Water-Supply and Irrigation Paper No. 168 Series P, Hydrographic Progress Reports, 44

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
CHARLES D. WALCOTT, DIRECTOR

REPORT

OF

PROGRESS OF STREAM MEASUREMENTS

FOR

THE CALENDAR YEAR 1905

PREPARED UNDER THE DIRECTION OF F. H. NEWELL

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

BY

M. R. HALL and JOHN C. HOYT

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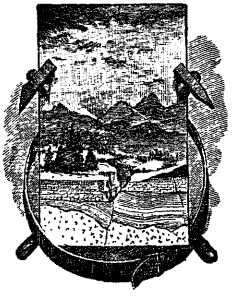

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INTRODUCTION.

ORGANIZATION AND SCOPE OF WORK.

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. The first specific appropriation for gaging streams was made by the act of August 18, 1894, which contained an item of $12,500 "for gauging 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." (Stat. L., vol. 28, p. 398.)

Since that time the appropriations have been gradually increased, as shown by the following table:

Annual appropriation for hydrographic surveys for fiscal years ending June 30, 1895 to 1906.

1895	$12,500	1901	$100,000
1896	20,000	1902	100,000
1897	50,000	1903	200,000
1898	50,000	1904	200,000
1899	50,000	1905	200,000
1900	50,000	1906	200,000

As a result of the increased appropriations the work has been greatly extended, and at the same time it has been more thoroughly systemized by the adoption of standard methods and by grouping the States into districts, in each of which a district hydrographer and a corps of assistants carry on a comprehensive study of the hydrographic resources.

The chief features of the hydrographic work are the collection of data relating to the flow of the surface waters and the study of the conditions affecting this flow. There is also collected information concerning river profiles, duration and magnitude of floods, water power, etc., which may be of use in hydrographic studies. This work includes the study of the hydrography of every important river basin in the United States and is of direct value in the commercial and agricultural development of the country.

In order to collect the material from which estimates of daily flow are made, gaging stations are established. The selection of a site for a gaging station and the length of time it is maintained depend largely upon the physical features and the needs of each locality. If the water is to be used for power, special effort is made to obtain informa-

tion concerning the minimum flow; if water is to be stored, the maximum flow receives special attention. In all sections of the country permanent stations are maintained for general statistical purposes, to show the conditions existing through long periods. They are also used as primary stations, and, in connection with short series of measurements, serve as a basis for estimating the flow at other points in the drainage basin.

During the calendar year 1905 the division of hydrography has continued measuring the flow of streams on the same general lines as in previous years. Many new and improved methods have been introduced, by which the accuracy and value of the results have been increased. Approximately 800 regular gaging stations were maintained during the year, and an exceptionally large number of miscellaneous measurements and special investigations were made. "The report of Progress of Stream Measurements," which contains the results of this work, is published in a series of fourteen Water-Supply and Irrigation Papers, Nos. 165 to 178, as follows:

No. 165. Atlantic coast of New England drainage.
No. 166. Hudson, Passaic, Raritan, and Delaware River drainages.
No. 167. Susquehanna, Gunpowder, Patapsco, Potomac, James, Roanoke, and Yadkin River drainages.
No. 168. Santee, Savannah, Ogeechee, and Altamaha rivers and Eastern Gulf of Mexico drainages.
No. 169. Ohio and lower eastern Mississippi river drainages.
No. 170. Great Lakes and St. Lawrence River drainages.
No. 171. Hudson Bay, and upper eastern and western Mississippi River drainages.
No. 172. Missouri River drainage.
No. 173. Meramec, Arkansas, Red, and lower western Mississippi river drainages.
No. 174. Western Gulf of Mexico and Rio Grande drainages.
No. 175. Colorado River drainage.
No. 176. The Great Basin drainage.
No. 177. The Great Basin and Pacific Ocean drainages in California.
No. 178. Columbia River and Puget Sound drainages.

These papers embody the data collected at the regular gaging stations, the results of the computations based upon the observations, and such other information as may have a direct bearing on the subject of study, and include, as far as practicable, descriptions of the basins and the streams draining them.

For the purpose of introducing uniformity into the reports for the various years the drainages of the United States have been divided into eleven grand divisions, which have been again divided into secondary divisions, as shown in the following list. The Progress Report has been made to conform to this arrangement, each part containing the data for one or more of the secondary divisions. The secondary divisions have in most cases been redivided, and the facts have been arranged, as far as practicable, geographically.

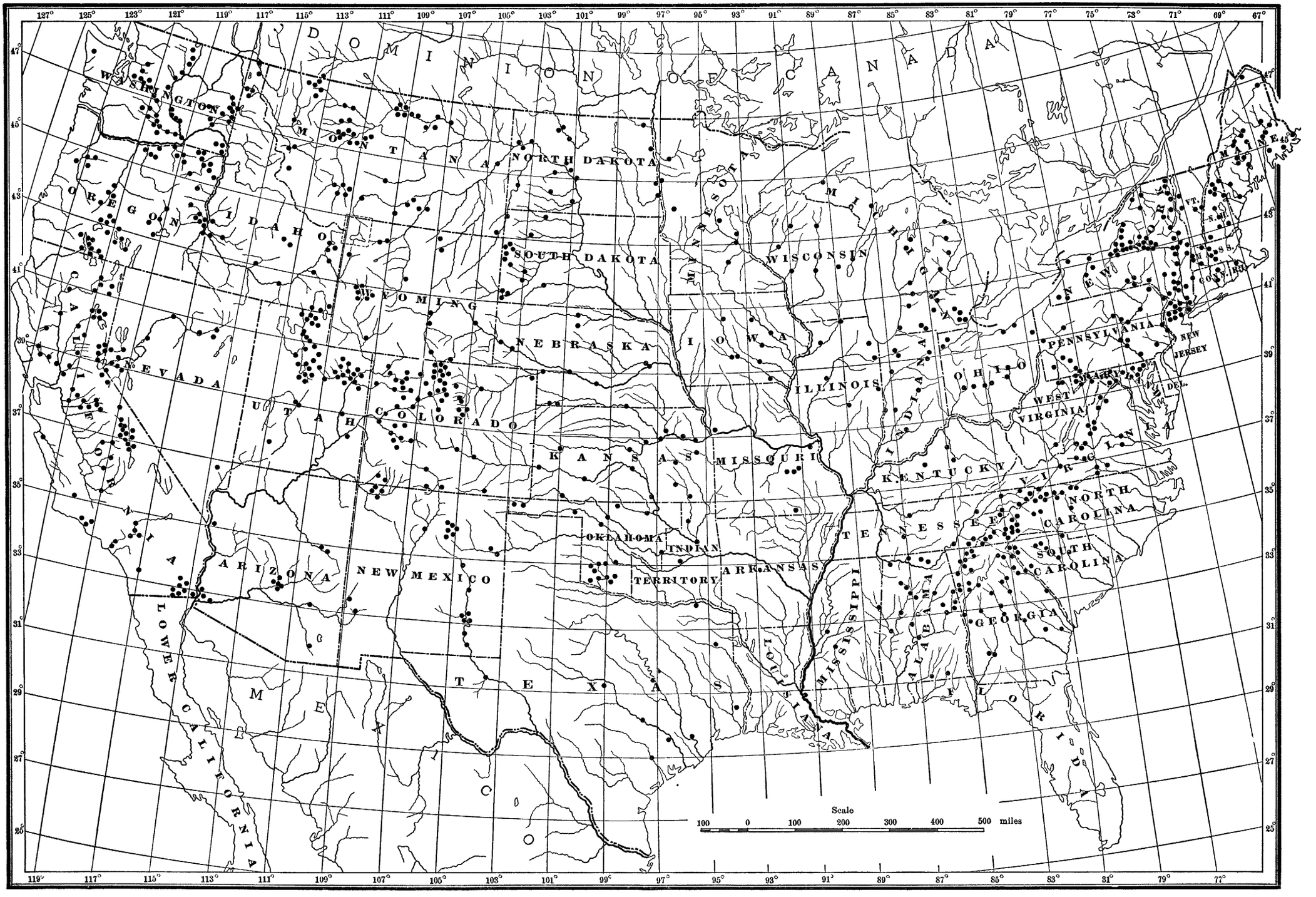
List of drainage basins in the United States.

NORTHERN ATLANTIC DRAINAGE BASINS.

St. John.	Thames.
St. Croix.	Housatonic.
Penobscot.	Hudson.
Kennebec.	Passaic.
Androscoggin.	Raritan.
Presumpscot.	Delaware.
Saco.	Susquehanna.
Merrimac.	Potomac.
Connecticut.	Minor Chesapeake Bay.
Blackstone.	Minor Northern Atlantic.

SOUTHERN ATLANTIC DRAINAGE BASINS.

James.	Great Pedee (Yadkin).
Chowan.	Santee.
Roanoke.	Savannah.
Tar.	Ogeechee.
Neuse.	Altamaha.
Cape Fear.	Minor Southern Atlantic.



MAP OF THE UNITED STATES, SHOWING LOCATION OF PRINCIPAL RIVER STATIONS MAINTAINED DURING 1905.

EASTERN GULF OF MEXICO DRAINAGE BASINS.

Suwanee.
Apalachicola.
Mobile.
Pearl.
Minor Eastern Gulf of Mexico.

EASTERN MISSISSIPPI RIVER DRAINAGE BASINS.

Lower eastern Mississippi.
Ohio.
Upper eastern Mississippi.

ST. LAWRENCE DRAINAGE BASINS.

Lake Superior.
Lake Michigan.
Lake Huron.
Lake St. Clair.
Lake Erie.
Niagara River.
Lake Ontario.
Lake Champlain (Richelieu River).
Minor St. Lawrence.

WESTERN MISSISSIPPI RIVER DRAINAGE BASINS.

Upper western Mississippi.
Missouri.
Meramec.
Lower western Mississippi.
Arkansas.
Red.

WESTERN GULF OF MEXICO DRAINAGE BASINS.

Sabine.
Neches.
Trinity.
Brazos.
Colorado (of Texas).
Guadelupe.
San Antonio.
Nueces.
Rio Grande.
Minor Western Gulf of Mexico.

COLORADO RIVER DRAINAGE BASIN.

THE GREAT BASIN.

Wasatch Mountain.
Humboldt.
Sierra Nevada.
Minor streams in Great Basin.

PACIFIC COAST DRAINAGE BASINS.

Southern Pacific.
San Francisco Bay.
Northern Pacific.
Columbia.
Puget Sound.

DEFINITIONS.

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

"Second-foot" is an abbreviation for cubic foot per second, and is the quantity of water flowing in a stream one foot wide, one foot deep, at a rate of one foot per second. It is generally used as a fundamental unit from which others are computed.

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

The "miner's inch" is the quantity of water that passes through an orifice one inch square under a head which varies locally. It has been commonly used by miners and irrigators throughout the West, and is defined by statute in each State in which it is used. In most States the California miner's inch is used, which is the fiftieth part of a second-foot.

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

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

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of one foot. It is commonly used in connection with storage for irrigation work. There is a convenient relation between the second-foot and the acre-foot. One second-foot flowing for twenty-four hours will deliver 86,400 cubic feet or approximately two acre-feet.

EXPLANATION OF TABLES.

For each regular gaging 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, based upon all the facts obtained to date.

The descriptions of stations give such general information about the locality and equipment as would enable the reader to find and use the station, and 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, including the date, the name of the hydrographer, the area of cross section, the mean velocity, the gage height, and the discharge in second-feet.

The table of daily gage heights gives the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. At most 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 monthly discharge, the column headed "Maximum" gives the mean flow for the day when the mean gage height was 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" is the average flow for each second during the month. Upon this the computations for the two remaining columns, which are defined on page 9, 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 be expressed by at least two and 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 of 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 out 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.

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 to at least three significant figures, except in the case of decimals where the first significant figure is preceded by one or more naughts (0), when the quantity shall be carried out to two significant figures. Example: 1.25; 0.125; 0.012; 0.0012. The yearly means for these quantities are always to be expressed in three significant figures and at least two decimal places.

CONVENIENT EQUIVALENTS.

1 second-foot equals 50 California miner's inches.
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,272 gallons for one day.
1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet deep, 13.572 inches deep.
1 second-foot for one year equals 0.000214 cubic mile; equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot falling 10 feet equals 1.136 horsepower.
100 California miner's inches equals 15 United States gallons per second.
100 California miner's inches equals 77 Colorado miner's inches.
100 California miner's inches for one day equals 4 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches equals 130 California miner's inches.
100 Colorado miner's inches for one day equals 5.2 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.44 acre-feet.
1 million United States gallons per day equals 1.55 second-feet.
1 million United States gallons equals 3.07 acre-feet.
1 million cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 inch equals 2.54 centimeters.
1 foot equals 0.3048 meter.
1 yard equals 0.9144 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 1,760 yards; equals 5,280 feet; equals 63,360 inches.
1 square yard equals 0.836 square meter.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet; equals 4,840 square yards.
1 acre equals 209 feet square, nearly.
1 square mile equals 259 hectares.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons; equals 0.804 bushel.
1 cubic foot of water weighs 62.5 pounds.
1 cubic yard equals 0.7646 cubic meter.
1 cubic mile equals 147,198,000,000 cubic feet.
1 cubic mile equals 4,667 second-feet for one year.

1 gallon equals 3.7854 liters.
1 gallon equals 8.36 pounds of water.
1 gallon equals 231 cubic inches (liquid measure).
1 pound equals 0.4536 kilogram.
1 avoirdupois pound equals 7,000 grains.
1 troy pound equals 5,760 grams.
1 meter equals 39.37 inches. Log. 1.5951654.
1 meter equals 3.280833 feet. Log. 0.5159842.
1 meter equals 1.093611 yards. Log. 0.0388629.
1 kilometer equals 3,281 feet; equals five-eighths mile, nearly.
1 square meter equals 10,764 square feet; equals 1,196 square yards.
1 hectare equals 2.471 acres
1 cubic meter equals 35.314 cubic feet; equals 1.308 cubic yards.
1 liter equals 1.0567 quarts.
1 gram equals 15.43 grains.
1 kilogram equals 2.2046 pounds
1 tonneau equals 2,204.6 pounds.
1 foot per second equals 1.097 kilometers per hour.
1 foot per second equals 0.68 mile per hour.
1 cubic meter per minute equals 0.5886 second-foot.
1 atmosphere equals 15 pounds per square inch; 1 ton per square foot; 1 kilogram per square centimeter.
Acceleration of gravity equals 32.16 feet per second every second.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.8 feet.
1⅓ horsepower equal about 1 kilowatt.
To calculate water power quickly: $\frac{\text{Sec.-ft. x fall in feet}}{11}$ =Net horsepower on water wheel, realizing 80 per cent of the theoretical power.
Quick formula for computing discharge over weirs: Cubic feet per minute equals $0.4025\,lV\overline{h^3}$; l=length of weir in inches; h=head in inches flowing over weir, measured from surface of still water.
To change miles to inches on map:
Scale 1:125000, 1 mile=0.50688 inch.
Scale 1:90000, 1 mile=0.70400 inch.
Scale 1:62500, 1 mile=1.01376 inches.
Scale 1:45000, 1 mile=1.40800 inches.

FIELD METHODS OF MEASURING STREAM FLOW.

The methods used in collecting these data and in preparing them for publication are given in detail in Water-Supply Papers No. 94 (Hydrographic Manual, U. S. Geological Survey) and No. 95 (Accuracy of Stream Measurements). In order that persons using this report may readily become acquainted with the general methods employed, the following brief descriptions are given:

Streams may be divided, with respect to their physical conditions, into three classes: (1) Those with permanent beds; (2) those with beds which change only during extreme low or high water; (3) those with constantly shifting beds. In estimating the daily flow, special methods are necessary for each class. The data upon which these estimates are based and the methods of collecting them are, however, in general the same.

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

Slope method.—Much information has been collected relative to the coefficients to be used in the Chezy formula, $v=c\sqrt{Rs}$. This has been utilized by Kutter, both in developing his formula for c and in determining the values of the coefficient n, which appears therein. The results obtained by the slope method are, in general, only roughly approximate, owing to the difficulty in obtaining accurate data and the uncertainty of the value for n to be

used in Kutter's formula. The most common use of this method is in estimating the flood discharge of a stream when the only data available are the cross section, the slope as shown by marks along the bank, and a knowledge of the general conditions.

Weir method.—When funds are available and the conditions are such that sharp-crested weirs can be erected, these offer the best facilities for determining the flow. If dams are suitably situated and constructed, they may be utilized for obtaining reliable estimates of flow. The conditions necessary to insure good results may be divided into two classes: (1) Those relating to the physical characteristics of the dam itself, and (2) those relating to the diversion and use of water around and through the dam.

The physical requirements are as follows: (a) Sufficient height of dam, so that backwater will not interfere with free fall over it; (b) absence of leaks of appreciable magnitude; (c) topography or abutments which confine the flow over the dam at high stages; (d) level crests, which are kept free from obstructions caused by floating logs or ice; (e) crests of a type for which the coefficients to be used in $Q=c\,b\,h^{\frac{3}{2}}$ or some similar standard weir formula, are known (see Water-Supply Paper No. 150); (f) either no flash boards or exceptional care in reducing leakage through them and in recording their condition.

Preferably there should be no diversion of water through or around the dam. Generally, however, the dam is built for purposes of power or navigation, and part or all of the water flowing past it is diverted for such uses. This water is measured and added to that passing over the dam. To insure accuracy in such estimates the amount of water diverted should be reasonably constant. Furthermore, it should be so diverted that it can be measured,

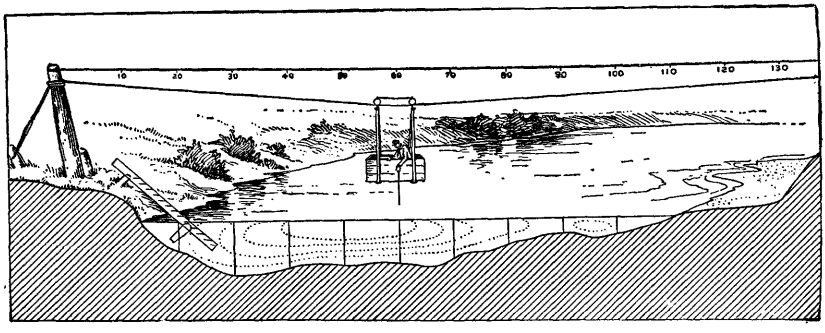


FIG. 1.—Cable station, showing section of river, car, gage, etc.

either by a weir, a current meter, or a simple system of water wheels which are of standard make, or which have been rated as meters under working conditions, and so installed that the gate openings, the heads under which they work, and their angular velocities may be accurately observed.

The combination of physical conditions and uses of the water should be such that the estimates of flow will not involve, for a critical stage of considerable duration, the use of a head, on a broad-crested dam, of less than 6 inches. Moreover, when all other conditions are good, the cooperation of the owners or operators of the plant is still essential if reliable results are to be obtained.

A gaging station at a weir or dam has the general advantage of continuity of record through the period of ice and floods, and the disadvantages of uncertainty of coefficient to be used in the weir formula and of complications in the diversion and use of the water.

Velocity method.—The determination of the quantity of water flowing past a certain section of a stream at a given time is termed a discharge measurement. This quantity is the product of two factors—the mean velocity and the area of the cross section. The mean velocity is a function of surface slope, wetted perimeter, roughness of bed, and the channel conditions at, above, and below the gaging section. The area depends upon the contour of the bed and the fluctuations of the surface. The two principal ways of measuring the velocity of a stream are by floats and current meters.

Great care is taken in the selection and equipment of gaging stations for determining discharge by velocity measurements in order that the data may have the required degree of accuracy. Their essential requirements are practically the same whether the velocity is determined by meters or floats. They are located as far as possible where the channel is straight both above and below the gaging section; where there are no cross currents, backwater or boils; where the bed of the stream is reasonably free from large projections of a permanent character; and where the banks are high and subject to overflow only at flood stages. The station must be so far removed from the effects of tributary streams and dams or other artificial obstructions that the gage height shall be an index of the discharge.

There are generally pertinent to a gaging station certain permanent or semipermanent structures which are usually referred to as equipment. These are a gage for determining the fluctuations of the water surface, bench marks to which the datum of the gage is referred, permanent marks on a bridge or a tagged line indicating the points of measurement, and where the current is swift, some appliance (generally a secondary cable) to hold the meter in position in the water. As a rule, the stations are located at bridges if the channel conditions are satisfactory, as from them the observations can more readily be made and the cost of the equipment is small.

The floats in common use are the surface, subsurface, and tube or rod floats. A corked bottle with a flag in the top and weighted at the bottom makes one of the most satisfactory surface floats, as it is affected but little by wind. In case of flood measurements, good results can be obtained by observing the velocity of floating cakes of ice or débris. In case of all surface float measurements coefficients must be used to reduce the observed velocity to the mean velocity. The subsurface and tube or rod floats are intended to give directly the mean velocity in the vertical. Tubes give excellent results when the channel conditions are good, as in canals.

In measuring velocity by a float, observation is made of the time taken by the float to pass over the "run," a selected stretch of river from 50 to 200 feet long. In each discharge measurement a large number of velocity determinations are made at different points across the stream, and from these observations the mean velocity for the whole section is determined. This may be done by plotting the mean positions of the floats as indicated by the distances from the bank as ordinates and the corresponding times as abscissas. A curve through these points shows the mean time of run at any point across the stream, and the mean time for the whole stream is obtained by dividing the area bounded by this curve and its axis by the width. The length of the run divided by the mean time gives the mean velocity.

The area used in float measurements is the mean of the areas at the two ends of the run and at several intermediate sections.

The essential parts of the current meters in use are a wheel of some type, so constructed that the impact of flowing water causes it to revolve, and a device for recording or indicating the number of revolutions. The relation between the velocity of the moving water and the revolutions of the wheel is determined for each meter. This rating is done by drawing the meter through still water for a given distance at different speeds, and noting the number of revolutions for each run. From these data a rating table is prepared which gives the velocity per second for any number of revolutions.

Many kinds of current meters have been constructed. They may, however, be classed in two general tpyes: Those in which the wheel is made up of a series of cups, as the Price, and those having a screw propeller wheel, as the Haskell. Each meter has been developed for use under some special condition. In the case of the small Price meter, which has been largely developed and has been extensively used by the United States Geological Survey, an attempt has been made to get an instrument which could be used under practically all conditions.

