per second; gage height, 1.41 feet; discharge 1,813 second-feet.

Santa Fe River near High Springs, Fla.—This stream enters Suwanee River from the left about 30 miles above its mouth. A measure-

ment was made December 22 at the wagon bridge, just above the Atlantic Coast Line Railroad bridge. The bench mark is the top of the downstream end of the cap of the first bent from the left bank, 17.00 feet above the datum of the gage.

Width, 130 feet; area, 996 square feet; mean velocity, 0.54 foot per second; gage height, 1.60 feet; discharge, 537 second-feet.

Withlacoochee River at Dunnellon, Fla.—A measurement was made December 24 from the new iron wagon bridge, one-fourth mile from Dunnellon, Fla.:

Width, 82 feet; area, 1,003 square feet; mean velocity, 1.27 feet per second; discharge, 1,270 second-feet. The water surface was 14.05 feet below the top of the downstream right-bank pier.

Blue Run near Dunnellon, Fla.—This stream is tributary to Withlacoochee River. A measurement was made December 24 from the wagon bridge, three-fourths mile east of Dunnellon:

Width, 53 feet; area, 422 square feet; mean velocity, 1.70 feet per second; discharge, 716 second-feet. The water surface was 4.45 feet below the top of the cap of the right bent, downstream side of the bridge.

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PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

[Water-Supply Paper No. 127.]

The publications of the United States Geological Survey consist of (1) Annua. Reports; (2) Monographs; (3) Professional Papers; (4) Bulletins; (5) Mineral Resources; (6) Water-Supply and Irrigation Papers; (7) Topographic Atlas of United States, folios and separate sheets thereof; (8) Geologic Atlas of United States, folios thereof. The classes numbered 2, 7, and 8 are sold at cost of publication; the others are distributed free. A circular giving complete lists may be had on application.

Most of the above publications may be obtained or consulted in the following ways:

1. A limited number are delivered to the Director of the Survey, from whom they may be obtained, free of charge (except classes 2, 7, and 8), on application.

2. Every member of Congress is allotted a certain number, from whom they may be obtained, free of charge, on application.

3. Other copies are deposited with the Superintendent of Documents, Washington, D. C., from whom they may be had at practically cost.

4. Copies of all Government publications are furnished to the principal public libraries in the large cities throughout the United States, where they may be consulted by those interested.

The Professional Papers, Bulletins, and Water-Supply Papers treat of a variety of subjects, and the total number issued is large. They have therefore been classified into the following series: A, Economic geology; B, Descriptive geology; C, Systematic geology and paleontology; D, Petrography and mineralogy; E, Chemistry and physics; F, Geography; G, Miscellaneous; H, Forestry; I, Irrigation; J, Water storage; K, Pumping water; L, Quality of water; M, General hydrographic investigations; N, Water power; O, Underground waters; P, Hydrographic progress reports.

Series P.—The hydrographic progress reports contain the results of stream measurements. A report is issued for every calendar year, containing the results of data collected during that year. These reports were first published as a part of the Director's annual report or as a bulletin; they are now published as water-supply and irrigation papers. The following is a list, by years, of the publications containing the progress reports of stream measurements. A detailed index of these reports (1888–1903) is published as Water-Supply Paper No. 119.

1888. Tenth Annual Report, Part II.
1889. Eleventh Annual Report, Part II.
1890. Twelfth Annual Report, Part II.
1891. Thirteenth Annual Report, Part III.
1892. Fourteenth Annual Report, Part II.
1893. Bulletin No. 131.
1894. Bulletin No. 131; Sixteenth Annual Report, Part II.
1895. Bulletin No. 140.
1896. Water-Supply Paper No. 11; Eighteenth Annual Report, Part IV.
1897. Water-Supply Papers Nos. 15 and 16; Nineteenth Annual Report, Part IV.
1898. Water-Supply Papers Nos. 27 and 28; Twentieth Annual Report, Part IV.
1899. Water-Supply Papers Nos. 35, 36, 37, 38, and 39; Twenty-first Annual Report, Part IV.
1900. Water-Supply Papers Nos. 47, 48, 49, 50, 51, and 52; Twenty-second Annual Report, Part IV.
1901. East of Mississippi River, Water-Supply Papers Nos. 65 and 75.
West of Mississippi River, Water-Supply Papers Nos. 66 and 75.
1902. East of Mississippi River, Water-Supply Papers Nos. 82 and 83.
West of Mississippi River, Water-Supply Papers Nos. 84 and 85.

1903. East of Mississippi River, Water-Supply Papers Nos. 97 and 98.
West of Mississippi River, Water-Supply Papers Nos. 99 and 100.
1904. East of Mississippi River, Water-Supply Papers Nos. 124, 125, 126, 127, 128, and 129.
West of Mississippi River, Water-Supply Papers Nos. 130, 131, 132, 133, 134, and 135.

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U. S. Geological survey.

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Reference.

U. S. Dept. of the Interior.

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