Current-meter measurements may be made from a bridge, a cable, a boat, or by wading, and gaging stations may be classified in accordance with such use. Fig. 1 shows a typical cable station.

In making the measurement an arbitrary number of points are laid off on a line perpendicular to the thread of the stream. The points at which the velocity and depth are observed are known as measuring points, and are usually fixed at regular intervals, varying from 2 to 20 feet, depending upon the size and condition of the stream. Perpendiculars dropped from the measuring points divide the gaging section into strips. For each strip or pair of strips the mean velocity, area, and discharge are determined independently, so that conditions existing in one part of the stream may not be extended to parts where they do not apply.

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

The three principal multiple-point methods in general use are the vertical velocity-curve; 0.2 and 0.8 depth; and top, bottom, and mid-depth.

In the vertical velocity-curve method a series of velocity determinations are made in each vertical at regular intervals, usually from 0.5 to 1 foot apart. By plotting these velocities as abscissas and their depths as ordinates, and drawing a smooth curve among the resulting points, the vertical velocity-curve is developed. This curve shows graphically the magnitude and changes in velocity from the surface to the bottom of the stream. The mean velocity in the vertical is then obtained by dividing the area bounded by this velocity-curve and its axis by the depth. On account of the length of time required to make a complete measurement by this method, its use is limited to the determination of coefficients for purposes of comparison and to measurements under ice.

In the second multiple point method the meter is held successively at 0.2 and 0.8 of the depth and the mean of the velocities at these two points is taken as the mean velocity for that vertical. Assuming that the vertical velocity-curve is a common parabola with horizontal axis, the mean of the velocities at 0.22 and 0.79 of the depth will give (closely) the mean velocity in the vertical. Actual observations under a wide range of conditions show that this second multiple-point method gives the mean velocity very closely for open-water conditions where the depth is over 5 feet and the bed comparatively smooth, and moreover the indications are that it will hold nearly as well for ice-covered rivers.

In the third multiple-point method the meter is held at mid-depth, at 0.5 foot below the surface, and at 0.5 foot above the bottom, and the mean velocity is determined by dividing by 6 the sum of the top velocity, 4 times the mid-depth velocity, and the bottom velocity. This method may be modified by observing at 0.2, 0.6, and 0.8 depth.

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 generally occurs 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, at which point the meter is held in a majority of the measurements. A large number of vertical velocity-curve measurements taken on many streams and under varying conditions show that the average coefficient for reducing the velocity obtained at 0.6 depth to mean velocity is practically unity.

In the other principal single-point method the meter is held near the surface, usually 1 foot below, or low enough to be out of the effect of the wind or other disturbing influences. This is known as the subsurface method. The coefficient for reducing the velocity taken at the subsurface to the mean has been found to be from 0.85 to 0.95, depending upon the stage, velocity and channel conditions. The higher the stage the larger the coefficient. 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 vertical-integration method consists in moving the meter at a slow, uniform speed from the surface to the bottom and back again to the surface, and noting the number of revolutions and the time taken in the operation. This method has the advantage that the velocity at each point of the vertical is measured twice. It is well adapted for measurements under ice and as a check on the point methods.

The area, which is the other factor in the velocity method of determining the discharge of a stream, depends on the stage of the river, which is observed on the gage, and on the general contour of the bed of the stream, which is determined by soundings. 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 streams 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 of value in obtaining the area for use in computations of high-water measurements, as accurate soundings are hard to obtain at high stages.

In computing the discharge measurements from the observed velocities and depths at various points of measurement, 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 a double strip. The total discharge and the 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 determination of the flow of an ice-covered stream is difficult, owing to diversity and instability of conditions during the winter period, and also to lack of definite information in regard to the laws of flow of water under ice. The method now employed is to make frequent discharge measurements during the frozen periods by the vertical velocity-curve method, and to keep an accurate record of the conditions, such as the gage height to the surface of the water as it rises in a hole cut in the ice, the thickness and character of the ice, etc.

From these data an approximate estimate of the daily flow can be made by constructing a rating curve (really a series of curves) similar to that used for open channels, but considering in addition to gage heights and discharge, varying thickness of ice. Such data as are available in regard to this subject are published in Water-Supply Paper No. 146, pp. 141–48.

OFFICE METHODS OF COMPUTING RUN-OFF.

There are two principal methods of estimating run-off, depending upon whether or not the bed of the stream is permanent.

For stations of streams with permanent beds the first step in computing the run-off is the construction of a rating table, which shows the discharge corresponding to any stage of the stream. This rating table is applied to the record of stage to determine the amount of water flowing. The construction of the rating table depends upon the method used in measuring flow.

For a station at a weir or dam, the basis for the rating table is some standard weir formula. The coefficients to be used in its application depend upon the type of dam and other conditions near its crest. After inserting in the weir formula the measured length of crest and assumed coefficient, the discharge is computed for various heads, and the rating table constructed.

The data necessary for the construction of a rating table for a velocity-area station are the results of the discharge measurements, which include the record of stage of the river at the time of measurement, the area of the cross section, the mean velocity of the current, and the quantity of water flowing, and a thorough knowledge of the conditions at and in the vicinity of the station.

The construction of the rating table depends upon the following laws of flow for open permanent channels: (1) The discharge will remain constant so long as 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. (3) The discharge is a function of and increases gradually with the stage.

The plotting of results of the various discharge measurements, using gage heights as ordinates, and discharge, mean velocity, and area as abscissas, will define curves which show the discharge, mean velocity, and area corresponding to any gage height. For the

development of these curves there should be therefore a sufficient number of discharge measurements to cover the range of the stage of the stream. Fig. 2 shows a typical rating curve with its corresponding mean velocity and area curves.

As the discharge is the product of two factors, the area and the mean velocity, any change in either factor will produce a corresponding change in the discharge. Their curves are therefore constructed in order to study each independently of the other.

The area curve can be definitely determined from accurate soundings extending to the limits of high water. It is always concave toward the horizontal axis or on a straight line, unless the banks of the stream are overhanging.

The form of the mean velocity curve depends chiefly upon the surface slope, the roughness of the bed, and the cross section of the stream. Of these the slope is the principal factor. In accordance with the relative changes of these factors the curve may be either a straight line, convex or concave toward either axis, or a combination of the three. From a careful study of the conditions at any gaging station the form which the vertical velocity curve will take can be predicted, and it may be extended with reasonable certainty to stages beyond the limits of actual measurements. Its principal use is in connection with the area curve in locating errors in discharge measurements and in constructing the rating table.

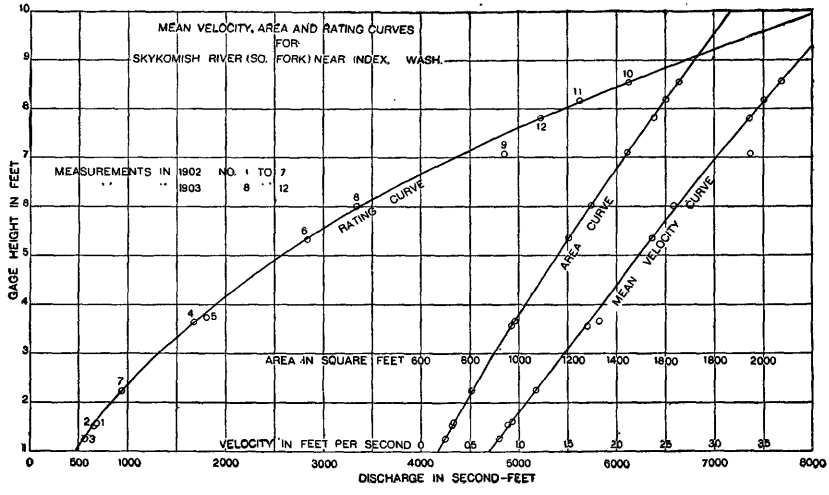


FIG. 2.—Rating, area, and mean velocity curves for South Fork of Skykomish River near Index, Wash.

The discharge curve is defined primarily by the measurements of discharge, which are studied and weighted in accordance with the local conditions existing at the time of each measurement. The curve may, however, best be located between and beyond the measurements by means of curves of area and mean velocity. The discharge curve under normal conditions is concave toward the horizontal axis and is generally parabolic in form.

In the preparation of the rating table the discharge for each tenth or half tenth on the gage is taken from the curve. The differences between successive discharges are then taken and adjusted according to the law that they shall either be constant or increasing.

The determination of daily discharge of streams with changeable beds is a difficult problem. In case there is a weir or dam available, a condition which seldom exists on streams of this class, estimates can be obtained by its use. In case of velocity-area stations frequent discharge measurements must be made if the estimates are to be other than rough approximates. For stations with beds which shift slowly or are materially changed only during floods, rating tables can be prepared for periods between such changes, and satisfactory results obtained with a limited number of measurements, provided that some of them are

taken soon after the change occurs. For streams with continually shifting beds, such as the Colorado and Rio Grande, discharge measurements should be made every two or three days and the discharge for intervening days obtained either by interpolation modified by gage height or by Professor Stout's method, which has been described in full in the Nineteenth Annual Report, Part IV, p. 323, and in the Engineering News of April 21, 1904. This method, or a graphical application of it, is also much used in estimating flow at stations where the bed shifts but slowly.

COOPERATION AND ACKNOWLEDGMENTS.

Most of the measurements presented in this paper have been obtained through local hydrographers. Acknowledgement 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 district 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, B. S. Drane, and F. A. Murray. Dr. E. A. Smith, State geologist, has paid the salaries of river observers at Beck, Pera, Sturdevant, Jenifer, Riverside, Elk, and Centerville. Gage heights were furnished by the Corps of Engineers, U. S. Army, for Palos and Tuscaloosa, and by the United States Weather Bureau observer, F. P. Chaffee, for Selma.

Georgia.—District Hydrographer M. R. Hall, assisted by J. M. Giles, W. E. Hall, B. S. Drane, F. A. Murray, A. T. Mitchelson, and O. P. Hall. Prof. W. S. Yeates, State geologist, has paid the salaries of river observers at Tallulah Falls, Groveland, Davisboro, Reidsville, Greensboro, Buckhead, Flovilla, Norcross, Demorest, Freemans, Canton (part of year), 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 M. B. Summers, Macon, Ga. Transportation has been furnished by J. S. B. Thompson, general agent of the Southern 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 W. L. Mapother, first vice-president of the Louisville and Nashville 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.

North Carolina.—District hydrographer, M. R. Hall, assisted by W. E. Hall and B. S. Drane. 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, B. S. Drane, A. T. Mitchelson, and F. A. Murray.

SANTEE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Santee River is formed in the central part of South Carolina by the junction of Congaree and Wateree rivers, flows southeastward, and enters the Atlantic Ocean about 10 miles north of Cape Roumain. 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 northeastward and then eastward, then bends abruptly to the southeast and flows in this general direction across the south central part of North Carolina and 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. The

[a] Office of the district hydrographer for South Atlantic States and eastern Gulf of Mexico, 209 Temple court, Atlanta, Ga.

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 course 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 2 feet lower than the flood of May, 1901, on the lower part of the river, but the latter rise exceeded all previous records on the upper part 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 North, South, and Middle forks, and flows southeastward 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 1905:

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 September 11, 1903, by J. M. Giles. 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.

The channel is straight above and below the bridge. 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 current is sluggish at low water—rather too much so for accurate work.

Discharge 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 bridge is a three-span deck bridge about 520 feet long, with 250 feet of trestle approach on the right bank and 160 feet on the left bank. The bridge is not quite at right angles with the current and corrections are made to the widths in computing measurements.

The gage is a vertical timber, reading from zero to 12 feet, 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 the gage is attached to a tree on the bank of a small branch about 200 feet from the river and the same distance above the bridge. This section extends from 12 to 27 feet. The gage is read twice each day by J.Y. Brice. Bench marks were established as follows: (1) The top of the joint plate on the upstream bottom chord at a point 44 feet from the initial point, elevation, 31.70 feet. (2) 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; elevation, 5.73 feet. Elevations refer to datum of the gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: Ann 18, iv, p 64; WS 15, p 34; 27, p 27; 36, pp 120–121; 48, p 143; 65, p 247; 83, pp 73–74; 98, p 42; 127, p 20.

Discharge: Ann 18, iv, p 64; WS 15, p 34; 27, p 44; 36, p 121; 48, p 143; 65, p 247; 98, p 42; 127, p 20.

Discharge, minimum: WS 36, p 122.

Discharge, monthly: Ann 18, iv, p 65; 19, iv, p 212; 20, iv, p 149; 21, iv, p 123; WS 75, p 58; 127, p 22.

Discharge, yearly: Ann 20, iv, p 50.

Gage heights: WS 11, p 18; 15, p 34; 27, p 37; 36, p 121; 48, p 144; 65, p 248; 83, p 74; 98, p 43; 127, p 21.

Hydrographs: Ann 19, iv, p 213; 20, iv, p 149; 21, iv, p 123.

Rating tables: Ann 18, iv, p 65; 19, iv, p 212; WS 27, p 45; 39, p 443; 65, p 320; 127, p 22.

Discharge measurements of Catawba River near Catawba, S. C., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
January 14	J. M. Giles	475	5,721	2.88	7.95	16,460
January 16	do	456	3,916	1.46	4.15	5,731
March 13	do	444	3,402	1.60	3.76	5,438
May 29	B. S. Drane	470	2,965	1.42	3.06	4,221
November 15	W. E. Hall	452	2,696	.31	1.55	824

Daily gage height, in feet, of Catawba River near Catawba, S. C., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	2.5	3.7	2.55	2.65	2.65	2.05	3.0	2.4	1.8	2.1	2.2
2	2.65	2.45	3.4	2.5	2.45	2.45	2.0	2.7	2.3	1.75	2.15	2.3
3	2.45	2.35	3.3	2.65	2.4	2.4	3.15	2.45	2.55	2.05	2.25	2.75
4	2.5	2.3	3.2	2.5	4.6	2.25	2.85	2.25	3.15	2.1	2.15	4.7
5	2.45	2.3	3.1	2.45	3.35	2.45	2.7	2.95	2.7	2.1	1.55	4.6
6	2.4	2.55	3.2	3.15	3.45	2.25	6.0	4.4	2.7	2.1	1.75	3.2
7	3.5	2.35	3.0	3.25	4.3	2.1	5.8	3.05	2.45	1.95	2.05	2.55
8	3.8	2.7	3.1	3.05	5.4	2.15	3.8	3.45	2.25	1.7	2.1	2.4
9	3.7	3.5	2.9	2.85	4.4	2.2	2.8	6.1	2.2	1.95	2.05	2.4
10	3.1	3.9	3.1	2.85	3.7	2.1	2.7	6.8	2.2	2.05	2.1	4.8
11	2.85	4.5	3.0	2.75	3.45	1.95	3.05	13.4	2.35	2.15	2.1	6.3
12	3.2	5.0	3.4	2.8	3.55	2.2	5.0	11.9	2.3	2.1	1.5	4.2
13	6.1	7.4	3.8	2.7	3.95	2.25	11.6	9.7	2.35	3.15	1.8	3.3
14	8.1	7.7	3.3	3.1	5.2	2.1	17.3	6.6	2.0	2.7	2.05	2.95
15	5.4	5.5	3.2	3.25	5.7	2.0	14.2	5.4	2.1	2.05	2.05	2.95
16	4.2	3.8	3.0	3.15	6.4	2.1	8.8	4.8	2.0	2.45	2.1	3.45
17	3.3	3.4	2.9	3.1	5.6	2.1	5.4	4.4	2.0	2.1	2.15	3.4
18	3.2	3.2	2.8	2.85	5.2	2.1	4.2	3.8	2.55	2.1	2.2	3.45
19	3.0	3.2	2.75	2.65	4.1	3.9	3.7	3.35	2.55	2.15	1.50	2.9
20	3.0	3.7	2.85	2.6	3.45	4.1	3.5	3.05	2.15	2.25	1.85	2.95
21	3.0	11.9	2.7	2.55	3.05	3.7	3.3	3.1	2.0	2.2	2.3	12.4
22	2.75	11.2	2.7	2.5	3.1	2.9	3.25	4.8	2.35	1.55	2.3	13.2
23	2.85	8.2	2.75	2.45	3.45	2.55	3.55	3.4	2.0	1.75	2.25	7.2
24	2.65	7.0	2.85	2.5	3.55	2.3	3.6	3.9	1.9	2.05	2.2	4.8
25	2.6	5.8	2.65	2.45	3.05	2.5	3.05	4.2	2.25	2.15	2.15	3.95
26	2.45	4.7	2.75	2.45	2.9	2.85	2.95	6.2	2.0	2.3	1.55	3.55
27	2.1	4.4	2.85	2.55	3.0	2.35	2.7	3.85	2.0	2.25	1.75	3.4
28	2.05	4.0	2.65	2.5	2.9	2.2	2.65	3.2	2.1	2.2	2.2	3.6
29	2.4	.....	2.65	2.5	3.1	2.05	5.0	2.8	2.0	1.6	2.15	3.95
30	2.7	.....	2.55	2.4	2.75	1.9	4.1	2.6	2.0	1.9	2.05	3.65
31	2.6	.....	2.5	.....	2.65	.....	3.85	2.5	.....	2.15	.....	3.15

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, 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 channel is straight for about 200 feet above and 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.

Discharge measurements are made from the downstream side of the single-span steel highway bridge. The initial point for soundings is the left end of the downstream hand rail.

A standard chain gage is attached to the lower chord on the downstream side of the bridge; length of chain, 37.60 feet. The gage is read once each day by Hort Edmunson. Bench marks were established as follows: (1) The left side of the upper surface of the sixth floor beam at the downstream side of the bridge, marked by a spot of white paint and the letters "B. M.;" elevation, 34.77 feet. (2) A copper plug set in cement in a rock on the left bank 24.3 feet back of the initial point for soundings, 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.;" elevation, 37.37 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 48, p 140-141; 65, p 247; 83, p 75; 98, pp 45–46; 127, p 23.
Discharge: 48, p 141; 65, p 247; 83, p 75; 98, p 46; 127, p 24.
Discharge, monthly: 83, p 77; 98, p 47; 127, p 26.
Gage heights: 48, p 141; 83, pp 75–76; 98, pp 46–47; 127, p 25.
Rainfall data: 83, p 77.
Rating tables: 83, p 76; 98, p 47; 127, p 25.

Discharge measurements of Catawba River near Morganton, N. C., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
April 19	B. S. Drane	170	482	1.72	1.51	827
June 27	do	139	419	1.76	1.35	738
August 25	do	171	630	2.43	2.01	1,529
November 9	W. E. Hall	165	460	1.08	1.09	498

Daily gage height, in feet, of Catawba River near Morganton, N. C., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.45	1.3	2.05	.....	1.35	1.5	1.7	1.55	1.45	1.1	.....	1.1
2	1.4	1.25	1.00	.....	1.35	1.45	1.6	1.55	1.95	1.05	.....	1.1
3	1.4	1.3	1.9	.....	1.5	1.4	1.65	1.5	1.8	1.15	.....	4.3
4	1.3	1.2	1.85	.....	1.7	1.4	1.7	1.5	1.65	1.15	.....	2.0
5	1.25	1.25	1.85	.....	1.65	1.35	1.95	1.45	1.45	1.15	.....	1.85
6	1.75	1.3	1.8	.....	3.3	1.35	3.3	1.55	1.4	1.1	.....	1.45
7	2.2	1.45	1.75	.....	2.6	1.3	2.3	1.45	1.35	1.15	1.1	1.4
8	1.55	1.45	1.65	.....	2.25	1.25	2.0	2.0	1.3	1.15	1.1	1.3
9	1.45	1.4	1.8	1.75	2.4	1.25	2.95	2.7	1.3	1.1	1.1	4.8
10	1.85	1.3	2.2	1.7	2.5	1.2	1.95	4.1	1.3	3.4	1.1	2.6
11	2.3	1.6	2.25	1.65	2.25	1.15	3.2	6.2	1.25	1.65	1.1	1.9
12	7.2	2.1	2.1	1.75	2.2	1.15	11.5	4.2	1.35	1.55	1.1	1.75
13	3.8	2.6	2.00	2.05	1.95	1.1	8.2	4.0	1.3	1.4	1.1	1.7
14	2.65	1.7	1.9	2.00	4.5	1.15	6.2	3.5	1.25	1.35	1.15	1.6
15	2.1	1.7	1.65	1.85	4.6	1.6	4.0	3.6	1.25	1.35	1.1	1.95
16	1.95	1.6	1.6	1.7	4.8	2.3	3.4	2.9	1.25	1.25	1.1	2.35
17	1.7	1.55	1.7	1.65	3.2	5.6	2.6	2.5	1.25	1.2	1.1	2.1
18	1.6	1.5	1.6	1.65	2.7	4.7	2.4	2.3	1.3	1.2	1.05	1.95
19	1.55	1.45	1.6	1.5	2.45	3.2	2.25	2.2	1.3	1.2	1.05	1.85
20	1.5	2.3	1.55	1.45	2.0	2.6	2.15	2.1	1.25	1.2	1.2	1.7
21	1.5	3.7	1.5	1.4	2.05	2.25	2.1	2.0	1.3	1.15	1.2	4.8
22	1.45	3.8	1.55	1.45	2.0	1.9	2.6	2.0	1.2	1.1	1.15	2.8
23	1.4	3.6	1.6	1.45	1.95	1.85	2.45	1.8	1.2	1.05	1.1	3.3
24	1.35	2.9	1.5	1.4	3.3	1.7	2.4	2.0	1.2	1.15	1.1	2.05
25	1.3	2.6	.....	1.4	2.55	1.55	2.3	2.25	1.2	1.25	1.1	1.95
26	1.2	2.4	.....	1.45	2.15	1.5	2.15	1.9	1.15	1.20	1.1	1.9
27	1.15	2.2	.....	1.5	1.95	1.35	2.1	1.75	1.15	.....	1.05	1.8
28	1.15	2.1	.....	1.5	1.9	1.35	1.95	1.6	1.15	.....	1.1	1.6
29	1.1	.....	.....	1.45	1.85	1.65	2.00	1.55	1.15	.....	1.1	1.6
30	1.35	.....	.....	1.4	1.75	1.8	1.85	1.5	1.1	.....	1.1	1.75
31	1.3	.....	.....	.....	1.65	.....	1.6	1.4	.....	.....	.....	1.6

Station rating table for Catawba River near Morganton, N. C., from January 1 to December 31, 1905.

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	400	1.40	740	1.80	1,200	2.10	1,655
1.10	470	1.50	840	1.90	1,340	2.20	1,835
1.20	550	1.60	950	2.00	1,490	2.30	2,025
1.30	640	1.70	1,070				

The above table is based on discharge measurements made during 1903–1905. It is well defined between gage heights 1 foot and 2.7 feet. The table has been extended beyond these limits. Above gage height 2.3 feet the rating curve is a tangent, the difference being 195 per tenth. Above gage height 2.2 feet the table is the same as for 1904.

Estimated monthly discharge of Catawba River near Morganton, N. C., for 1905.

[Drainage area, 758 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	11,580	470	1,438	1.90	2.19
February	4,950	550	1,616	2.13	2.22
March 1-24	1,930	840	1,212	1.60	1.43
April 9-30	1,572	740	964	1.27	1.04
May	6,900	690	2,311	3.05	3.52
June	8,460	470	1,474	1.94	2.16
July	19,960	950	3,290	4.34	5.00
August	9,630	740	2,259	2.98	3.44
September	1,415	470	670	.884	.986
October 1-26	4,170	435	710	.937	.906
November 7-30	550	435	476	.628	.561
December	6,900	470	1,875	2.47	2.85

JOHN RIVER NEAR MORGANTON, N. C.

This station was established for the purpose of making a series of miscellaneous measurements. It is located at the iron highway bridge on the Lenoir road, about 3 miles from Morganton, N. C.

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.

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.

Gage heights are determined directly from the bench mark, which 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; elevation, 30.00 feet above the datum of the assumed gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 48, pp 142-143; 65, p 247; 83, p 77; 127, p 26.
Discharge: 48, p 143; 65, p 247; 83, p 77; 98, p 55; 127, p 27.
Discharge, monthly: 83, p 80.
Gage heights: 48, p 143; 65, p 247; 83, pp 78-79.
Rainfall data: 83, p 80.
Rating table: 83, p 79.

Discharge measurements of John River near Morganton, N. C., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
April 19	B. S. Drane	64	178	1.60	1.66	284
June 27	do	63	173	1.38	1.62	239
August 25	do	64	207	2.26	2.0	468
November 9	W. E. Hall	60	127	1.12	1.28	142

WATEREE RIVER NEAR CAMDEN, S. C.

Camden, S. C., is on Wateree River, 45 miles above its mouth and about 5 miles below the fall line. A station has been maintained by the United States Weather Bureau since 1891 at the toll bridge about 2 miles west of Camden.

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. Both banks are high, but are liable to overflow at time of floods. Both are open and cultivated, except along the edge, where there are trees. The bed is sand and is slightly changeable. The river below has a very small slope, which is unfavorable for good rating at high stages, as the position of the flood crest will affect the slope largely.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is the face of the right-bank abutment. The bridge consists of two spans, about 180 feet each, supported by tubular iron piers, and has short wooden approaches with brick abutments on both banks.

The Weather Bureau gage is in three sections. Only the third section, reading from 15 to 32 feet, painted on the upstream cylindrical pier on the right bank, is in good condition. August 12, 1904, a standard chain gage was fastened to a short vertical timber resting on the end of a floor beam 40 feet from the right-bank pier and fastened to the double rod hanger; length of chain, 43.53 feet. The datum is the same as that of the upper section of the Weather Bureau gage. The bottom of the box is about 3 feet above the bridge floor, and is 41.53 feet above the gage datum. Gage heights are furnished by the United States Weather Bureau. Bench marks were established as follows: (1) The top of the upstream end of the floor beam 40 feet from right-bank pier, at a point directly under the gage; elevation, 36.85 feet. (2) 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; elevation, 31.27 feet. (3) The top of a 2-inch capped pipe post, set about 3 feet into the ground and provided with a cross at the bottom to make it permanent; it is located on the right bank, about 100 feet to the right of the first iron pier and 15 feet upstream from the line of the upper edge of the bridge; elevation, 33.10. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 36, p 123; 98, pp 40–41; 127, pp 27–28.
Discharge: 98, pp 41, 54; 127, p 28.
Gage heights: 98, p 41; 127, p 28.

Discharge measurements of Wateree River near Camden, S. C., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 11	J. M. Giles	286	3,455	1.52	7.80	5,275
March 14	do	299	4,488	1.83	11.07	8,243
May 27	B. S. Drane	300	4,328	1.86	10.64	8,059
May 27	do	300	4,429	1.92	10.90	8,524
June 26	A. T. Mitchelson	275	2,735	1.05	5.09	2,873
June 26	do	275	2,816	1.10	5.24	3,107
October 19	F. A. Murray	272	2,346	0.73	4.33	1,708

Daily gage height, in feet, of Wateree River near Camden, S. C., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.1	5.0	9.9	5.3	5.5	6.3	4.0	8.6	6.3	4.4	4.5	3.9
2	5.4	4.8	9.1	5.4	5.8	5.8	3.8	6.9	6.2	4.1	4.4	4.3
3	5.4	4.7	8.5	5.6	5.5	5.3	4.2	6.1	6.4	3.6	4.8	9.6
4	5.0	4.7	8.2	5.8	8.8	5.0	6.6	5.6	6.9	4.9	4.6	10.9
5	4.9	4.6	8.0	6.4	11.5	4.8	6.4	5.4	7.7	4.3	4.5	12.8
6	4.8	4.4	7.5	7.0	8.1	5.0	5.8	8.8	6.9	4.8	3.8	10.4
7	6.1	5.2	7.6	8.2	8.8	4.8	17.1	9.2	6.8	4.8	[a] 2.85	7.4
8	9.3	5.4	7.3	7.6	11.6	4.5	12.2	8.4	6.4	4.4	4.2	5.1
9	8.4	8.7	7.2	7.0	12.2	4.4	7.7	20.3	6.3	3.9	4.4	5.55
10	8.2	14.5	7.8	6.2	9.9	4.4	5.6	23.7	5.6	3.8	4.0	8.7
11	6.7	15.1	7.7	6.6	11.1	4.1	5.4	25.0	5.3	4.8	4.8	13.7
12	6.0	14.6	8.8	6.4	9.6	4.0	7.0	28.5	5.8	4.8	4.4	13.8
13	8.5	20.5	10.8	9.3	11.2	4.5	16.8	27.8	6.3	4.6	3.8	10.2
14	18.1	25.3	10.8	9.2	11.8	4.8	27.0	24.8	6.7	7.6	[a] 2.9	7.9
15	18.5	22.9	9.6	8.2	13.1	4.8	29.4	19.6	6.2	5.6	4.0	8.2
16	12.0	16.5	8.8	8.2	13.8	4.6	26.8	15.6	5.2	4.8	4.0	8.6
17	9.4	11.1	7.6	7.6	15.1	4.6	21.6	16.0	5.2	5.4	4.2	8.5
18	7.7	8.7	7.3	7.2	14.0	4.5	14.2	12.2	4.9	5.0	4.2	8.3
19	6.8	7.9	7.0	6.4	11.7	4.8	10.6	9.8	6.9	4.8	4.5	8.4
20	6.7	7.7	6.6	6.0	9.1	8.7	8.8	8.5	6.0	4.8	3.75	7.4
21	6.7	21.5	6.9	5.9	7.6	9.0	8.2	7.8	5.3	4.8	[a] 2.9	23.0
22	6.4	28.1	6.6	5.8	7.1	7.2	7.6	7.9	4.9	4.6	4.8	28.4
23	5.8	26.5	6.6	5.8	7.9	6.1	8.0	10.4	5.0	3.8	4.75	26.3
24	5.9	22.3	6.9	5.8	11.9	5.6	8.2	12.4	4.5	[a] 3.4	4.5	19.6
25	5.4	19.3	6.6	5.7	9.6	4.9	8.0	12.4	4.4	4.4	4.5	13.4
26	5.1	15.5	6.4	5.8	7.7	5.3	7.4	15.4	5.3	4.4	4.2	10.2
27	4.1	12.5	6.0	8.0	10.5	5.6	7.3	14.2	4.9	4.8	3.8	9.0
28	4.3	11.2	6.5	7.0	9.0	4.8	6.6	10.1	4.7	4.9	[a] 3.05	8.6
29	4.0	.....	6.0	5.8	7.4	4.7	8.0	8.3	4.4	4.8	4.35	13.0
30	4.0	.....	5.8	5.8	7.1	4.3	13.0	7.5	4.7	3.9	4.2	13.0
31	5.2	.....	5.4	.....	6.2	.....	10.7	7.0	.....	[a] 3.0	.....	9.7

[a] Extreme low gage heights probably due to storage above.

Station rating table for Wateree River near Camden, S. C., from September 11, 1904, to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
2.80	890	5.00	2,800	7.40	5,005	13.00	10,420
2.90	970	5.10	2,890	7.60	5,195	13.50	10,920
3.00	1,050	5.20	2,980	7.80	5,385	14.00	11,420
3.10	1,135	5.30	3,070	8.00	5,575	14.50	11,920
3.20	1,220	5.40	3,160	8.20	5,765	15.00	12,420
3.30	1,305	5.50	3,250	8.40	5,955	15.50	12,970
3.40	1,390	5.60	3,340	8.60	6,145	16.00	13,520
3.50	1,475	5.70	3,430	8.80	6,335	17.00	14,620
3.60	1,560	5.80	3,520	9.00	6,525	18.00	15,720
3.70	1,645	5.90	3,610	9.20	6,715	19.00	16,820
3.80	1,730	6.00	3,700	9.40	6,905	20.00	17,920
3.90	1,815	6.10	3,790	9.60	7,095	21.00	19,120
4.00	1,900	6.20	3,880	9.80	7,285	22.00	20,320
4.10	1,990	6.30	3,970	10.00	7,475	23.00	21,520
4.20	2,080	6.40	4,060	10.20	7,665	24.00	22,720
4.30	2,170	6.50	4,150	10.40	7,855	25.00	23,920
4.40	2,260	6.60	4,245	10.60	8,045	26.00	25,220
4.50	2,350	6.70	4,340	10.80	8,235	27.00	26,520
4.60	2,440	6.80	4,435	11.00	8,425	28.00	27,820
4.70	2,530	6.90	4,530	11.50	8,920	29.00	29,120
4.80	2,620	7.00	4,625	12.00	9,420	30.00	30,420
4.90	2,710	7.20	4,815	12.50	9,920		

The above table is based on discharge measurements made during 1904–5. It is well defined between gage heights 4.4 feet and 11 feet. Beyond these limits it is uncertain. The high-water estimates are rough approximations.

Estimated monthly discharge of Wateree River near Camden, S. C., for 1904–5.

[Drainage area, 2,635 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1904.					
September 11–30	6,430	1,475	2,390	0.907	0.675
October 1–15; 23–31	2,350	1,050	1,490	.565	.504
November 1–12; 27–30	5,005	1,220	2,470	.937	.558
December	11,520	1,645	3,717	1.41	1.63
1905.					
January	16,270	1,900	4,828	1.83	2.11
February	27,950	2,260	11,100	4.21	4.38
March	8,235	3,160	5,206	1.98	2.28
April	6,810	3,070	4,358	1.65	1.84
May	12,530	3,250	7,205	2.73	3.15
June	6,525	1,900	3,025	1.15	1.28
July	29,640	1,730	8,617	3.27	3.77
August	28,470	3,160	10,880	4.13	4.76
September	5,290	2,260	3,468	1.32	1.47
October	5,195	1,050	2,429	.922	1.06
November	2,620	930	2,019	.766	.855
December	28,340	1,815	8,946	3.40	3.92
The year	29,640	930	6,007	2.28	30.88

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

This station was established July 3, 1896, by E. W. Myers at the Southern Railway bridge at Alston, S. C., about 27 miles above Columbia.

The channel is straight above the station, 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, broken only by the piers of the bridge.

Discharge measurements are made from the downstream side of the six-span steel railway bridge. 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.

During 1905 the bridge was replaced by a new one. The standard chain gage, which had been located on the old bridge, was fastened to the outside of the guard rail of the new bridge at the third floor beam of the second span from the left bank at the original datum. The length of the chain is 39.28 feet. The gage is read twice each day by G. M. Heron. Bench marks were established as follows: (1) The right edge of the top of the downstream end of the third floor beam from the left end of the second span from the left bank; elevation, 37.91 feet. (2) 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, 21.2 feet from the corner of the pump house; elevation, 26.59 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: Ann 18, iv, p 67; WS 15, p 37; 27, p 28; 36, p 125; 48, p 146; 65, p 250; 83, p 82; 98, p 48; 127, pp 28-29.

Discharge: Ann 18, iv, p 68; WS 15, p 37; 27, p 44; 36, p 125; 48, p 146; 65, p 250; 83, p 82; 98, p 48; 127, p. 29.

Discharge, monthly: Ann 20, iv, p 151; 21, iv, p 128; 22, iv, p 158; WS 75, p 60; 83, p 84; 98, p 51; 127, p. 31.

Discharge, yearly: Ann 20, iv, p 50.

Gage heights: WS 11, p 18; 15, p 37; 27, p 39; 36, p 125; 48, p 147; 65, p 250; 83, p 83; 98, p 49; 127, p 30.

Hydrographs: Ann 20, iv, p 152; 21, iv, p 128; 22, iv, p 158; WS 75, p 60.

Rating tables: WS 27, p 45; 39, p 444; 52, p 512; 65, p 320; 83, p 83; 98; p 50; 127, p 30.

Discharge measurements of Broad River (of the Carolinas) at Alston, S. C., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 10	J. M. Giles	496	2,050	2.23	4.25	4,575
March 15	do	493	2,039	2.58	4.57	5,253
May 25	B. S. Drane	553	2,597	2.36	[a] 5.27	6,143
June 23	A. T. Mitchelson	493	1,880	1.80	3.58	3,398
June 24	do	500	1,662	1.92	3.59	3,205
June 24	M. R. Hall	502	1,892	1.80	3.59	3,413
September 9	W. E. Hall	473	1,837	1.53	3.11	2,687
October 18	F. A. Murray	481	1,124	1.73	2.63	1,941

[a] Gage height doubtful.

Daily gage height, in feet, of Broad River (of the Carolinas) at Alston, S. C., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.9	3.35	5.2	3.65	3.85	4.2	3.1	3.45	3.4	2.55	2.82	2.8
2	3.65	3.7	4.9	3.6	3.7	3.8	6.0	3.3	3.3	2.4	3.8	2.8
3	3.5	3.55	4.6	3.5	3.35	3.6	8.8	3.1	3.65	2.05	2.48	4.9
4	3.8	3.5	4.5	3.15	8.6	3.45	8.4	3.35	4.5	2.55	2.58	8.8
5	3.65	3.55	4.35	3.75	8.5	3.3	6.2	3.35	3.6	2.8	2.4	7.0
6	3.55	3.45	4.2	4.05	6.2	3.0	5.5	3.8	3.4	2.78	2.68	5.3
7	4.0	3.4	4.1	4.25	6.0	3.35	6.6	3.4	3.35	2.62	2.48	4.2
8	5.0	4.5	4.3	3.95	6.3	3.15	5.2	4.65	3.4	2.05	2.78	3.95
9	4.7	6.5	4.25	3.85	6.3	3.25	4.2	8.8	3.1	2.55	2.8	4.65
10	4.35	8.5	4.3	4.0	5.2	3.05	3.9	7.8	3.0	2.1	2.8	8.8
11	4.25	8.9	4.2	4.85	4.6	3.15	5.0	12.2	2.7	2.1	2.92	8.0
12	4.2	9.0	4.35	5.0	6.3	3.0	6.1	13.4	2.55	[a] 1.8	2.25	5.7
13	8.4	11.7	5.1	4.2	5.1	2.6	10.6	11.7	3.35	3.3	3.9	4.85
14	9.5	12.1	4.7	4.25	8.4	3.0	12.8	8.8	4.6	4.0	2.82	4.4
15	7.1	10.0	4.6	4.35	7.7	3.1	11.0	6.3	4.0	3.8	2.2	4.7
16	5.8	7.3	4.25	4.4	6.1	3.1	8.4	5.7	3.35	2.4	2.12	5.1
17	5.0	5.7	4.15	3.95	6.4	2.9	6.0	5.4	2.9	2.3	2.22	5.2
18	4.7	5.1	4.05	3.4	5.8	4.2	5.2	5.6	2.9	2.6	2.4	4.65
19	4.4	4.9	4.05	3.85	4.9	4.45	4.9	5.0	2.55	2.8	2.68	4.4
20	4.45	4.9	3.85	3.65	4.6	3.7	4.35	3.8	3.55	3.0	2.58	5.1
21	4.4	14.9	3.65	3.6	4.2	3.7	4.15	4.2	3.0	3.3	2.87	18.7
22	4.2	15.2	4.05	3.65	3.9	3.5	4.0	4.0	2.9	2.5	3.2	19.0
23	4.0	12.2	4.3	3.6	3.9	3.35	4.2	4.8	2.85	2.28	3.0	11.9
24	3.75	10.0	4.1	3.35	7.6	3.85	3.7	4.6	2.85	2.7	2.88	6.8
25	4.1	7.6	3.95	3.0	4.95	3.25	3.4	6.6	2.5	3.4	2.92	5.7
26	3.65	6.4	3.85	3.4	4.7	2.95	3.55	9.4	2.2	2.55	2.98	5.1
27	3.35	5.6	3.55	4.9	6.2	2.5	3.5	6.9	2.6	2.55	2.75	4.8
28	3.45	5.4	3.45	4.0	5.8	2.8	3.4	4.8	2.65	2.45	2.58	4.6
29	3.55	.....	3.85	3.6	5.2	2.95	5.6	3.9	2.65	2.92	2.85	6.2
30	3.7	.....	3.75	3.7	4.55	3.2	5.8	4.0	2.65	2.5	2.88	5.6
31	3.3	.....	3.7	.....	4.25	.....	4.1	3.5	.....	2.0	.....	5.0

[a] Probably due to storing water.

Station rating table for Broad River (of the Carolinas) at Alston, S. C., from January 1, 1904, to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.80	990	3.20	2,590	4.60	5,750	6.00	9,600
1.90	1,040	3.30	2,770	4.70	6,025	6.20	10,200
2.00	1,100	3.40	2,960	4.80	6,300	6.40	10,800
2.10	1,170	3.50	3,150	4.90	6,575	6.60	11,400
2.20	1,250	3.60	3,350	5.00	6,850	6.80	12,000
2.30	1,340	3.70	3,560	5.10	7,125	7.00	12,600
2.40	1,440	3.80	3,780	5.20	7,400	7.20	13,200
2.50	1,550	3.90	4,010	5.30	7,675	7.40	13,800
2.60	1,670	4.00	4,250	5.40	7,950	7.60	14,400
2.70	1,800	4.10	4,500	5.50	8,225	7.80	15,000
2.80	1,940	4.20	4,750	5.60	8,500	8.00	15,650
2.90	2,090	4.30	5,000	5.70	8,775	8.50	17,275
3.00	2,250	4.40	5,250	5.80	9,050	9.00	18,900
3.10	2,420	4.50	5,500	5.90	9,325	10.00	22,150

The above table is based on 29 discharge measurements made during 1901–1905. It is well defined between gage heights 3 feet and 10 feet. Above 10 feet the discharge is approximate.

Estimated monthly discharge of Broad River (of the Carolinas) at Alston, S. C., for 1905.

[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	20,520	2,770	5,719	1.24	1.43
February	41,600	2,865	13,970	3.03	3.15
March	7,400	3,055	4,780	1.04	1.20
April	6,850	2,250	4,045	.878	.980
May	17,600	2,865	8,629	1.87	2.16
June	5,375	1,550	2,873	.623	.695
July	32,040	2,420	9,318	2.02	2.33
August	34,400	2,420	9,653	2.09	2.41
September	5,750	1,250	2,590	.562	.627
October	4,250	990	1,831	.397	.458
November	4,010	1,186	1,943	.422	.471
December	56,800	1,940	11,720	2.54	2.93
The year	56,800	990	6,423	1.39	18.85

GREEN RIVER NEAR FLAT ROCK, N. C.

This station was established November 13, 1905, for the purpose of making a series of miscellaneous measurements. It is located at a single 50-foot span wagon bridge, 3½ miles northeast of Flat Rock, N. C., and about the same distance downstream from the crossing of the Southern Railway.

The current is good, being fairly swift at lowest water. The bed is partly rock, with some sand. All the water passes beneath the bridge at all stages.

Gage heights are determined directly from the bench mark, which is the top of the downstream end of the first floor beam from the left end of the bridge; elevation, 16.00 feet above the datum of the assumed gage.

Discharge measurements of Green River near Flat Rock, N. C., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
November 13	W. E. Hall	45	87	0.84	1.65	73
November 13	do	45	88	.82	1.65	72

SALUDA RIVER NEAR WATERLOO, S. C.

This station was established August 30, 1896, by E. W. Myers. 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 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 of the water passes beneath the bridge and its approaches. The channel is broken only by the piers of the bridge and trestle bents. The width of the stream at low water is about 200 feet, and the velocity is moderate.

Discharge measurements are made from the bridge, which is a steel structure of two spans of 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.

A standard chain gage is located on the downstream side of the bridge, on the span next the left bank; length of chain, 45.85 feet. The gage is read once each day by R. N. Cunningham. Bench marks were established as follows: (1) A point on the top surface of the downstream end of the first floor beam to the left of the center pier; elevation, 44.64 feet. (2) 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; elevation, 61.44 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: Ann 18, iv, p 68; WS 15, p 38; 27, p 28; 36, p 126; 48, p 147, 65, p 250; 83, p 84; 98, pp 51–52; 127, pp 32–33, 36.

Discharge: Ann 18, iv, p 68; 22, iv, p 159; WS 15, p 38; 36, p 126; 48, p 147; 65, p 250; 83, p 85; 98, p 52; 127, pp 33, 36.

Discharge, monthly: Ann 20, iv, p 153; 21, iv, p 129; WS 75, p 61; 83, p 86; 98, p 54; 127, p 35.

Discharge, yearly: Ann 20, iv, p 50.

Gage heights: WS 11, p 19; 15, p 38; 27, p 39; 36, p 127; 48, p 148; 65, p 251; 83, p 85; 98, pp 52–53; 127, p 34.

Hydrographs: Ann 20, iv, p 154; 21, iv, p 130; 22, iv, p 159; WS 75, p 61.

Rating tables: WS 27, p 46; 39, p 444; 52, p 513; 65, p 320; 83, p 86; 98, p 53; 127, p 34.

Discharge measurements of Saluda River near Waterloo, S. C., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 9	J. M. Giles	185	698	1.97	6.87	1,380
March 17	do	192	838	1.97	7.35	1,650
May 24	B. S. Drane	198	782	1.96	7.05	1,532
May 31	do	195	674	1.73	6.32	1,163
June 28	A. T. Mitchelson	195	595	1.8	6.29	1,071
October 16	F. A. Murray	185	447	1.88	5.78	839
October 16	do	185	434	1.89	5.66	821

Daily gage height, in feet, of Saluda River near Waterloo, S. C., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.6	.....	6.4	6.1	6.05	6.45	8.8	5.5	6.0	5.7	5.85	5.65
2	5.6	.....	6.6	5.6	5.7	6.25	14.6	5.35	7.4	4.75	5.55	5.65
3	5.85	.....	6.5	5.55	7.4	6.15	15.8	5.55	8.1	5.45	5.9	8.8
4	5.65	.....	6.4	6.2	9.1	6.15	11.2	5.45	6.7	5.65	5.7	12.8
5	5.55	.....	6.8	6.2	8.0	6.0	8.6	5.5	6.5	5.6	5.45	8.9
6	5.9	5.0	6.45	6.45	7.5	5.9	9.6	6.7	5.75	5.6	5.3	7.4
7	6.8	6.1	6.6	6.2	10.2	4.85	10.8	5.95	6.55	5.45	5.7	6.35
8	6.5	.....	6.1	6.75	9.2	6.5	9.0	6.9	5.5	5.65	5.65	6.25
9	5.45	7.4	6.3	6.25	9.8	5.1	7.6	8.5	6.1	4.85	5.75	8.6
10	5.85	8.7	6.8	5.5	7.4	5.6	7.2	8.3	6.45	5.55	5.8	10.6
11	5.8	8 5	6.4	6.35	6.6	5.25	7.2	9.4	5.45	5.85	5.8	8.8
12	5.7	9.6	7.2	6.45	6.5	4.7	10.8	12.8	5.45	8.1	5.2	7.9
13	11.0	12.6	6.3	6.1	7.1	5.45	15.6	12.4	5.6	6.65	5.35	6.7
14	10.6	12.6	7.0	6.2	6.8	5.6	14.2	8.8	5.95	5.85	5.7	6.4
15	8.0	9.2	6.8	6.3	6.25	5.5	12.6	7.4	5.75	5.85	5.75	7.0
16	7.2	7.7	6.2	5.7	6.65	5.55	9.3	10.2	5.65	5.8	5.45	6.7
17	6.25	7.0	6.6	5.8	6.55	5.6	8.2	7.4	6.15	5.5	5.75	6.95
18	6.0	6.9	6.2	5.85	6.5	9.4	7.8	7.0	5.2	5.6	5.75	6.8
19	6.05	6.8	6.2	5.55	6.45	7.2	7.6	7.0	5.85	5.9	5.2	6.5
20	6.1	8.6	5.55	5.8	6.35	6.6	7.2	7.0	5.6	5.55	5.5	12.0
21	6.45	14.8	6.4	5.65	6.3	6.35	7.0	6.65	5.5	5.7	6.1	15.0
22	6.3	13.8	6.35	6.75	6.1	6.05	7.0	6.2	5.45	5.95	7.1	14.7
23	5.85	10.4	6.45	5.45	7.9	5.9	6.95	6.15	5.95	5.35	5.95	9.0
24	6.1	8.6	6.2	5.2	7.0	6.45	6.7	6.25	5.7	5.55	5.9	8.4
25	5.8	8.0	6.05	5.7	6.85	5.85	6.2	11.1	4.6	5.7	5.0	7.9
26	5.7	7.6	6.3	5.7	6.65	5.25	6.85	9.5	5.4	5.65	4.65	7.5
27	5.7	7.4	5.7	5.8	6.55	6.85	5.9	6.0	5.55	5.65	4.65	6.9
28	5.85	6.75	6.2	5.75	6.45	5.25	5.75	6.25	5.45	5.95	5.2	7.7
29	.....	.....	6.3	5.95	6.35	5.6	6.7	6.3	5.4	6.5	5.7	8.0
30	.....	.....	5.95	5.9	6.45	5.6	6.4	5.3	5.5	5.4	5.75	7.6
31	.....	.....	6.0	.....	6.35	.....	5.4	5.45	.....	5.6	.....	7.6

NOTE.—The gage was read only once a day; and as there was a great daily fluctuation, caused by dams above, the one reading can not be relied on as giving the mean daily gage height.

Station rating table for Saluda River near Waterloo from January 1, 1904, to December 31, 1905.

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	5.10	550	6.30	1,150	8.00	2,250
4.00	219	5.20	592	6.40	1,205	8.20	2,400
4.10	240	5.30	636	6.50	1,260	8.40	2,560
4.20	262	5.40	682	6.60	1,320	8.60	2,725
4.30	286	5.50	730	6.70	1,380	8.80	2,900
4.40	312	5.60	780	6.80	1,440	9.00	3,085
4.50	340	5.70	830	6.90	1,500	9.20	3,280
4.60	370	5.80	880	7.00	1,560	9.40	3,485
4.70	402	5.90	930	7.20	1,690	9.60	3,700
4.80	436	6.00	985	7.40	1,820	9.80	3,920
4.90	472	6.10	1,040	7.60	1,960	10.00	4,150
5.00	510	6.20	1,095	7.80	2,100		

The above table is based on discharge measurements made during 1903–1905. 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.

Estimated monthly discharge of Saluda River near Waterloo, S. C., for 1905.

[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 1–28	5,350	706	1,324	1.25	1.30
February 6–7, 9–28	9,910	510	3,319	3.14	2.57
March	1,690	755	1,191	1.13	1.30
April	1,410	592	971	.920	1.03
May	4,390	830	1,688	1.60	1.84
June	3,485	402	1,008	.955	1.07
July	11,110	682	3,447	3.26	3.76
August	7,510	636	2,080	1.97	2.27
September	2,325	370	941	.891	.994
October	2,325	419	865	.819	.944
November	1,625	386	793	.751	.838
December	10,150	805	2,821	2.67	3.08

SALUDA RIVER NEAR NINETY SIX, S. C.

This is a temporary station, located at the highway bridge known as Watts Bridge, about 6 miles northeast of Ninety Six, S. C. It was established in 1905, in an endeavor to find a better measuring section than the one at the Waterloo station.

The channel is slightly curved both above and below the station. Both banks will overflow for 800 to 1,000 feet at highest water, but only an exceptional flood will go beyond the abutments of the bridge. The current is swift and somewhat irregular. The bed is partly rock.

A temporary gage was read twice each day during a part of November and December, 1905. The average of the two daily gage readings is published, but it is doubtful if these give the true mean daily gage heights, owing to the stored water above. The bench mark is the top of the downstream end of the second-floor beam from the right-bank pier; elevation, 29.00 feet above gage datum.

Discharge measurements of Saluda River near Ninety Six, S. C., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
September 8	W. E. Hall	156	609	2.09	4.81	1,273
October 17	F. A. Murray	156	524	2.03	3.47	1,062
October 21	do	156	496	2.13	3.34	1,057

Daily gage height, in feet, of Saluda River near Ninety Six, S. C., for 1905.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	2.9	2.95	12	.....	.....	6.6	22	.....	2.48	.....
2	.....	2.75	.....	13	.....	2.2	5.1	23	2.3	2.75	8.0
3	.....	2.2	.....	14	.....	2.3	4.7	24	2.9	2.65	.....
4	.....	2.65	.....	15	.....	2.5	5.1	25	2.9	2.55	8.0
5	.....	.....	7.9	16	.....	2.5	4.8	26	3.3	.....	8.1
6	.....	2.9	5.7	17	.....	2.65	.....	27	3.2	2.8	4.9
7	.....	3.3	5.0	18	.....	2.6	4.4	28	3.2	2.9	.....
8	.....	2.25	4.4	19	.....	.....	4.6	29	.....	2.7	6.4
9	.....	2.8	6.7	20	.....	2.2	.....	30	2.3	2.7	.....
10	.....	2.2	.....	21	.....	2.45	.....	31	3.0	.....	.....
11	.....	2.7	7.2								

MISCELLANEOUS MEASUREMENTS IN SANTEE RIVER DRAINAGE BASIN.

The following is a list of miscellaneous discharge measurements made in Santee River drainage basin during 1905:

Green River near Rutherfordton, N. C.—A measurement was made April 18, 1905, at Cox Bridge, 9 miles from Rutherfordton, N. C. The bench mark is the top of iron plate over eyebar over downstream end of first-floor beam from the left end of the bridge; elevation, 23.00 feet above the datum of the assumed gage.

Width, 86 feet; area, 137 square feet; mean velocity, 1.80 feet per second; gage height, 1.08 feet; discharge, 247 second-feet.

Muddy Creek near Bridgewater, N. C.—A measurement was made April 19, 1905, at a bridge near Bridgewater, N. C. The bench mark is a head of a copper nail driven into the top edge of the downstream edge of the floor beam toward the right bank; elevation, 7.00 feet above the datum of the assumed gage.

Width, 58 feet; area, 68 square feet; mean velocity, 1.41 feet per second; gage height, 1.24 feet; discharge, 96 second-feet.

Saluda River at Chappells, S. C.—A measurement was made June 27, 1905, from the upstream side of a wooden highway bridge, about 400 feet from the Southern Railway depot at Chappells, S. C. The bench mark is the top of the upstream stringer, 18 feet from the right end of the bridge; elevation, 31.56 feet above the datum of the assumed gage. The discharge of a small channel, which could not be measured, was estimated at 15 second-feet.

Width, 91 feet; area, 532 square feet; mean velocity, 2.04 feet per second; gage height, 2.26 feet; discharge, 1,083 second-feet.

Saluda River at Columbia, S. C.—Measurements were made by R. H. Anderson, in investigating power possibilities at Columbia. He assumed the zero of the gage to be the height of the water at the lowest measurement.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Second-feet.*		*Feet.*	*Second-feet.*
October 10	0.15	760	October 16	0.40	1,120
October 11	.00	600	Do	.35	1,050
October 14	1.05	2,400	October 17	.30	950

Saluda River near Newberry, S. C.—Measurements were made from Higgins Ferry Bridge, 8 miles southwest of Newberry, S. C. The initial point for soundings is the center of the downstream tubular pier at the left bank. The bench mark is the top of the downstream

end of the second iron crossbeam from the left-bank tubular pier; elevation, 29.00 feet above the datum of the assumed gage.

March 16: Width, 138 feet; area, 730 square feet; mean velocity, 2.43 feet per second; gage height, 4.05 feet; discharge, 1,778 second-feet.

October 20: Width, 133 feet; area, 465 square feet; mean velocity, 1.81 feet per second; gage height, 2.43 feet; discharge, 841 second-feet.

Saluda River near Prosperity, S. C.—Measurements were made from the upstream side of a new steel bridge 8 miles south of Prosperity and about 1½ miles downstream from Wise's ferry. The initial point for soundings is the right end of the bridge at the upstream side. The bench mark is the top of the upstream end of the first crossbeam from the right end of the bridge; elevation, 31.00 feet above the datum of the assumed gage.

March 15: Width, 182 feet; area, 1,163 square feet; mean velocity, 1.71 feet per second; gage height, 3.35 feet; discharge, 1,986 second-feet.

May 30: Width, 180 feet; area, 860 square feet; mean velocity, 1.70 feet per second; gage height, 2.74 feet; discharge, 1,463 second-feet.

SAVANNAH RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Savannah River is formed by the junction of Tugaloo 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.

Tugaloo River is formed by the junction of Chattooga and Tallulah rivers, which join at the west 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 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 Bank counties and flows in a southeasterly direction to the southeast corner of Madison County, Ga., where South Fork joins it. Thence 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 1905.

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. The record was resumed January 18, 1901, and maintained until December 31, 1901. The station was reestablished July 10, 1904, when bench marks were determined and regular gage readings begun. The station 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 channel is nearly straight for 300 feet above and 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.

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 original gage is a vertical rod, spiked to a small maple tree on the left bank of the river about 50 feet above the bridge. June 21, 1905, a 5-foot rod gage was fastened vertically to the solid rock on the right bank 25 feet above the bridge. The datum is the same as that of the original gage. The gage is read once each day by J. T. McKay, who is paid by the Georgia Geological Survey. Bench marks were established as follows: (1) The top of a large rock on the right bank, about 30 feet above the bridge; elevation, 7.50 feet. (2) A copper plug set in the solid rock on the right bank, about 7 feet to the right of the new gage and 27 feet upstream from the upper edge of the bridge; elevation, 7.05 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 48, p 148; 65, p 251; 127, pp 37-38.
Discharge: 48, p 148; 65, p 251; 98, p 71; 127, p 38.
Discharge, monthly: 75, p 62; 127, p 39.
Gage heights: 48, p 148; 65, p 252; 127, p 38.
Rating tables: 52, p 513; 65, p 320; 127, p 39.

Discharge measurements of Tallulah River at Tallulah Falls, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 3	W. E. Hall	60	419	1.12	1.70	471
May 11	F. A. Murray	58	428	1.41	1.83	605
May 27	W. E. Hall	60	410	1.64	2.10	673
May 28	do	60	406	1.68	2.10	681
June 21	A. T. Mitchelson	60	388	.97	1.34	375
June 22	do	60	412	1.50	1.77	621
July 18	Hall and Hoyt	61	421	1.67	2.08	705
July 18	do	61	424	1.60	2.08	683
September 6	F. A. Murray	57	389	.81	1.15	317
October 24	do	56	340	.67	.89	228
November 15	do	56	339	.58	.82	198

Daily gage height, in feet, of Tallulah River at Tallulah Falls, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.1	1.2	1.8	1.6	1.7	1.2	3.5	1.4	1.1	0.8	0.9	0.9
2	1.0	1.1	1.7	1.6	1.6	1.2	1.9	1.4	1.1	.9	.9	1.0
3	1.0	1.1	1.7	1.5	1.8	1.1	1.4	1.3	1.0	.9	.9	4.5
4	.9	1.2	1.7	1.4	2.1	1.1	1.8	1.3	.9	1.1	.9	2.9
5	.9	1.2	1.6	1.8	2.0	1.1	2.0	1.4	.9	.9	1.0	2.5
6	1.0	1.5	1.7	1.6	2.9	1.2	4.2	1.4	1.1	.9	.9	1.3
7	1.8	1.8	1.7	1.7	2.9	1.2	1.3	1.3	1.0	.8	.9	1.2
8	1.3	1.8	1.8	1.7	2.2	1.4	1.7	2.3	1.1	.8	.9	1.4
9	1.1	2.7	3.5	1.5	2.1	1.3	1.6	2.1	1.1	1.1	.9	4.7
10	1.0	2.5	2.8	1.5	1.8	1.3	1.7	2.2	1.1	1.2	.8	2.8
11	1.1	2.3	2.3	1.5	1.7	1.4	3.5	2.5	1.0	3.1	.8	2.1
12	6.5	2.1	2.0	1.6	1.6	1.3	4.6	2.6	1.0	1.5	.8	1.8
13	3.2	3.2	1.8	1.6	1.6	1.2	3.4	2.5	1.0	1.3	.8	1.6
14	2.3	2.3	2.8	1.7	1.6	1.2	4.4	2.6	1.0	1.1	.8	1.6
15	1.9	2.1	1.7	1.7	1.7	1.3	3.0	2.0	.9	1.1	.8	1.7
16	1.6	1.8	1.7	1.8	3.1	1.4	2.4	1.8	1.0	1.1	.8	1.6
17	1.5	1.7	1.7	1.7	2.3	1.3	2.3	1.7	1.1	1.0	.9	1.7
18	1.4	1.5	1.6	1.7	2.0	1.4	2.1	1.7	1.0	1.0	.9	1.5
19	1.5	1.4	1.5	1.5	1.8	1.6	2.0	1.5	1.0	1.0	.9	1.5
20	1.4	2.5	1.7	1.5	1.6	1.7	2.1	1.6	.9	1.0	1.0	2.3
21	1.4	3.3	2.5	1.5	1.6	1.6	1.8	1.5	.9	1.0	1.0	2.1
22	1.4	3.0	2.0	1.5	1.8	1.8	1.7	1.4	1.0	1.0	.9	2.0
23	1.2	2.7	1.9	1.5	2.3	1.5	1.7	1.5	1.0	.9	.8	2.4
24	1.3	2.4	1.7	1.6	2.5	1.3	1.6	1.4	.9	.9	.9	2.4
25	1.3	2.2	1.7	1.6	1.8	1.3	1.6	1.5	.9	.9	1.0	2.5
26	1.1	2.0	1.8	1.7	1.9	1.2	1.7	1.5	.9	1.4	1.0	2.4
27	1.1	2.0	1.7	1.8	1.4	1.2	1.6	1.4	.8	1.3	.8	2.2
28	1.0	1.9	1.7	1.7	1.3	1.2	1.6	1.4	.8	1.2	.8	2.1
29	.9	.....	1.7	1.6	1.4	1.3	1.6	1.2	.8	1.0	.8	1.9
30	1.1	.....	1.6	1.9	1.2	1.4	1.4	1.2	.9	.9	.9	1.7
31	1.0	.....	1.6	.....	1.1	.....	1.4	1.1	.....	.9	.....	1.8

Station rating table for Tallulah River at Tallulah Falls, Ga., from July 15, 1904, to December 31, 1905.

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
.50	145	1.20	320	1.90	630	2.60	1,070
.60	165	1.30	355	2.00	685	2.70	1,145
.70	185	1.40	395	2.10	740	2.80	1,220
.80	210	1.50	435	2.20	800	2.90	1,300
.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 on 23 discharge measurements made during 1904–1905. It is well defined between gage heights 0.4 foot and 2 feet. The table has been extended beyond these limits. Above 3 feet gage height the discharge has been estimated.

Estimated monthly discharge of Tallulah River at Tallulah Falls, Ga., for 1905.

[Drainage area, 191 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	4,360	235	526	2.75	3.17
February	1,635	290	744	3.90	4.06
March	1,805	435	649	3.40	3.92
April	630	395	490	2.57	2.87
May	1,465	290	650	3.40	3.92
June	575	290	369	1.93	2.15
July	2,740	355	900	4.71	5.43
August	1,070	290	537	2.81	3.24
September	290	210	254	1.33	1.48
October	1,465	210	312	1.63	1.88
November	260	210	230	1.20	1.34
December	2,825	235	793	4.15	4.78
The year	4,360	210	538	2.82	38.24

TUGALOO RIVER NEAR MADISON, S. C.

This station was originally established July 19, 1898, at Cooks Ferry and was discontinued December 31, 1901, when the ferry was moved. It was reestablished July 7, 1903, by M. R. Hall, at Holcombs 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 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, being 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 the right bank and 250 feet on the left. Both are open and cultivated except for a few trees along the edge of the river. These conditions make it possible to obtain fairly good float measurements at the time of floods.

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 land side 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 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 each day by T. A. Spencer. Bench marks were established as follows: (1) A nail in a willow tree on the right bank, 20 feet below the ferry landing; elevation, 7 feet. (2) Two large nails in the locust tree to which the third section of the gage is fastened; elevation, 22 feet. (3) 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; elevation, 44.27 feet. (4) Geological Survey standard bronze tablet marked "666 Atlanta" on the right-bank pier of the Southern Railway bridge; elevation, 35.37 feet. Elevations refer to the datum of the gage. Bench mark No. 4 is 665.47 feet above sea level.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper).

Description: WS 27, p 28; 36, pp 127-128; 48, p 149; 65, p 252; 98, pp 67-68; 127, pp 39-40.
Discharge: WS 36, p 128; 48, p 149; 65, p 252; 98, p 68; 127, p 40.
Discharge, monthly: Ann 20, iv, p 162; 21, iv, p 131; 22, iv, p 160; WS 75, p 63; 98, p 69; 127, pp 42.
Gage heights: WS 27, p 40; 36, p 128; 48, p 149; 65, p 253; 98, p 69; 127, p 41.
Hydrographs: Ann 20, iv, p 162; 21, iv, p 131; 22, iv, p 160.
Rating tables: WS 27, p 46; 39, p 444; 52, p 513; 65, p 320; 98, p 69; 127, p 41.

Discharge measurements of Tugaloo River near Madison, S. C., in 1905.

Date.	Hydrographer.	Width	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 7	J. M. Giles	165	584	2.26	3.38	1,317
March 20	do	163	585	2.13	3.25	1,243
March 21	do	163	691	2.25	3.75	1,552
March 21	do	163	731	2.46	4.00	1,795
May 1	B. S. Drane	164	596	2.12	3.31	1,264
June 29	A. T. Mitchelson	151	458	1.91	2.56	874
September 8	F. A. Murray	160	445	2.18	2.78	970
October 14	do	160	43o	2.03	2.66	880
November 17	do	160	373	1.72	2.13	641

Daily gage height, in feet, of Tugaloo River near Madison, S. C., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.1	2.4	3.8	2.9	3.4	3.6	21.5	3.4	3.0	2.35	2.35	2.2
2	2.1	2.4	3.6	2.9	3.1	3.5	7.1	3.3	3.8	2.35	2.3	2.1
3	2.1	2.35	3.5	2.9	3.5	3.4	4.9	3.2	3.7	2.3	2.3	12.3
4	2.0	2.25	3.4	2.9	4.5	3.3	4.1	3.2	3.2	3.2	2.3	5.2
5	1.8	2.2	3.3	3.1	4.1	3.2	4.8	3.3	3.1	2.6	2.3	3.7
6	1.9	3.2	3.2	3.3	5.8	3.1	4.7	3.5	2.9	2.4	2.3	3.1
7	4.4	4.0	3.4	3.1	6.2	3.0	4.8	3.3	2.8	2.35	2.35	2.85
8	2.8	3.4	3.4	2.9	5.0	3.0	4.1	4.5	2.8	2.3	2.3	2.8
9	2.4	7.3	3.3	2.9	4.6	2.9	4.0	4.6	2.85	2.3	2.3	12.6
10	2.4	6.6	4.6	3.1	4.0	2.9	4.0	6.2	2.75	2.4	2.3	7.0
11	2.3	4.9	5.1	2.9	3.8	2.8	7.7	6.7	2.7	7.4	2.25	5.0
12	11.8	4.5	4.3	2.95	3.6	2.8	14.0	6.4	2.75	4.0	2.25	4.2
13	8.7	7.9	4.0	3.5	3.5	2.8	10.3	6.8	2.9	3.5	2.25	3.8
14	5.3	5.8	4.0	3.2	3.3	7.7	14.5	6.0	2.7	2.6	2.2	3.5
15	4.0	4.8	3.7	3.0	3.2	2.9	8.0	5.3	2.6	2.6	2.2	3.9
16	3.6	4.0	3.6	3.2	5.9	3.4	6.7	4.7	2.6	2.65	2.15	3.9
17	3.3	3.9	3.4	3.0	4.6	3.6	6.0	4.3	2.6	2.5	2.15	3.6
18	3.0	3.5	3.4	2.9	3.9	3.1	5.3	4.2	2.55	2.4	2.1	3.4
19	2.9	3.3	3.3	2.8	3.6	2.9	5.3	4.1	2.6	2.45	2.1	3.2
20	2.9	7.1	3.3	2.8	3.4	3.2	5.3	3.9	2.6	2.45	2.55	3.4
21	2.8	9.5	3.5	2.75	3.3	3.4	4.7	3.8	2.6	2.45	2.35	7.0
22	2.6	6.9	4.1	2.8	3.5	3.8	4.5	3.7	2.5	2.3	2.2	5.2
23	2.5	5.9	3.7	2.7	6.2	3.3	4.2	3.5	2.45	2.35	2.15	4.4
24	2.5	5.1	3.5	2.7	6.6	3.0	4.1	3.9	2.4	2.3	2.1	4.6
25	2.4	4.7	3.4	2.65	4.5	2.8	4.0	3.8	2.35	2.35	2.3	4.1
26	2.0	4.4	3.3	2.7	4.3	2.7	3.9	4.0	2.35	2.9	2.4	3.8
27	2.1	4.1	3.2	3.5	4.9	2.6	3.8	3.4	2.3	2.7	2.25	3.6
28	2.4	4.0	3.1	3.3	5.4	2.65	3.7	3.3	2.3	2.5	2.15	3.5
29	2.3	.....	3.1	3.0	4.6	2.6	3.8	3.2	2.3	2.45	2.15	4.5
30	2.4	.....	3.0	4.0	4.1	15.0	3.6	3.1	2.3	2.4	2.2	3.9
31	2.4	.....	3.0	.....	3.9	.....	3.5	3.0	.....	2.4	.....	3.6

Station rating table for Tugaloo River near Madison, S. C., from January 1 to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
2.00	600	3.30	1,275	4.60	2,240	5.90	3,460
2.10	640	3.40	1,340	4.70	2,325	6.00	3,560
2.20	680	3.50	1,405	4.80	2,410	6.20	3,760
2.30	725	3.60	1,470	4.90	2,500	6.40	3,960
2.40	770	3.70	1,540	5.00	2,590	6.60	4,160
2.50	820	3.80	1,610	5.10	2,680	6.80	4,360
2.60	870	3.90	1,680	5.20	2,770	7.00	4,560
2.70	925	4.00	1,755	5.30	2,860	7.20	4,780
2.80	980	4.10	1,830	5.40	2,960	7.40	5,000
2.90	1,035	4.20	1,910	5.50	3,060	7.60	5,220
3.00	1,095	4.30	1,990	5.60	3,160	7.80	5,440
3.10	1,155	4.40	2,070	5.70	3,260	8.00	5,660
3.20	1,215	4.50	2,155	5.80	3,360		

The above table is based on 10 discharge measurements made during 1905. It is well defined between gage heights 2 feet and 4 feet. Above 4 feet the table is uncertain, the high water estimates being rough approximations. Above gage height 8 feet the rating curve is a tangent, the difference being 120 per tenth.

Estimated monthly discharge of Tugaloo River near Madison, S. C., for 1905.

[Drainage area, 593 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	10,220	520	1,442	2.43	2.80
February	7,460	680	2,494	4.21	4.38
March	2,680	1,095	1,466	2.47	2.85
April	1,755	898	1,107	1.87	2.09
May	4,160	1,155	2,087	3.52	4.06
June	14,060	870	1,572	2.65	2.96
July	21,860	1,405	4,025	6.79	7.83
August	4,360	1,095	1,986	3.35	3.86
September	1,610	725	942	1.59	1.77
October	5,000	725	996	1.68	1.94
November	845	640	704	1.19	1.33
December	11,180	640	2,414	4.07	4.69
The year	21,860	520	1,770	2.98	40.56

SAVANNAH RIVER AT WOODLAWN, S. C.

This station was established November 9, 1905, by M. R. Hall. It is located at the Charleston and Western Carolina Railway bridge, 1,000 feet from the depot at Woodlawn, S. C., 17 miles above Augusta, Ga., and 10 miles above the Augusta water-power dam.

The flow of the river is almost natural at this point, being affected very slightly by stored water mostly from Seneca River. The river is divided by a low island into two channels. The east channel is the main part of the river, as there is very little water flowing in the west channel at ordinary stages and probably none at the lowest stage. The channel is practically straight at the station. The left bank is high and will not overflow except under the short trestle approach. The island and the bank for a short distance west of the

west channel will overflow. The current is swift, and is good in the greater part of the section at low water, but at places it is broken and irregular or is sloping with the direction of the section. The bed of the stream is mostly rock, the considerable roughness of which causes the irregularities in the current above mentioned. Careful measurements should give good results at this station.

Discharge measurements are made from the upstream side of the railroad bridge, which is in four spans over the east channel and a single span over the west channel. Across the island between the two channels there is about 900 feet of wooden trestle.

The present gage is a vertical rod attached to a timber which is driven into the bed of the river and spiked to a tree on the left bank about 40 feet upstream from the bridge. It is read twice each day by M. A. Palmore. The bench mark is the top of the upstream end of the second floor beam from the left end of the bridge; elevation, 37.00 feet above the datum of the gage.

Discharge measurements of Savannah River at Woodlawn, S. C., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
November 9	M. R. Hall	409	2,116	1.52	3.49	3,216
November 21	F. A. Murray	417	2,203	1.39	3.31	3,060

Daily gage height, in feet, of Savannah River at Woodlawn, S. C., for 1905.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		3.65	12	4.1	6.9	22	4.0	14.0
2		3.6	13	3.8	5.6	23	3.75	9.8
3		5.9	14	3.45	5.4	24	3.55	7.3
4		12.1	15	3.55	5.8	25	3.6	6.3
5		9.2	16	3.5	6.2	26	3.6	5.8
6		6.2	17	3.45	5.9	27	3.6	5.4
7		5.0	18	3.45	5.3	28	3.7	5.4
8		4.6	19	3.5	5.0	29	3.75	7.8
9	3.55	5.4	20	3.3	7.2	30	3.7	7.3
10	3.55	11.6	21	3.4	15.5	31		6.2
11	4.1	9.4						

SAVANNAH RIVER AT AUGUSTA, GA.

Observations of river heights have been maintained since 1875 by the city of Augusta, Ga., at the city highway bridge.

The channel is straight for a long distance above and below the bridge 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 stream is sandy and undergoes considerable change. The current is swift.

Discharge measurements are made from the downstream side of the North Augusta bridge at Thirteenth street in the city of Augusta. This bridge consists of three spans, each 208 feet long, with 319 feet of wooden approach on the right bank and 259 feet on the left. The initial point for soundings is the end of the bridge at the right bank on the downstream side.

The gage, located at the Fifth Street Bridge, 1 mile below the measuring station, is a vertical timber fastened to the first bridge pier which is in the water, on the side of the pier

near the upstream corner, facing the right bank. Readings are made four times each 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 a foot. 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 United States Weather Bureau has published the results of its observations in a volume entitled "Stages of Water at River Stations," as follows: 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.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; Bull=Bulletin; WS=Water-Supply Paper):

Description: Ann 14, ii, p 147; 18, iv, p 75; Bull 140, pp 72-73; WS 27, pp 28-31; 36, p 130; 48, p 150; 65, p 254; 83, pp 87-88; 98, p 57; 127, pp 42-43.
Discharge: Ann 19, iv, p 227; WS 27, p 44; 36, p 131; 48, p 150; 65, p 254; 83, p 88; 98, p 58; 127, p 43.
Discharge, flood: Ann 14, ii, p 149.
Discharge, monthly: Ann 14, ii, pp 147-148; 18, iv, pp 76-77; 20, iv, pp 160, 165; 21, iv, 135; 22, iv, p 162; WS 27, p 30; 75, p 64; 83, p 89; 98, p 59; 127, p 45.
Discharge, yearly: Ann 20, iv, pp 50, 51.
Gage heights: Bull 140, p 73; WS 27, pp 41-42; 36, p 131; 48, p 151; 65, p 255; 83, p 88; 98, p 58; 127, p 44.
Hydrographs: Ann 20, iv, p 165; 21, iv, p 135; 22, iv, p 162; WS 75, p 64.
Rating tables: WS 27, p 29; 39, p 444; 52, p 513; 65, p 320, 83, p 89; 98, p 59; 127, p 45.

Discharge measurements of Savannah River at Augusta, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 29	M. R. Hall	528	3,306	1.61	7.72	5,333
April 12	Hall and Murphy	533	3,480	1.68	8.04	5,867
June 7	M. R. Hall	532	2,961	1.72	7.35	5,092
October 13	do	563	4,392	2.25	10.10	9,882
October 14	do	531	3,155	1.65	7.78	5,204
November 22	F. A. Murray	526	2,603	1.68	6.70	4,365

Daily gage height, in feet, of Savannah River at Augusta, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.5	7.2	9.6	7.6	6.6	8.1	11.3	6.8	7.1	5.0	6.2	6.3
2	7.6	7.1	9.4	7.6	8.6	7.9	22.6	6.9	7.0	5.8	6.1	6.1
3	7.5	7.2	9.1	7.5	8.3	7.7	20.2	7.0	9.2	5.3	6.1	8.1
4	7.3	7.0	8.8	7.5	10.9	7.1	12.3	6.9	9.5	5.6	5.9	20.6
5	7.2	7.2	8.6	7.5	12.3	7.2	9.6	6.7	8.2	6.4	6.0	20.3
6	7.2	7.1	9.0	7.8	11.0	7.2	9.5	6.4	7.6	7.5	6.3	12.6
7	7.5	7.3	8.1	8.1	11.5	7.0	13.1	6.7	7.1	6.6	6.1	9.3
8	8.6	9.0	8.2	8.2	18.1	7.1	12.1	7.3	6.9	5.4	5.6	8.4
9	8.8	13.4	8.5	7.4	15.0	6.8	10.4	9.1	6.8	6.0	6.2	9.4
10	8.0	16.9	8.5	7.7	12.1	6.6	9.3	11.1	6.5	5.8	6.1	19.0
11	7.7	17.2	8.7	8.3	10.0	6.2	8.1	9.3	6.8	6.3	6.4	18.2
12	7.7	16.4	10.6	7.9	9.0	6.7	11.5	12.6	6.6	6.6	7.6	14.0
13	12.0	23.5	12.3	8.5	8.3	6.4	18.4	13.8	6.3	9.8	7.2	10.6
14	17.9	25.3	9.8	8.8	7.9	6.6	20.7	13.3	6.6	7.9	6.5	9.4
15	14.2	20.9	9.9	8.4	7.9	7.4	16.5	10.6	7.0	6.7	6.3	9.9
16	10.8	16.3	9.3	8.2	7.8	7.6	13.1	9.5	6.7	6.8	6.4	11.2
17	9.2	12.5	8.9	8.2	7.9	7.4	11.1	9.6	5.9	6.5	6.3	10.4
18	8.7	10.8	8.6	7.3	9.4	7.7	9.3	9.4	6.5	6.5	6.2	9.6
19	8.4	10.2	8.5	7.4	8.2	7.8	9.5	8.8	6.3	6.4	5.6	9.1
20	8.2	10.1	8.4	7.4	7.6	7.5	9.3	8.5	5.6	6.5	6.2	10.2
21	8.3	18.0	8.4	7.4	7.4	7.1	9.1	8.5	6.2	6.0	6.1	27.6
22	8.2	23.5	8.7	7.1	7.8	7.1	8.4	7.8	6.1	5.8	6.5	27.5
23	8.2	20.2	9.0	6.9	8.4	7.8	7.6	7.9	6.1	6.5	7.0	21.5
24	8.0	15.6	8.6	6.9	14.6	7.8	7.9	8.7	5.4	5.8	6.4	16.2
25	7.7	12.4	8.2	6.9	14.2	6.9	7.6	9.2	5.8	6.1	6.4	12.4
26	7.5	11.4	8.4	7.0	11.4	6.9	7.6	10.9	5.7	5 9	5.4	10.8
27	7.2	10.7	8.4	7.0	9.7	6.8	7.5	10.5	5.9	5.9	6.5	9.8
28	7.0	9.7	7.6	7.3	9.5	6.6	7.3	9.0	5.7	6.1	6.3	9.7
29	6.8	.....	7.6	7.7	9.6	6.8	7.6	8.1	5.6	6.5	6.4	14.3
30	7.2	.....	7.8	9.2	9.4	6.5	7.7	7.7	5.2	6.4	6.3	14.0
31	7.2	.....	7.5	.....	8.7	.....	7.9	7.2	.....	6.1	.....	12.9

NOTE.—The gage-height records can be considered as only approximately representing the mean daily heights.

Station rating table for Savannah River at Augusta, Ga., from January 1 to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
5.00	2,650	6.70	4,190	8.80	7,200	13.50	16,850
5.10	2,725	6.80	4,300	9.00	7,600	14.00	17,900
5.20	2,800	6.90	4,410	9.20	8,000	15.00	20,100
5.30	2,880	7.00	4,520	9.40	8,400	16.00	22,400
5.40	2,960	7.10	4,630	9.60	8,800	17.00	24,800
5.50	3,045	7.20	4,740	9.80	9,200	18.00	27,300
5.60	3,130	7.30	4,860	10.00	9,600	19.00	30,100
5.70	3,220	7.40	4,980	10.20	10,000	20.00	33,300
5.80	3,310	7.50	5,100	10.40	10,400	21.00	36,900
5.90	3,400	7.60	5,220	10.60	10,800	22.00	41,000
6.00	3,495	7.70	5,340	10.80	11,200	23.00	45,800
6.10	3,590	7.80	5,470	11.00	11,600	24.00	52,000
6.20	3,690	7.90	5,600	11.50	12,650	25.00	60,000
6.30	3,790	8.00	5,740	12.00	13,700	26.00	68,800
6.40	3,890	8.20	6,050	12.50	14,750	27.00	77,600
6.50	3,990	8.40	6,400	13.00	15,800	28.00	86,400
6.60	4,090	8.60	6,800				

The above table is based on discharge measurements made during 1902–1905. It is fairly well defined between gage heights 6.6 feet and 13 feet. The table has been extended beyond these limits. Above gage height 8.3 feet the table is the same as that of 1903.

Estimated monthly discharge of Savannah River at Augusta, Ga., for 1905.

[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	25,800	4,300	7,075	0.970	1.12
February	62,640	4,520	18,780	2.57	2.68
March	14,330	5,100	7,275	.997	1.15
April	8,000	4,410	5,416	.743	.829
May	27,580	4,090	9,764	1.34	1.54
June	5,890	3,690	4,704	.645	.720
July	43,880	4,860	12,620	1.73	1.99
August	17,480	3,890	7,745	1.06	1.22
September	8,600	2,800	4,218	.578	.645
October	9,200	2,650	3,916	.537	.619
November	5,220	2,960	3,789	.519	.579
December	82,880	3,590	19,270	2.64	3.04
The year	82,880	2,650	8,714	1.19	16.13

CHAUGA RIVER NEAR MADISON, S. C.

A station was established on Chauga River at Bryan wagon bridge, 2 miles east of 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 Cook's ferry, near Madison. When the Tugaloo River station was reestablished in 1903 the Chauga River station was also reestablished for the purpose of making a series of miscellaneous measurements.

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.

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 initial point for soundings is the top of the anchor bolt in the upstream corner of the right-bank abutment.

Gage heights are determined directly from the bench marks. No. 1 is the top of the downstream guard rail 7 feet from the right bank; elevation, 10.00 feet. No. 2 is a large nail driven horizontally into the center of the downstream end of the lowest cross log of the right-bank crib abutment; elevation, 4.50 feet. Elevations refer to the datum of the assumed gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 127, p. 46.
Discharge: 98, p. 70; 127, p. 46.

Discharge measurements of Chauga River near Madison, S. C., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
May 1	B. S. Drane	41	78	1.74	1.23	136
June 29	A. T. Mitchelson	38	67	1.55	.97	104

SENECA RIVER NEAR CLEMSON COLLEGE, S. C.

This station was established as a regular station December 8, 1903, by M. R. Hall, at which time a standard chain gage and the bench marks were established. A vertical gage had been put in July 19, 1903, and records obtained from it for a portion of the time. Both gages are referred to the same datum. The station is located at the highway 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.

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 operations of water powers above.

The standard chain gage is located on the lower chord on the downstream side of the bridge; length of chain, 31.82 feet. The vertical gage is in 5-foot sections, fastened 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. The gage is read twice each day by M. L. Sanders. Bench marks were established as follows: (1) The top of the upstream cylinder of the right-bank pier at a point marked "B. M." by chisel cuts; elevation, 28.95 feet. (2) 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; elevation, 10.27 feet. (3) 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; elevation, 30.52 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 98, pp 65–66; 127, pp 46–47.
Discharge: 98, p 66; 127, pp 47–48.
Discharge, monthly: 98, p 67; 127, p 49.
Gage heights: 98, p 66; 127, p 48.
Rating table: 98, p 67; 127, p 49.

Discharge measurements of Seneca River near Clemson College, S. C., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 8	J. M. Giles	146	538	2.03	3.75	1,093
March 20	do	146	540	1.89	3.60	1,023
May 1	B. S. Drane	148	474	1.88	3.43	890
June 1	do	149	591	2.04	4.09	1,204
September 7	F. A. Murray	149	489	2.05	3.59	996
October 14	do	149	462	2.16	3.69	1,000

Daily gage height, in feet, of Seneca River near Clemson College, S. C., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	2.95	4.7	3.1	3.4	3.6	16.5	3.4	3.4	2.25	3.0	2.6
2	2.55	3.1	4.3	3.2	3.4	3.6	12.7	3.0	4.1	2.3	2.95	2.65
3	2.7	2.95	4.4	3.1	4.3	3.4	5.6	3.0	3.6	3.3	2.85	16.0
4	2.65	3.1	4.1	3.0	6.6	3.4	4.6	3.1	4.2	3.8	2.75	8.2
5	3.0	3.3	4.1	3.4	6.0	3.2	6.4	4.4	4.3	3.0	2.75	5.4
6	2.45	3.5	4.2	3.6	5.6	3.2	6.4	3.6	4.2	2.65	2.75	4.7
7	5.0	4.2	4.1	3.6	7.4	3.2	5.5	3.8	3.4	2.65	2.65	4.0
8	3.5	5.1	3.4	3.6	5.2	3.2	4.8	3.5	3.3	2.7	2.6	4.4
9	3.3	8.8	4.0	3.4	5.2	2.95	4.2	6.4	3.4	2.4	2.6	13.0
10	3.1	7.5	4.2	2.9	4.0	3.0	4.5	4.2	3.2	2.6	2.5	8.6
11	2.8	6.0	4.4	3.0	3.1	3.2	8.2	11.0	3.3	11.1	2.6	6.4
12	12.2	6.3	4.2	2.8	2.9	3.1	16.2	8.6	3.1	7.0	2.7	5.4
13	12.0	10.3	4.5	3.2	2.8	3.1	13.9	6.9	3.4	4.4	2.75	5.1
14	6.5	7.2	3.8	2.85	3.4	3.0	13.5	5.4	3.5	2.6	2.75	4.7
15	4.6	5.4	3.8	3.1	3.4	3.0	8.6	6.0	3.2	2.95	2.45	6.6
16	4.2	4.5	3.8	3.2	3.9	3.0	6.0	6.2	2.85	3.1	2.5	6.5
17	4.3	4.7	3.8	3.2	3.0	3.2	5.3	5.9	3.4	3.1	2.5	4.6
18	4.2	4.3	3.8	2.8	3.1	3.6	5.1	5.2	3.2	3.0	2.55	4.2
19	3.9	4.0	3.6	2.85	3.4	3.4	3.5	5.1	3.4	3.0	2.75	4.2
20	4.2	6.2	3.6	3.0	3.4	3.7	3.1	4.6	3.0	2.75	3.6	4.2
21	4.0	11.2	3.6	2.85	3.4	4.4	3.3	4.6	3.0	2.75	3.0	9.6
22	4.1	8.0	3.7	2.95	4.5	4.6	4.2	4.5	2.85	2.95	2.95	6.2
23	3.5	6.1	3.7	2.7	5.4	4.0	4.2	4.6	3.2	2.95	2.85	5.2
24	3.5	5.4	3.1	2.8	6.4	3.6	4.2	4.2	3.6	2.95	2.65	6.0
25	3.5	5.2	3.2	2.75	4.2	3.2	4.2	6.5	3.2	2.95	2.75	6.1
26	2.95	5.0	3.3	3.2	4.6	3.0	4.0	7.1	3.0	3.2	2.45	5.8
27	3.1	4.6	3.5	2.7	5.4	2.8	4.3	4.6	3.1	3.2	3.0	5.5
28	2.75	4.2	3.5	3.0	4.2	2.85	3.6	4.1	2.9	3.2	2.75	5.0
29	2.55	.....	3.2	2.95	4.6	2.9	4.2	3.8	2.4	2.9	2.35	5.0
30	3.1	.....	3.1	3.6	4.8	4.0	3.7	3.8	2.45	2.95	2.35	5.1
31	3.0	.....	3.0	.....	4.2	.....	4.0	3.4	.....	2.95	.....	5.8

Station rating table for Seneca River near Clemson College, S. C., from January 1, 1904, to December 31, 1905.

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	2.60	644	3.80	1,096	5.00	1,620
1.50	310	2.70	678	3.90	1,138	5.20	1,720
1.60	336	2.80	713	4.00	1,180	5.40	1,820
1.70	363	2.90	749	4.10	1,222	5.60	1,920
1.80	391	3.00	785	4.20	1,265	5.80	2,020
1.90	420	3.10	822	4.30	1,308	6.00	2,120
2.00	450	3.20	859	4.40	1,351	6.20	2,230
2.10	481	3.30	897	4.50	1,395	6.40	2,340
2.20	512	3.40	936	4.60	1,440	6.60	2,450
2.30	544	3.50	975	4.70	1,485	6.80	2,560
2.40	577	3.60	1,015	4.80	1,530	7.00	2,670
2.50	610	3.70	1,055	4.90	1,575		

The above table is based on discharge measurements made during 1903–1905. It is fairly well defined between gage heights 1.4 feet and 6 feet. The table has been extended beyond these limits. Above 7 feet the discharge is estimated.

Estimated monthly discharge of Seneca River near Clemson College, S. C., for 1905.

[Drainage area, 646 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	5,530	594	1,287	1.99	2.29
February	4,980	767	1,926	2.98	3.10
March	1,485	785	1,100	1.70	1.96
April	1,015	678	817	1.26	1.41
May	2,890	713	1,370	2.12	2.44
June	1,440	713	921	1.43	1.60
July	7,895	822	2,433	3.77	4.35
August	4,870	785	1,675	2.59	2.99
September	1,308	577	905	1.40	1.56
October	4,925	528	967	1.50	1.73
November	1,015	561	688	1.07	1.19
December	7,620	644	2,199	3.40	3.92
The year	7,895	528	1,357	2.10	28.54

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 bridge 3 miles east of Carlton, Ga., and 2 miles above the mouth of the South Fork.

The channel above and below the station is straight for 500 feet. The right bank is high and is not liable to overflow. The left bank is low for about 400 feet, below which it is 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.

Discharge measurements are made from the upstream side of the bridge of 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 initial point for soundings is the end of the iron bridge on the right bank, upstream side.

A standard chain gage is fastened 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 is 54 feet. The gage is read once each day by S. P. Powers, jr. During the low water of October 1 to December 31, 1905, the gage was read twice each day. Bench marks were established as follows: (1) The top of the upstream iron girder under the cross-ties at a point about 40 feet from the initial point for soundings; elevation, 51 feet. (2) The top of the capstone of the right-bank pier at a point under the upstream side of the end of the bridge; elevation, 30.78 feet. (3) 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; elevation, 57.67 feet. Elevations refer to the datum of the gage, which is 384 feet above sea level.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: WS 15, p 40; 27, p 31; 36, pp 131-132; 48, p 151; 65, p 255; 83, p 92; 98, p 63; 127, p 50.
Discharge: WS 15, p 40; 27, p 44; 36, p 132; 48, p 151; 49, p 207; 65, p 255; 83, p 93; 98, p 63; 127, p 51.
Discharge, monthly: Ann 19, iv, p 227; 20, iv, p 163; 21, iv, p 132; 22, iv, p 163; WS 75, p 65; 83, p 94; 98, p 65; 127, p 52.
Discharge, yearly: Ann 20, iv, p 51.
Gage heights: WS 15, p 40; 27, p 42; 36, p 132; 48, p 152; 65, p 256; 83, p 93; 98, p 64; 127, p 51.
Hydrographs: Ann 19, iv, p 226; 20, iv, p 163; 21, iv, p 133; 22, iv, p 163.
Rating tables: Ann 19, iv, p 226; WS 27, p 46; 39, p 444; 52, p 513; 65, p 321; 83, p 94; 98, p 64; 127, p 52.

Discharge measurements of Broad River (of Georgia) near Carlton, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
January 18	J. M. Giles	172	413	1.80	2.50	745
January 18	do	172	409	1.86	2.50	762
March 18	do	164	442	1.45	2.25	642

Daily gage height, in feet, of Broad River (of Georgia) near Carlton, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug	Sept.	Oct.	Nov.	Dec.
1	2.2	2.0	2.5	2.1	2.2	2.3	6.3	1.7	1.6	1.4	1.65	1.7
2	2.2	2.0	2.5	2.1	2.1	2.1	4.3	1.6	3.0	1.5	1.65	1.7
3	2.2	2.0	2.5	2.1	2.2	2.1	3.0	1.6	2.4	1.6	1.65	9.4
4	2.1	2.0	2.4	2.1	5.3	2.0	2.2	1.6	2.0	2.0	1.6	8.4
5	2.0	2.0	2.4	2.2	3.4	2.0	2.4	1.6	1.7	2.2	1.6	4.2
6	2.0	2.2	2.4	2.3	4.9	1.9	8.2	1.6	1.7	1.7	1.6	3.5
7	2.6	2.6	2.3	2.2	6.8	1.9	3.6	1.6	1.7	1.6	1.7	3.0
8	2.7	3.0	2.3	2.1	6.9	1.9	2.8	1.6	1.6	1.5	1.65	2.5
9	2.4	4.0	2.3	2.2	4.4	1.8	2.0	3.1	1.6	1.5	1.65	7.0
10	2.2	5.7	2.5	2.2	3.4	1.8	2.0	2.2	1.6	1.6	1.8	7.9
11	2.2	5.4	2.4	2.1	2.8	1.8	3.9	2.7	1.6	2.0	2.0	5.4
12	2.8	4.4	2.5	2.1	2.5	1.7	3.6	3.2	1.6	2.6	1.8	4.3
13	6.1	6.6	2.6	2.2	2.4	2.1	5.0	4.0	2.3	2.2	1.7	3.3
14	6.0	6.4	2.5	2.2	2.3	1.9	4.4	2.6	1.9	1.8	1.7	2.9
15	3.5	4.7	2.4	2.1	2.2	3.0	3.8	2.6	1.7	1.7	1.7	3.0
16	3.0	3.3	2.4	2.1	2.3	2.0	3.0	2.4	1.6	1.7	1.6	3.0
17	2.7	3.0	2.3	2.1	2.7	2.0	2.5	2.0	1.6	1.7	1.6	2.7
18	2.6	2.9	2.2	2.1	2.5	2.0	2.3	2.0	1.5	1.65	1.6	2.6
19	2.4	2.8	2.2	2.0	2.4	2.0	2.1	2.2	1.5	1.7	1.6	2.6
20	2.6	3.0	2.2	2.0	2.2	2.7	2.6	2.0	1.5	1.7	1.65	4.3
21	2.5	7.8	2.3	2.0	2.2	1.9	2.0	1.9	1.5	1.7	1.95	7.8
22	2.4	8.5	2.3	2.0	2.2	2.2	2.5	1.9	1.5	1.6	1.9	5.7
23	2.2	5.0	2.3	2.0	2.4	2.0	2.3	1.8	1.5	1.6	1.7	3.0
24	2.2	3.7	2.3	2.0	4.5	2.0	2.0	2.2	1.4	1.6	1.7	2.5
25	2.1	3.3	2.3	2.0	4.4	1.9	1.8	2.2	1.4	1.6	1.7	2.4
26	2.1	3.0	2.2	2.0	2.9	1.9	1.8	2.8	1.4	1.8	2.1	2.3
27	2.1	2.8	2.2	2.0	2.8	1.7	1.8	2.6	1.4	2.0	2.1	2.2
28	2.1	2.7	2.1	2.0	2.7	1.7	1.7	2.2	1.4	1.8	1.95	2.2
29	2.0	.....	2.1	2.0	2.8	1.7	1.7	1.9	1.4	1.75	1.8	3.3
30	2.0	.....	2.1	2.1	2.6	1.6	1.7	1.7	1.4	1.7	1.75	2.9
31	2.0	.....	2.1	.....	2.3	.....	1.7	1.7	.....	1.7	.....	2.6

Station rating table for Broad River (of Georgia) near Carlton, Ga., from January 1, 1904, to December 31, 1905.

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	270	2.90	1,060	4.40	2,320	6.60	4,880
1.50	305	3.00	1,130	4.50	2,420	6.80	5,140
1.60	340	3.10	1,200	4.60	2,520	7.00	5,400
1.70	380	3.20	1,280	4.70	2,620	7.20	5,680
1.80	420	3.30	1,360	4.80	2,720	7.40	5,960
1.90	460	3.40	1,440	4.90	2,820	7.60	6,240
2.00	510	3.50	1,520	5.00	2,920	7.80	6,520
2.10	560	3.60	1,600	5.20	3,140	8.00	6,800
2.20	610	3.70	1,680	5.40	3,360	8.20	7,080
2.30	670	3.80	1,770	5.60	3,600	8.40	7,360
2.40	730	3.90	1,860	5.80	3,840	8.60	7,640
2.50	790	4.00	1,950	6.00	4,100	8.80	7,920
2.60	850	4.10	2,040	6.20	4,360	9.00	8,200
2.70	920	4.20	2,130	6.40	4,620	9.50	8,950
2.80	990	4.30	2,220				

The above table is based on discharge measurements made during 1900–1905. It is well defined between gage heights 1.5 feet and 5.3 feet. The extension of the curve above 5.3 feet is based on one measurement at 9.1 feet.

Estimated monthly discharge of Broad River (of Georgia) near Carlton, Ga., for 1905.

[Drainage area, 762 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	4,230	510	934	1.23	1.42
February	7,500	510	2,046	2.69	2.80
March	850	560	687	.902	1.04
April	670	510	555	.728	.812
May	5,270	560	1,392	1.83	2.11
June	1,130	340	514	.675	.753
July	7,080	380	1,277	1.68	1.94
August	1,950	340	630	.827	.953
September	1,130	270	382	.501	.559
October	850	270	407	.534	.616
November	560	340	397	.521	.581
December	8,800	380	2,184	2.87	3.31
The year	8,800	270	950	1.25	16.89

MISCELLANEOUS MEASUREMENTS IN SAVANNAH RIVER DRAINAGE BASIN.

The following is a list of miscellaneous discharge measurements made in Savannah River drainage basin during 1905:

Chattooga River near Tallulah Falls, Ga.—This river joins the Tallulah River and forms Tugaloo River. A measurement was made November 16, 1905, from a small boat at a point about 5 miles northeast of Tallulah Falls, Ga., at a narrow channel about 1,000 feet below Atkins Ferry and opposite B. H. Atkins's residence. There is a small shoal about 150 feet below and one 300 feet above the point of measurement. At the time of flood in

1876 the water is said to have been 36 to 40 feet higher than the present stage and did much damage to property. The bench mark is the center of the head of a wire nail driven horizontally into a sycamore stump which stands on the right bank about 200 feet above the point of measurement; elevation, 6.13 feet above the datum of the assumed gage. The gage height at the same time at the regular station on Tallulah River at Tallulah Falls was 0.82 foot.

Width, 107 feet; area, 442 square feet; mean velocity, 0.77 foot per second; gage height, 2.00 feet; discharge, 339 second-feet.

Little River near Washington, Ga.—Two measurements were made June 6, 1905, near Washington, Ga. The bench mark is the top of the downstream wooden stringer under the cross ties at the center of the first span of the railroad bridge at the right bank; elevation, 29.00 feet above the datum of the assumed gage.

Measurement at bridge of Washington Branch of Georgia Railroad: Width, 37 feet; area, 59 square feet; mean velocity, 0.58 foot per second; gage height, 1.40 feet; discharge, 34 second-feet.

Measurement at wagon bridge, 400 feet above railroad bridge: Width, 47 feet; area, 185 square feet; mean velocity, 0.19 foot per second; gage height, 1.40 feet; discharge, 35 second-feet.

Panther Creek near Tallulah Falls, Ga.—A measurement was made June 22, 1905, a short distance below where the Tallulah Falls Railroad crosses Panther Creek, near Tallulah Falls, Ga. The stage of the creek was probably somewhat high at the time of gaging, owing to showers the day before.

Width, 9 feet; area, 5.85 square feet; mean velocity, 1.17 feet per second; discharge, 6.82 second-feet.

Tugaloo River near Madison, S. C.—A measurement was made November 18, 1905, at Prathers Bridge, about 8 miles above the Southern Railway bridge near Madison, S. C. The initial point for soundings is the left end of the upstream guard rail at the end of the approach. The bench mark is the top of the upstream end of the second wooden cross beam from the left end of the bridge; elevation, 28.38 feet above the datum of the assumed gage. The gage height at the time by the gage at the regular station near Madison was 2.14 feet.

Width, 137 feet; area, 276 square feet; mean velocity, 2.22 feet per second; gage height, 2.15 feet; discharge, 614 second-feet.

OGEECHEE RIVER DRAINAGE BASIN.

DESCRIPTION OF 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 southeastward, 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 1905.

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 channel is straight for about 300 feet above and 400 feet below the station. The current is swift in the main channel, but 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, broken by the piers of the bridge, up to the height at which the river overflows its banks.

Discharge measurements are made from the downstream side of the nine-span wooden highway bridge. The initial point for soundings is the outer edge of the post which supports the end of the hand rail on the downstream side of the bridge on the left bank.

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. A new gage, reading from 0 to 10 feet, is fastened to the left-bank side of the upstream post of the third bent from the left bank, this being the first bent in the water at ordinary stages. Another 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 gage is read once each day by J. M. Edwards. Bench marks were established as follows: (1) 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, marked by a cross and the letters "B. M." cut in the floor; elevation, 20 feet. (2) 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; elevation, 20.12 feet. (3) Two large wire nails driven into the tree to which the third section of the gage is fastened; elevation, 5.30 feet. Two more nails are also driven at the 8-foot mark.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 98, pp. 71–72; 127, pp. 56–57.
Discharge: 98, pp. 72, 79; 127, p. 57.
Discharge, monthly: 98, p. 74; 127, p. 59.
Gage heights: 98, pp. 72–73; 127, p. 58.
Rating table: 98, p. 73; 127, p. 58.

Discharge measurements of Cannoochee River near Groveland, Ga., in 1905.

Date.	Hydrographer.	Width	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
April 26	F. A. Murray	104	694	1.51	6.17	1,051
April 26	do	104	694	1.51	6.14	1,050
June 12	A. T. Mitchelson	87	209	.14	1.60	30
July 27	F. A. Murray	88	280	.50	2.51	140
July 27[a]	do	78	103	1.29	2.50	133
November 7[a]	do	55	45	.51	1.25	23
November 7[a]	do	55	44	.61	1.26	27

[a] Made at different section.

Daily gage height, in feet, of Cannoochee River near Groveland, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	3.3	9.8	6.2	4.9	2.5	2.0	3.0	3.2	1.5	1.4	1.3
2	2.6	3.3	8.7	6.2	4.9	2.6	2.2	3.9	3.0	1.5	1.3	1.3
3	2.6	3.3	7.7	5.5	4.9	2.4	2.5	3.6	2.8	1.5	1.3	1.8
4	2.6	3.3	7.5	5.3	4.7	2.3	2.4	3.5	2.4	1.4	1.3	2.2
5	2.6	3.2	7.0	5.1	4.5	2.1	2.3	3.5	2.0	1.4	1.3	2.5
6	2.6	3.4	6.3	5.4	4.5	1.9	3.7	3.4	2.4	1.4	1.3	2.4
7	2.7	3.6	6.4	5.7	4.5	1.8	4.5	3.0	2.6	1.4	1.3	2.2
8	2.9	4.0	6.2	5.7	4.5	1.8	7.4	2.8	2.4	1.5	1.3	2.3
9	2.9	4.7	6.2	5.6	4.4	1.7	7.5	2.6	2.2	1.6	1.3	2.5
10	2.8	5.3	6.2	5.6	4.3	1.7	7.7	2.5	2.2	1.5	1.3	2.8
11	2.8	5.6	6.7	6.0	4.0	1.6	7.7	2.2	2.0	1.4	1.5	2.8
12	2.8	6.6	8.0	6.0	3.4	1.6	7.9	2.0	2.0	1.4	1.5	2.7
13	3.0	8.1	10.4	6.4	3.0	1.6	8.0	2.3	1.9	1.4	1.5	2.5
14	3.5	10.1	13.4	7.2	3.0	1.6	7.2	2.6	1.8	1.4	1.5	2.8
15	4.0	11.2	14.2	7.4	3.0	1.6	6.5	3.1	1.8	1.4	1.4	3.0
16	4.5	11.9	14.1	9.2	2.9	1.8	6.5	3.1	1.9	1.4	1.3	3.4
17	4.4	13.1	13.9	6.8	2.5	2.0	6.5	3.1	1.8	1.4	1.3	3.3
18	4.3	14.8	13.8	6.5	2.4	2.6	6.0	3.2	1.7	1.4	1.3	3.2
19	4.2	14.5	13.7	6.5	2.4	2.8	6.2	3.3	1.9	1.3	1.3	3.0
20	4.1	13.1	13.0	6.4	2.4	3.1	6.3	4.0	1.9	1.3	1.3	3.1
21	4.1	11.0	12.1	6.2	2.4	3.3	5.3	5.0	2.0	1.3	1.3	3.6
22	4.0	10.5	11.2	6.0	2.6	3.0	3.8	5.6	2.0	1.3	1.3	4.3
23	3.9	11.6	10.2	5.9	2.7	2.5	3.2	6.0	1.8	1.3	1.3	4.2
24	3.6	11.7	9.2	5.8	2.8	2.6	3.1	4.2	1.7	1.3	1.4	4.8
25	3.6	11.5	8.0	5.9	2.9	2.6	2.6	3.3	1.7	1.3	1.4	5.1
26	3.5	13.0	8.9	6.1	2.8	2.5	2.1	3.0	1.6	1.4	1.4	5.0
27	3.5	12.0	7.6	6.1	2.8	2.3	2.0	3.2	1.6	1.4	1.4	4.8
28	3.4	10.7	6.9	5.8	2.8	2.0	2.2	3.5	1.6	1.4	1.3	4.7
29	3.2	.....	6.7	5.4	2.7	1.9	2.3	3.6	1.5	1.4	1.3	4.7
30	3.1	.....	6.5	5.0	2.6	1.8	2.3	3.7	1.5	1.4	1.3	4.8
31	3.3	.....	6.2	.....	2.5	.....	2.9	3.4	.....	1.4	.....	4.7

Station rating table for Cannoochee River near Groveland, Ga., from January 1 to December 31, 1905.

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	23	2.60	144	4.00	405	6.80	1,183
1.30	27	2.70	158	4.20	453	7.00	1,245
1.40	32	2.80	172	4.40	503	7.20	1,309
1.50	38	2.90	187	4.60	554	7.40	1,373
1.60	44	3.00	203	4.80	606	7.60	1,438
1.70	51	3.10	220	5.00	660	7.80	1,504
1.80	58	3.20	238	5.20	714	8.00	1,570
1.90	66	3.30	257	5.40	769	8.20	1,638
2.00	75	3.40	276	5.60	825	8.40	1,706
2.10	85	3.50	296	5.80	882	8.60	1,775
2.20	96	3.60	317	6.00	940	8.80	1,845
2.30	107	3.70	338	6.20	1,000	9.00	1,915
2.40	119	3.80	360	6.40	1,060	9.50	2,095
2.50	131	3.90	382	6.60	1,121	10.00	2,275

The above table is based on discharge measurements made during 1903–1905. It is fairly well defined between gage heights 1.2 feet and 6.2 feet. The table has been extended beyond these limits. Above gage height 10 feet the rating curve is a tangent, the difference being 37.5 per tenth. Above 3.4 feet the table is the same as for 1904.

Estimated monthly discharge of Cannoochee River near Groveland, Ga., for 1905.

[Drainage area, 960 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	528	144	279	.291	.336
February	4,075	238	1,885	1.96	2.04
March	3,850	1,000	2,050	2.14	2.47
April	1,987	660	976	1.02	1.14
May	633	119	299	.311	.358
June	257	44	102	.106	.118
July	1,570	75	649	.676	.779
August	940	75	297	.309	.356
September	238	38	84.6	.088	.098
October	44	27	32.2	.034	.039
November	38	27	29.5	.031	.035
December	687	27	295	.307	.354
The year	4,075	27	582	.606	8.12

MISCELLANEOUS MEASUREMENT IN OGEECHEE RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurement was made in Ogeechee River drainage basin during 1905:

Lotts Creek near Groveland, Ga.—A measurement was made June 12, 1905, at a point 2 miles from Groveland, one-half mile above the mouth of the creek.

Width, 16 feet; area, 11.4 square feet; mean velocity, 1.18 feet per second; discharge, 13 second-feet.

ALTAMAHA RIVER DRAINAGE BASIN.

DESCRIPTION OF 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 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. Thence 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 southeast 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 waterpowers available from its source down to Milledgeville, where it crosses the fall line.

Ocmulgee River, the westernmost 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 south 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 1905.

SOUTH RIVER NEAR SNAPPING SHOALS, GEORGIA.

This station was established in 1905 for the purpose of making a series of miscellaneous discharge measurements. It is located at a four-span wooden bridge, known as Butlers Bridge, about 15 miles south from Conyers, Ga., and 4 miles above Snapping Shoals, where there is a large amount of fall.

The current is smooth and is fairly swift at lowest water. It is broken by one pier at low water. The right bank may overflow beyond the bridge approach at high floods. The left bank will not overflow. The bed is sandy and will probably change.

Gage heights are determined directly from the bench mark, which is the top of the downstream end, at the edge of the floor, of the first wooden floor beam from the left end of the third span from the left bank; elevation, 25.00 feet above the datum of the assumed gage.

Discharge measurements of South River near Snapping Shoals, Georgia, in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
October 23	M. R. Hall	83	87	1.38	3.46	120
October 24	do	83	98	1.38	3.56	135

OCMULGEE RIVER NEAR FLOVILLA, GA.

A station was established July 26, 1901, on Ocmulgee River at Lamars 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 and bench marks were washed away by a flood February 27, 1902. The station was reestablished June 18, 1903, at Lamars Ferry, by M. R. Hall.

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.

Discharge measurements are made from the ferryboat. The initial point for soundings is the windlass on the right bank.

The vertical gage is in three sections. The first section, reading from 0 to 5 feet, is fastened 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 the bank of the same branch, about 200 feet from the river. No attempt was made to place this gage on the same datum as the old one. The gage is read once each day by B. S. White, who is paid by the Georgia Geological Survey. During the low-water period from October 1 to December 31, 1905, the gage was read twice each day. Bench marks were established as follows: (1) A nail driven into a large cottonwood tree about 200 feet from the river, on the branch on which the gage is located; elevation, 14.00 feet. (2) 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; elevation, 34.24 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 65, p 262; 83, p 110; 98, pp 97-98; 127, pp 63-64.
Discharge: 65, p 262; 83, pp 110, 113; 98, p 98; 127, p 64.
Discharge, monthly: 75, p 75; 83, p 111; 98, p 99; 127, p 66.
Gage heights: 65, p 263; 83, p 110; 98, p 98; 127, p 65.
Rating tables: 65, p 321; 83, p 110; 98, p 99; 127, p 65.

Discharge measurements of Ocmulgee River near Flovilla, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 25	W. E. Hall	210	685	1.69	1.88	1,155
June 15	A. T. Mitchelson	216	657	1.63	1.16	1,074
July 24	F. A. Murray	200	324	1.53	.34	496
September 29	M. R. Hall	185	201	1.46	− .32	293
November 3	F. A. Murray	195	300	1.58	.27	474

Daily gage height, in feet, of Ocmulgee River near Flovilla, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.6	1.4	2.6	1.5	1.4	1.0	6.0	0.5	0.3	−0.2	0.35	0.65
2	1.5	1.5	2.5	1.5	1.3	.8	6.0	.4	.7	.4	.25	.65
3	1.4	1.4	2.4	1.4	2.1	.7	4.2	.3	1.6	1.15	.20	11.2
4	1.2	1.5	2.3	1.6	3.0	.8	2.4	.0	.5	.65	.15	14.4
5	1.1	1.4	2.1	1.7	3.2	.7	2.5	.1	.6	.60	.1	10.4
6	1.3	1.5	2.0	2.2	2.5	.7	2.1	.2	.5	.45	.1	4.8
7	1.7	1.4	2.0	2.0	2.0	.6	3.7	.3	.3	.25	.5	4.0
8	1.8	5.0	2.0	1.8	1.8	.5	2.6	.5	.1	− .1	.4	3.4
9	1.8	6.9	2.0	2.2	1.9	.4	2.4	2.1	.2	− .15	.3	6.6
10	1.4	7.1	2.4	4.3	1.5	.2	1.7	2.5	.0	.05	.9	8.6
11	1.5	6.2	2.1	3.0	1.3	.0	4.3	2.9	− .1	.8	3.5	6.1
12	2.0	5.5	2.4	2.4	1.2	.0	3.4	9.2	− .1	1.05	2.55	4.2
13	6.2	12.6	3.0	2.1	1.0	1.7	7.0	6.3	.1	.75	1.75	4.0
14	6.9	10.5	2.7	1.9	.9	1.0	4.0	4.3	.1	.5	1.25	3.6
15	6.0	7.2	2.5	1.5	.8	.7	2.9	5.8	.2	.35	1.0	4.0
16	2.1	5.0	2.2	2.0	1.5	1.2	2.1	3.7	.0	.3	.65	3.8
17	2.8	4.2	1.9	1.8	1.4	1.1	1.7	2.2	.1	.4	.25	3.4
18	2.6	4.0	1.9	1.6	1.3	.9	1.5	2.0	.0	.3	.4	3.0
19	2.1	3.5	1.8	1.4	1.0	.7	1.2	1.4	− .2	.42	.5	1.9
20	2.1	3.3	1.7	1.5	.8	.4	1.0	1.1	− .2	.72	.45	7.2
21	2.0	5.5	2.1	1.4	.6	.3	.9	.9	− .2	.0	.55	14.6
22	1.8	6.6	2.5	1.3	.8	.2	.6	.8	− .3	.0	.6	9.3
23	1.7	5.3	2.2	1.3	1.3	1.8	.4	.7	− .3	.0	.58	5.0
24	1.6	4.3	2.0	1.3	3.9	2.3	.3	2.5	− .4	.2	.5	6.0
25	1.4	3.9	1.9	1.3	4.0	1.3	.6	2.4	− .5	.2	.5	5.2
26	1.3	3.6	1.7	1.2	3.6	1.1	1.9	1.2	− .6	.7	.5	3.6
27	1.4	3.2	1.6	1.2	2.2	1.5	1.5	.7	− .4	.7	.75	3.5
28	1.3	2.8	1.5	1.1	2.0	1.9	.8	.5	− .5	.6	.85	3.4
29	1.5	.....	1.4	1.0	1.9	2.2	.5	.4	− .4	.4	.80	3.8
30	1.4	.....	1.5	2.0	1.7	1.4	.3	.4	− .2	.35	.75	3.6
31	1.5	.....	1.4	.....	1.5	.....	.2	.3	.....	.3	.....	3.5

Station rating table for Ocmulgee River near Flovilla, Ga., from January 1 to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
− .6	220	0.90	690	2.40	1,370	4.80	2,940
− .5	245	1.00	730	2.50	1,420	5.00	3,090
− .4	270	1.10	770	2.60	1,470	5.20	3,240
− .3	295	1.20	810	2.70	1,525	5.40	3,395
− .2	325	1.30	850	2.80	1,580	5.60	3,555
− .1	355	1.40	895	2.90	1,635	5.80	3,715
.0	385	1.50	940	3.00	1,690	6.00	3,875
.10	415	1.60	985	3.20	1,820	6.20	4,035
.20	445	1.70	1,030	3.40	1,950	6.40	4,195
.30	475	1.80	1,075	3.60	2,080	6.60	4,355
.40	510	1.90	1,120	3.80	2,210	6.80	4,515
.50	545	2.00	1,170	4.00	2,350	7.00	4,675
.60	580	2.10	1,220	4.20	2,490	7.50	5,085
.70	615	2.20	1,270	4.40	2,640	10.50	7,650
.80	650	2.30	1,320	4.60	2,790	11.00	8,100

The above table is based on discharge measurements made during 1904-05. It is fairly well defined between gage heights −0.5 foot and 5.5 feet. The table has been extended beyond these limits, being based on logarithmic extension above 7 feet. Above gage height 3 feet the table is the same as that for 1904.

Estimated monthly discharge of Ocmulgee River near Flovilla, Ga., for 1905.

[Drainage area, 1,500 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	4,595	770	1,328	0.885	1.02
February	9,540	895	2,917	1.94	2.02
March	1,690	895	1,212	.808	.932
April	2,565	730	1,071	.714	.797
May	2,350	580	1,107	.738	.851
June	1,320	385	722	.481	.537
July	4,675	445	1,457	.971	1.12
August	6,530	385	1,273	.849	.979
September	985	220	402	.268	.299
October	790	325	512	.341	.393
November	2,015	415	651	.434	.484
December	11,340	598	3,592	2.39	2.76
The year	11,340	220	1,354	.902	12.19

OCMULGEE RIVER AT MACON, GA.

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 channel is straight and without obstructions, except for one bridge pier. The banks are high and not subject to overflow. The bed of the river is soft and changeable.

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. 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 Weather Bureau gage is a heavy timber bolted to the downstream portion of the right-bank stone pier of the Central of Georgia Railway bridge. October 9, 1905, a standard chain gage was installed on the Fifth Street Bridge, on the outside of the latticed railing of the downstream footway at a point 85 feet from the right-bank end; length of chain, 40.83 feet. Bench marks were established as follows: (1) The top of the iron rim of the sidewalk 80 feet from the initial point for soundings; elevation, 34.42 feet. (2) 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; elevation, 37.37 feet. (3) The top of the downstream side of the capstone of the right-bank abutment of the Central of Georgia Railway bridge; elevation, 32.30 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; Bull=Bulletin; WS=Water-Supply Paper):

Description: Ann 18, iv, pp 79–80; 19, iv, p 230; Bull 140, p 74; WS 15, p 44; 27, p 32; 36, pp 136–137; 48, p 155; 65, p 264; 83, p 107; 98, pp 94–95; 127, pp 66–67.

Discharge: Ann 18, iv, p 80; 19, iv, pp 230–231; Bull 140, p 75; WS 15, p 44; 27, p 44; 36, p 137; 48, p 155; 83, p 107; 65, p 265; 98, p 95; 127, p 67.

Discharge, low-water: Ann 18, iv, p 84.

Discharge, monthly: Ann 18, iv, pp 82-83; 19, iv, p 232; 20, iv, pp 161, 171; 21, iv, p 139; 22, iv, p 172; WS 75, p 75; 83, p 109; 98, p 97; 127, p 69.

Discharge, yearly: Ann 20, iv, p 51.

Gage heights: Bull 140, p 75; WS 11, pp 21–23; 15, p 44; 27, p 43; 36, p 137; 48, p 156; 65, p 265; 83, p 108; 98, pp 95–96; 127, p 68.

Hydrographs: Ann 18, iv, p 84; 19, iv, p 233; 20, iv, p 172; 21, iv, p 139; 22, iv, p 173.

Rainfall and run-off relation: Ann 20, iv, p 161.

Rating tables: Ann 18, iv, pp 81–82; 19, iv, p 232; WS 27, p 46; 39, p 444; 52, p 513; 65, p 321; 83, p 109; 98, p 96; 127, p 68.

Discharge measurements of Ocmulgee River at Macon, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 14	W. E. Hall	270	2,269	1.12	4.88	2,554
June 14	A. T. Mitchelson	209	1,350	.58	1.22	789
September 13	W. E Hall	195	1,090	.71	.71	772
September 28	M. R. Hall	127	786	.41	− .39	321
November 4[a]	A. F. Murray	150	309	1.83	.46	565

[a] Made at different section.

Daily gage height, in feet, of Ocmulgee River at Macon, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct	Nov.	Dec.
1	2.7	2.1	4.2	2.2	2.9	2.1	3.0	0.8	0.7	0.6	0.7	0.8
2	2.3	2.1	3.9	2.2	2.4	1.8	6.7	.7	1.7	1.0	.6	.8
3	2.4	2.0	3.6	2.3	2.7	1.6	7.9	.8	2.4	1.2	.4	1.7
4	2.4	1.9	3.4	2.2	4.4	2.3	7.5	.6	2.2	2.9	.43	13.0
5	2.1	2.0	3.3	2.4	4.6	2.0	5.0	.4	2.2	2.0	.44	15.0
6	2.0	2.3	3.2	3.3	4.4	1.6	3.5	.0	1.5	1.5	.37	10.4
7	2.2	3.2	3.0	3.3	3.6	1.4	3.9	— .1	1.3	1.15	.32	6.7
8	2.7	6.2	3.0	3.0	3 8	1.3	4.5	— .1	.8	.75	.65	5.1
9	3.0	13.3	3.0	2.7	3.4	1.1	3.9	2.2	.4	.3	.62	6.9
10	2.4	11.4	3.7	3.3	3.0	1.0	3.2	4.4	.2	.27	.85	11.6
11	2.1	10.3	3.4	5.3	2.7	.8	3.7	3.5	— .1	.24	3.3	11.2
12	1.9	10.7	4.6	4.3	2.3	.7	6.7	3.4	— .2	.8	4.2	8.3
13	5.3	16.4	5.7	6.3	2.0	.9	6.6	10.6	— .3	1.3	3.4	6.7
14	9.0	15.4	5.0	4.6	1.8	1.7	8.2	7.4	.6	1.5	2.3	4.9
15	7.9	12.7	4.4	3.0	1.7	1.1	6.7	6.2	.2	1.2	1.85	6.6
16	5.0	10.2	3.9	4.1	2.4	1.8	3.3	6.3	.2	.7	1.7	5.9
17	4.1	7.7	3.5	3.3	4.0	3.8	2.7	4.2	.0	.45	1.35	5.4
18	3.8	6.4	3.3	3.1	2.5	2.2	2.3	3.5	— .2	.51	1.2	4.6
19	3.1	5.8	3.0	2.7	2.2	1.7	1.7	3.2	— .3	.43	1.12	4.1
20	3.0	5.3	3.0	2.4	1.8	1.4	1.6	1.9	— .4	.36	1.1	4.9
21	2.9	8.0	5.6	2.2	1.7	1.1	1.8	1.5	— .5	.34	.6	16.7
22	2.9	9.6	4.3	2.2	1.6	1.1	1.8	1.3	— .5	.26	.6	15.1
23	2.8	9.1	4.2	2.1	4.0	4.8	1.3	1.2	— .5	.16	.8	12.4
24	2.5	7.3	3.5	2.1	3.8	3.9	1.2	2.3	— .6	.18	.7	10.5
25	2.4	6.1	3.4	2.1	4.9	3.2	.9	2.9	— .3	.12	.6	9.4
26	2.2	5.6	3.3	2.0	4.4	2.3	1.2	2.3	— .2	.9	.6	7.9
27	1.9	5.0	3.2	2.0	3.5	1.8	2.1	1.5	— .3	1.3	.7	5.8
28	1.7	4.5	2.9	2.0	3.0	1.4	1.7	1.2	— .4	1.1	.9	4.7
29	2.0	.....	2.7	2.0	2.9	2.5	1.2	1.1	— .3	1.25	1.1	6.4
30	2.0	.....	2.5	2.2	2.9	2.5	1.1	.9	— .2	1.1	.9	5.8
31	2.0	.....	2.4	.....	2.5	.....	1.0	1.4	.....	.74	.....	4.8

Station rating table for Ocmulgee River at Macon, Ga., from January 1 to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
−0.60	270	0.70	640	2.00	1,075	3.30	1,650
− .50	295	.80	670	2.10	1,110	3.40	1,700
− .40	320	.90	700	2.20	1,150	3.50	1,750
− .30	345	1.00	730	2.30	1,190	3.60	1,800
− .20	370	1.10	760	2.40	1,230	3.70	1,855
− .10	400	1.20	795	2.50	1,270	3.80	1,910
.00	430	1.30	830	2.60	1,315	3.90	1,965
.10	460	1.40	865	2.70	1,360	4.00	2,020
.20	490	1.50	900	2.80	1,405	4.20	2,130
.30	520	1.60	935	2.90	1,450	4.40	2,250
.40	550	1.70	970	3.00	1,500	4.60	2,370
.50	580	1.80	1,005	3.10	1,550	4.80	2,490
.60	610	1.90	1,040	3.20	1,600	5.00	2,610

The above table is based on discharge measurements made during 1903–1905. It is well defined between gage heights −0.4 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 1905.

[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	5,170	970	1,599	0.659	0.760
February	23,980	1,040	5,307	2.19	2.28
March	2,940	1,230	1,816	.749	.864
April	3,315	1,075	1,484	.612	.683
May	2,460	935	1,539	.635	.732
June	2,400	640	1,072	442	.493
July	4,560	700	1,878	.774	.892
August	6,830	400	1,466	.605	.698
September	1,230	270	533	.220	.246
October	1,450	466	696	.287	.331
November	2,130	526	810	.334	.373
December	25,240	670	5,580	2.30	2.65
The year	25,240	270	1,982	.817	11.00

ALCOVY RIVER NEAR STEWART, GA.

This station was established September 16, 1905, by M. R. Hall. It is located at a wooden wagon bridge known as "Waters Bridge," about 15 miles south of Covington, Ga., and 5 miles from Stewart, Ga. The bridge is below the mouth of Bear Creek and about 4 miles from the mouth of the river. The station is important because it is a short distance below a large amount of fall at the old Newton factory site.

The channel curves to the left bank about 45° in 300 feet above the station and is straight for 1,000 feet below the station. The right bank is high and will not overflow. The left bank may overflow about 200 feet at high floods. The channel above and below appears to contain much sand, which is shifting, though the bed is mostly rock in the part under the right span of the bridge, to which nearly all of the flow is confined at lowest stage of water.

Discharge measurements are made from the bridge of three spans of about 50 feet each.

A vertical staff gage is attached to a birch tree at the right edge of the water, 12 feet upstream from the bridge. It is read once each day by A. J. White. The bench mark is a cross and circles cut on a solid rock outcrop at the right edge of the water, just under the downstream side of the bridge; elevation, 2.36 feet above the datum of the gage.

Discharge measurements of Alcovy River near Stewart, Ga., in 1905 and 1906.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1905.		*Feet.*	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
September 16	M. R. Hall	36	48	1.00	1.54	48
September 16	do	36	48	1.00	1.55	48
November 24	do	54	61	1.73	2.03	106
November 24	do	54	62	1.68	2.05	105
1906.						
January 13	W. E. Hall	73	255	2.27	4.80	580
January 13	do	73	259	2.32	4.82	600

Daily gage height, in feet, of Alcovy River near Stewart, Ga., for 1905.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	1.65	1.95	2.05	17	1.75	1.65	2.1	4.2
2	.....	1.6	1.8	2.05	18	1.7	1.7	2.1	4.0
3	.....	1.6	1.8	6.25	19	1.7	1.7	2.1	3.8
4	.....	1.7	1.6	6.2	20	1.65	1.7	2.1	5.8
5	.....	1.75	1.65	7.5	21	1.6	1.7	2.0	7.5
6	.....	2.0	1.7	7.0	22	1.6	1.7	2.05	7.0
7	.....	2.05	2.05	6.0	23	1.6	1.7	2.0	7.8
8	.....	1.75	1.75	5.3	24	1.55	1.6	2.0	7.0
9	.....	1.75	1.8	6.3	25	1.55	1.65	2.0	6.0
10	.....	1.65	2.1	5.2	26	1.5	1.8	2.1	5.5
11	.....	2.0	3.3	5.2	27	1.5	1.85	2.2	4.8
12	.....	1.8	2.8	5.8	28	1.5	1.85	2.2	4.4
13	.....	1.95	2.8	6.0	29	1.45	1.95	2.05	4.4
14	.....	2.05	2.7	5.2	30	1.5	1.9	2.15	4.2
15	.....	2.0	2.45	4.8	31	.....	1.9	.....	4.2
16	1.55	1.95	2.25	4.2					

Station rating table for Alcovy River near Stewart, Ga., from September 16 to December 31, 1905.

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	34	2.90	220	4.30	474	5.70	824
1.50	44	3.00	236	4.40	496	5.80	852
1.60	55	3.10	252	4.50	518	5.90	880
1.70	66	3.20	268	4.60	540	6.00	910
1.80	77	3.30	284	4.70	564	6.20	970
1.90	88	3.40	300	4.80	588	6.40	1,030
2.00	100	3.50	318	4.90	612	6.60	1,090
2.10	112	3.60	336	5.00	636	6.80	1,150
2.20	124	3.70	354	5.10	662	7.00	1,210
2.30	136	3.80	372	5.20	688	7.20	1,274
2.40	150	3.90	392	5.30	714	7.40	1,338
2.50	164	4.00	412	5.40	740	7.60	1,402
2.60	178	4.10	432	5.50	768	7.80	1,466
2.70	192	4.20	452	5.60	796	8.00	1,530
2.80	206						

The above table is based on six discharge measurements made during 1905 and 1906. It is fairly well defined between gage heights 1.4 feet and 5 feet. The table has been extended beyond these limits.

Estimated monthly discharge of Alcovy River near Stewart, Ga., for 1905.

[Drainage area, 395 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
September 16–30	72	39	52.9	0.134	0.075
October	106	55	76.5	.194	.224
November	284	55	117	.296	.330
December	1,466	106	766	1.94	2.24

YELLOW RIVER NEAR STONE MOUNTAIN, GA.

This station was established in 1905 for the purpose of making a series of miscellaneous measurements. It is located at the single-span bridge known as Sextons Bridge, about 6 miles east from Stone Mountain, Ga., and 2½ miles above the old Annistown factory site, where there is a large amount of fall.

The section is good for measurements, but the bed is sandy and shifting.

Discharge measurements are made from the bridge.

Gage heights are determined directly from the bench mark, which is the top of the downstream end of the floor beam at the middle of the span; elevation, 21.00 feet above the datum of the assumed gage.

Discharge measurements of Yellow River near Stone Mountain, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
January 28	B. S. Drane	45	107	.90	1.96	96
November 23	M. R. Hall	39	54	1.06	1.78	57

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 Buckhead, Ga.

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 stream 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.

Discharge measurements are made from the downstream side of the bridge, the initial point being the outside of the iron pier at the left bank, downstream side. 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.

The original gage consisted of two sections; the first section, reading from 0 to 10 feet, was fastened to a small ash tree on the left bank about 100 feet below the bridge. The second section, reading 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. March 22, 1905, a standard chain gage was attached to the upstream side of the bridge, in the third panel from the right bank; length of the chain, 30.70 feet. The gage was read once each day by G. A. J. Adams, except for three months during low water when readings were made twice each day. Bench marks were established as follows: (1) The top of the iron pier from the right bank, downstream side; elevation, 25.00 feet. (2) The top of the downstream end of the first floor beam from the right bank; elevation, 25.50 feet. (3) A copper plug set in solid rock 10 feet west of the upstream tubular pier on the right bank and 3 feet upstream from the line of the upper edge of the bridge; elevation, 3.73 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 65, p 258; 83, p 104; 98, pp 90–91; 127, pp 72–73.
Discharge: 65, p 259; 83, p 104; 98, p 91; 127, p 73.
Discharge monthly: 75, pp 66, 74; 83, p 106; 98, p 92; 127, p 75.
Gage heights: 65, p 259; 83, p 105; 98, p 91; 127, p 74.
Rating tables: 65, p 321; 83, p 106; 98, p 92; 127, p 74.

Discharge measurements of Apalachee River near Buckhead, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 23	M. R. Hall	85	233	1.62	2.30	379
May 11	do	80	215	1.27	1.74	273
Jnue 8	do	79	187	1.19	1.44	223
June 8	do	79	186	1.12	1.41	208
September 8	do	75	157	1.00	1.13	157
September 8	do	75	154	1.02	1.13	157
October 30	do	68	117	.83	.80	97
October 31	do	79	166	1.11	1.38	185
November 15	F. A. Murray	77	172	1.06	1.39	183

Daily gage height, in feet, of Apalachee River near Buckhead, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.0	1.8	2.8	2.0	2.4	2.0	2.8	1.5	1.05	0.86	1.3	1.4
2	1.8	1.9	2.7	1.9	2.1	1.8	6.4	1.4	2.7	a.52	1.15	1.55
3	2.2	1.9	2.6	1.8	2.2	1.95	9.0	1.35	3.1	.62	1.1	4.6
4	2.0	1.8	2.5	2.0	3.5	2.1	3.3	1.3	2.1	1.05	1.1	13.7
5	1.9	1.9	2.5	2.2	3.3	1.65	2.0	1.25	1.72	1.45	1.1	10.5
6	1.8	2.0	2.4	2.2	3.4	1.85	2.3	1.0	1.4	1.3	a.71	5.5
7	2.2	2.5	2.4	2.25	2.4	1.65	5.4	a.4	1.15	1.15	1.35	2.95
8	2.1	3.4	2.3	2.25	2.5	1.55	10.2	1.0	1.1	1.1	1.3	3.2
9	2.1	4.5	2.5	2.25	2.25	1.5	5.5	1.95	1.0	a.51	1.25	6.4
10	2.0	5.6	2.5	2.25	2.2	1.45	3.0	4.3	.92	1.25	1.4	9.7
11	2.0	6.2	2.4	2.3	2.2	1.35	2.65	4.4	a.65	1.3	2.6	9.0
12	2.1	7.8	2.6	2.25	1.9	.85	2.7	4.4	.91	1.3	2.3	5.0
13	4.7	9.0	2.7	2.25	1.8	1.35	2.75	5.3	.94	1.25	1.95	4.2
14	5.0	11.4	3.1	2.2	1.7	1.4	2.6	3.6	.88	1.25	1.6	3.6
15	4.2	9.0	2.8	2.2	1.5	1.35	2.35	4.7	.95	1.2	1.55	3.6
16	3.0	5.3	2.7	2.2	2.1	1.35	1.9	3.4	.92	a.68	1.45	4.7
17	2.6	4.2	2.5	1.9	2.2	2.05	1.5	2.7	.88	1.2	1.45	3.8
18	2.2	3.7	2.4	2.2	2.0	1.5	1.75	7.6	a.52	1.15	1.45	3.0
19	2.3	3.3	2.2	2.0	1.8	1.0	1.7	2.7	.85	1.15	1.35	2.7
20	2.3	3.3	1.9	2.0	1.7	1.5	3.6	2.3	.73	1.1	1.0	4.2
21	2.2	5.6	2.4	1.9	1.5	1.35	1.95	1.65	.66	1.1	1.5	11.0
22	2.1	7.3	2.5	2.0	1.2	3.8	1.7	1.9	.75	.92	1.4	14.0
23	2.0	6.0	2.4	1.9	2.1	4.6	1.7	1.8	.82	a.59	1.4	9.9
24	1.9	4.8	2.35	1.8	3.3	3.4	1.0	1.7	.78	1.15	1.35	5.7
25	1.9	3.4	2.3	1.9	4.7	3.3	2.15	1.6	a.41	1.1	1.3	4.2
26	1.8	3.2	2.25	2.0	4.7	2.2	2.1	1.55	.63	1.15	1.3	3.7
27	1.8	3.0	2.2	1.9	3.1	1.85	1.75	1.4	.6	1.15	1.35	3.4
28	1.9	2.9	2.2	1.9	2.5	3.1	1.6	a.78	.67	1.1	1.65	3.8
29	1.9	.....	2.2	1.8	2.9	2.35	1.5	1.2	.65	1.1	1.55	4.2
30	1.8	.....	2.2	1.7	3.1	1.95	1.4	1.1	.65	a.85	1.4	4.0
31	1.8	.....	2.0	.....	2.2	.....	1.65	1.0	.....	1.35	.....	4.0

a During low water the Monday gage heights are lower than natural flow on account of storing water on Sundays at High Shoals Factory, 25 miles above the station.

Station rating table for Apalachee River near Buckhead, Ga., from January 1 to December 31, 1905.

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	44	2.10	358	3.70	820	6.60	1,690
.50	54	2.20	384	3.80	850	6.80	1,750
.60	66	2.30	410	3.90	880	7.00	1,810
.70	78	2.40	436	4.00	910	7.20	1,870
.80	92	2.50	464	4.20	970	7.40	1,930
.90	108	2.60	492	4.40	1,030	7.60	1,990
1.00	124	2.70	520	4.60	1,090	7.80	2,050
1.10	142	2.80	550	4.80	1,150	8.00	2,110
1.20	160	2.90	580	5.00	1,210	8.50	2,260
1.30	180	3.00	610	5.20	1,270	9.00	2,410
1.40	200	3.10	640	5.40	1,330	9.50	2,560
1.50	220	3.20	670	5.60	1,390	10.00	2,710
1.60	242	3.30	700	5.80	1,450	11.00	3,010
1.70	264	3.40	730	6.00	1,510	12.00	3,310
1.80	286	3.50	760	6.20	1,570	13.00	3,610
1.90	310	3.60	790	6.40	1,630	14.00	3,910
2.00	334						

The above table is based on discharge measurements made during 1903–1905. It is fairly well defined between gage heights 0.8 foot and 7.3 feet. The table has been extended beyond these limits.

Estimated monthly discharge of Apalachee River near Buckhead, Ga., for 1905.

[Drainage area, 440 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	1,210	286	423	0.961	1.11
February	3,130	286	1,074	2.44	2.54
March	640	310	448	1.02	1.18
April	410	264	346	.786	.877
May	1,120	160	469	1.07	1.23
June	1,090	100	345	.784	.875
July	2,770	124	624	1.42	1.64
August	1,990	[a] 44	462	1.05	1.21
September	640	[a] 45	145	.330	.368
October	210	[a] 55	139	.316	.364
November	492	[a] 79	209	.475	.530
December	3,910	200	1,371	3.12	3.60
The year	3,910	[a] 44	505	1.15	15.52

[a] See note to gage-height table, p. 64.

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.

Ordinarily the river is about 120 feet wide. The bed is sandy and shifting. The channel is nearly straight, and the current is regular. 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 about 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 for soundings is the end of the iron trestle on the right bank, downstream side. 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 the river is 144 feet long. There are 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.

A standard chain gage is fastened to the lower chord of the downstream side of the bridge 163 to 165 feet from the initial point for soundings; length of chain, 38.73 feet. The gage is read once each day by M. A. Stevens, except during three months of the low-water period, when it is read twice each day. Bench marks were established as follows: (1) The top of the downstream end of the second floor beam from the right-bank pier; elevation, 36.00 feet. (2) 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; elevation, 13.55 feet. (3) Point on a hickory tree 26 feet downstream from the end of the wooden trestle on the right bank; elevation, 33.15 feet. (4) The concrete foundation under the iron post below the initial point for soundings; elevation, 27.58 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 98, pp 88–89; 127, pp 75–76.
Discharge: 98, p 89; 127, p 76.
Discharge, monthly: 127, p 78.
Gage heights: 98, p 90; 127, p 77.
Rating table: 127, p 77.

Discharge measurements of Oconee River near Greensboro, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 23	M. R. Hall	117	468	1.77	2.32	826
May 11	do	116	469	1.89	2.48	886
June 8	do	116	326	1.59	1.36	519
June 8	do	116	317	1.62	1.30	514
September 7	do	91	248	1.36	.77	338
September 7	do	91	252	1.31	.74	331
October 30	do	91	213	1.54	.74	328
October 30	do	91	216	1.5	.73	325
November 25	F. A. Murray	111	253	1.61	1.03	407

Daily gage height, in feet, of Oconee River near Greensboro, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.2	1.9	3.2	2.1	2.0	2.3	2.2	1.4	1.25	0.4	0.7	1.3
2	2.1	2.0	3.1	2.1	2.0	2.0	2.0	1.3	1.85	.15	.65	1.1
3	2.0	2.0	2.9	1.9	2.6	2.0	6.8	1.3	1.3	.85	.7	8.1
4	1.9	2.1	2.8	2.0	4.1	1.8	2.8	1.0	1.1	1.55	.65	11.6
5	1.7	2.2	2.8	2.1	5.4	1.7	2.1	.7	1.4	1.3	.55	13.3
6	1.5	2.4	2.7	2.1	4.5	1.7	3.0	.4	1.15	1.15	.6	11.2
7	2.0	2.0	2.7	2.4	5.6	1.6	6.0	.3	.9	.85	.7	4.0
8	2.7	4.0	2.6	2.2	4.0	1.4	11.2	.6	.85	.8	.7	3.8
9	2.4	4.8	2.6	2.2	3.6	1.3	5.0	1.4	.8	.9	.95	8.1
10	2.0	6.9	2.7	2.0	3.0	1.1	3.1	4.3	.65	1.05	1.2	11.8
11	1.9	7.2	2.6	2.0	2.5	1.1	2.8	3.4	.40	1.25	2.55	12.4
12	1.5	8.0	2.6	2.1	2.2	1.2	5.1	4.4	.9	.95	2.0	8.2
13	3.0	11.4	2.7	2.0	2.0	1.2	4.4	4.6	1.1	1.25	1.85	5.4
14	8.5	12.5	3.2	2.0	1.9	1.5	4.3	4.3	.95	1.2	1.7	3.4
15	6.2	10.7	3.0	1.9	1.6	1.5	3.6	5.4	.95	.9	1.35	4.2
16	4.3	6.2	2.6	2.0	2.0	1.6	2.9	5.6	.8	.85	1.25	4.5
17	3.7	4.9	2.6	2.0	2.0	2.2	2.1	5.6	.65	1.1	1.2	3.9
18	2.7	4.0	2.4	1.9	2.0	2.0	2.0	4.6	.35	1.05	1.05	3.4
19	2.5	3.7	2.4	1.8	1.7	1.8	1.7	2.2	.8	1.05	1.0	3.2
20	2.5	4.2	2.4	1.8	1.5	1.8	1.8	2.4	.8	1.05	1.05	4.0
21	2.5	8.1	2.8	1.7	1.6	1.7	1.8	1.7	.6	.95	1.15	12.7
22	2.3	9.6	2.7	1.7	1.6	1.6	1.7	1.7	.6	.50	1.25	14.0
23	2.3	10.3	2.4	1.8	2.0	2.7	1.4	1.5	.55	.45	1.3	10.5
24	2.1	7.0	2.4	1.8	7.5	2.8	1.6	1.7	.35	.7	1.3	6.6
25	1.9	5.2	2.3	1.7	6.5	2.4	1.9	3.4	.20	.75	1.3	5.8
26	1.7	4.2	2.3	1.7	4.1	2.0	1.9	4.4	.50	.8	1.35	4.6
27	1.7	3.5	2.1	1.7	3.2	1.5	1.8	2.2	.45	.8	1.4	3.6
28	1.5	3.2	2.3	1.7	2.8	1.5	1.5	1.75	.4	.75	1.8	3.4
29	1.8	.....	2.3	1.6	2.6	1.8	1.4	1.6	.45	.7	1.4	4.0
30	1.7	.....	2.2	1.7	2.5	2.0	1.2	1.15	.5	.55	1.3	4.0
31	1.9	.....	2.1	.....	2.3	.....	1.0	1.1	.....	.6	.....	3.8

NOTE.—On account of a daily fluctuation caused by developed powers above two readings a day were made during the last four months. The low days during this period can be attributed to stored water, and do not represent the natural flow.

Station rating table for Oconee River near Greensboro, Ga., from January 1 to December 31, 1905.

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	195	1.80	655	3.40	1,250	6.00	2,550
.30	220	1.90	690	3.50	1,295	6.20	2,660
.40	245	2.00	725	3.60	1,340	6.40	2,770
.50	270	2.10	760	3.70	1,385	6.60	2,880
.60	295	2.20	795	3.80	1,430	6.80	3,000
.70	320	2.30	830	3.90	1,475	7.00	3,120
.80	345	2.40	865	4.00	1,520	7.20	3,240
.90	375	2.50	900	4.20	1,620	7.40	3,360
1.00	405	2.60	935	4.40	1,720	7.60	3,480
1.10	435	2.70	970	4.60	1,820	7.80	3,610
1.20	465	2.80	1,010	4.80	1,920	8.00	3,740
1.30	495	2.90	1,050	5.00	2,020	8.50	4,065
1.40	525	3.00	1,090	5.20	2,120	9.00	4,410
1.50	555	3.10	1,130	5.40	2,220	9.50	4,760
1.60	585	3.20	1,170	5.60	2,330	10.00	5,110
1.70	620	3.30	1,210	5.80	2,440	10.50	5,465

The above table is based on the discharge measurements made during 1903–5. It is well defined between gage heights 0.7 feet and 4 feet. The table has been extended beyond these limits. Above gage height 10.4 feet the rating curve is a tangent, the difference being 75 per tenth.

Estimated monthly discharge of Oconee River near Greensboro, Ga., for 1905.

[Drainage area, 1,100 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	4,065	555	970	0.882	1.02
February	6,965	690	2,497	2.27	2.36
March	1,170	760	937	.852	.982
April	865	585	698	.635	.708
May	3,420	555	1,156	1.05	1.21
June	1,010	435	646	.587	.655
July	5,990	405	1,195	1.09	1.26
August	2,330	220	978	.889	1.02
September	672	195	348	.316	.353
October	570	185	372	.338	.390
November	918	282	470	.427	.476
December	8,090	435	3,086	2.81	3.24
The year	8,090	185	1,113	1.01	13.67

NOTE.—For minimum flow see note to gage-height table, p. 67.

OCONEE RIVER AT FRALEYS FERRY, NEAR MILLEDGEVILLE, GA.

This station is located at Fraleys Ferry, about 6 miles above Milledgeville, Ga., and about 4 miles below the mouth of Little River, for the purpose of making a series of miscellaneous measurements. This point, being above the dam at Milledgeville, has a nearly natural flow, being but slightly affected by the dams a great distance upstream.

The channel is straight for some distance above and below the station. The current is moderate or slow at low stages. The bed is sandy and changing, but the rock shoals below will probably control the water level at the station.

Discharge measurements are made from the ferryboat or from a small boat controlled by the ferry cable along which the distances are marked. Measurements can be made at low and medium stages only, as the current soon becomes too great for safety in boat measurements.

During a short period in October and November, 1905, gage-height records were maintained by Charles F. Howe, who put in a temporary gage and has furnished the records to the Geological Survey. These gage heights, which are the means of four readings daily, and the discharge measurements which were made form a much more accurate basis for estimating the flow for the period which they cover than the records for the station at Milledgeville, 6 miles below. The bench mark is a nail driven horizontally into an ash tree on the right bank about 200 feet above the ferry; elevation, 10.00 feet above the datum of the gage.

Discharge measurements of Oconee River at Fraleys Ferry, near Milledgeville, Ga., in 1904 and 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1904.		*Feet.*	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
June 29	W. E. Hall	270	1,310	0.79	4.90	1,030
September 20	M. R. Hall	270	1,108	.50	4.35	547
1905.						
November 24	F. A. Murray	272	1,551	.63	5.02	985

Daily gage height, in feet, of Oconee River at Fraleys Ferry, near Milledgeville, Ga., for 1905.

Day.	Oct.	Nov.	Day.	Oct.	Nov.	Day.	Oct.	Nov.
1		4.85	12		6.0	22	4.65	
2		4.85	13		5.6	23	4.55	
3		4.75	14		5.2	24	4.55	
4		4.7	15			25	4.45	
5		4.7	16			26	4.8	
6		4.6	17			27	4.8	
7		4.65	18			28	4.85	
8		4.8	19			29		
9		4.85	20	4.7		30	4.8	
10		5.0	21	4.7		31	4.85	
11		6.0						

OCONEE RIVER AT MILLEDGEVILLE, GA.

This station was established August 22, 1903, by M. R. Hall, though several discharge measurements were made before that time. The first one was made October 19, 1895, by C. C. Babb. 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, Ga.

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.

Discharge measurements are made from the downstream side of the bridge, and the initial point for soundings is the end of the iron bridge at the right bank, downstream side. The bridge consists of four spans, 100 feet, 150 feet, 150 feet, and 80 feet long, respectively, beginning at the right-bank end, and short wooden trestles about 25 feet long at each end.

A standard chain gage, established in August, 1904, is fastened to the intermediate posts on the upstream side of the third panel of the second span from the right bank. The gage is read once each day by J. A. Brooks, who is paid by the United States Weather Bureau. The bottom of the gage box is 43.80 feet above the datum of the gage, and the length of the chain is 45.80 feet. The bench mark is the top of the third floor beam from the pier on the east bank, downstream end; elevation, 39.00 feet above the datum of the gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (WS=Water-Supply Paper; Bull=Bulletin):

Description: WS 98, pp 87–88; 127, pp 78–79.
Discharge: Bull 140, pp 73–74; WS 49, p 207; 83, p 113; 98, p 88; 127, p 79.
Discharge, monthly: WS 127, p 81.
Gage heights: WS 98, p 88; 127, p 80.
Rating table: WS 127, p 80.

Discharge measurements of Oconee River at Milledgeville, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 28	M. R. Hall	289	726	2.57	2.73	1,867
June 9	do	256	547	1.95	1.64	1,064
September 14	W. E. Hall	282	571	1.53	1.20	874
September 15	do	281	511	1.39	.95	712
November 23	F. A. Murray	283	617	1.35	1.16	856

Daily gage height, in feet, of Oconee River at Milledgeville, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.5	2.1	3.6	2.6	3.0	2.6	2.6	1.3	1.3	0.3	0.93	1.2
2	2.4	2.1	3.5	2.4	2.8	2.3	3.3	1.4	5.4	.7	1.0	1.1
3	2.3	2.1	3.3	2.4	4.0	2.2	6.4	1.2	4.4	.6	.92	2.3
4	2.5	2.1	3.1	2.4	4.0	2.1	5.4	1.0	3.4	1.6	.8	8.7
5	2.2	2.0	3.1	2.5	4.6	2.3	2.9	1.0	2.9	2.5	.77	11.4
6	2.0	2.3	3.0	2.9	4.7	2.0	2.3	.8	1.9	1.5	.75	11.6
7	2.4	3.0	2.9	3.1	3.7	2.0	3.0	.7	1.5	1.3	.7	5.4
8	2.6	4.9	2.9	2.9	5.2	1.8	8.0	1.1	1.2	1.15	.8	3.4
9	2.8	11.0	2.9	2.8	4.3	1.6	8.9	.9	1.0	.8	1.0	3.8
10	2.6	9.7	3.3	4.5	3.6	1.5	4.2	4.4	1.0	.87	1.2	9.6
11	2.4	8.5	3.3	4.3	3.1	1.4	3.6	5.0	1.0	.73	2.3	10.8
12	2.6	10.3	4.5	3.7	2.8	1.4	4.5	4.0	.9	1.0	3.7	10.2
13	3.3	21.0	6.2	5.9	2.5	1.5	4.8	6.8	.8	1.1	2.5	6.1
14	6.3	19.2	4.5	3.9	2.2	1.6	3.6	6.5	1.2	1.3	1.9	4.1
15	7.0	14.7	4.3	3.1	2.0	1.6	3.8	4.9	.9	1.1	1.7	6.1
16	5.0	10.0	3.7	3.2	2.0	1.5	2.7	4.9	1.0	.98	1.5	6.2
17	3.8	6.5	3.4	3.1	3.2	1.5	2.2	4.0	.8	1.1	1.3	5.0
18	3.0	5.3	3.1	2.8	2.7	2.5	1.9	13.0	.8	.82	1.2	4.2
19	2.8	4.6	3.1	2.7	2.4	2.1	1.8	5.7	.7	.93	1.0	3.5
20	2.9	4.3	3.0	2.6	2.1	1.9	1.7	2.7	.7	.9	1.0	4.4
21	2.9	7.8	4.2	2.4	1.9	1.7	2.1	2.1	.8	.85	1.1	18.8
22	2.7	10.2	4.7	2.4	2.2	2.5	1.8	1.8	.6	.7	1.2	18.1
23	2.5	9.6	3.6	2.5	3.3	4.7	1.7	1.8	.5	.63	1.1	15.1
24	2.4	8.6	3.2	2.4	6.6	4.3	1.5	2.1	.4	.68	1.1	10.5
25	2.4	6.3	3.1	2.3	7.3	3.2	2.1	3.4	.5	.63	1.3	6.5
26	2.2	4.9	3.0	2.4	6.2	2.8	2.1	2.8	.5	.87	1.1	5.0
27	2.0	4.3	3.0	2.5	4.9	2.1	1.9	3.6	.4	.87	1.1	4.3
28	2.0	3.9	2.9	2.5	3.5	2.0	1.7	2.0	.1	1.03	1.2	3.9
29	1.9	.....	2.7	2.3	3.1	2.2	1.5	1.6	.2	.95	1.6	6.6
30	2.0	.....	2.6	3.1	3.0	2.7	1.2	1.4	.4	.92	1.3	6.1
31	1.8	.....	2.6	.....	3.5	.....	1.5	1.2	.....	.88	.....	4.8

NOTE.—As this station is just below a mill, estimates based on the gage height can not be considered even approximately correct. From October 6 to November 6 an attempt was made to obtain a proper mean gage height by making six readings daily. For the rest of the time only one reading was made.

OCONEE RIVER AT DUBLIN, GA.

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 February 11 an observer was employed to read the gage. 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 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 the 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.

Discharge measurements are made from the iron highway bridge, which consists of a draw span between two other spans of 75 feet each. The total length of the bridge proper is 320 feet. On the left bank, which is low, there are 1,100 feet of iron-frame trestle

approach. There is also a short trestle on the right bank, which is high. The initial point for soundings is the end of the bridge at the right bank, on the upstream side.

The gage is a heavy timber bolted to the downstream side of the center pier of the Wrightsville and Tennille Railroad bridge, 500 feet downstream from the highway bridge.

The bridge is a drawbridge, and the pier to which the gage is attached is the circular center pier of the draw span. A secondary sloping gage, reading from −1.6 to + 1.9 feet, is attached to a solid rock on the right bank about 25 feet above the railroad bridge. The gage is read once each day by R. F. Mathis. Bench marks were established as follows: (1) The top of the upstream end of the floor beam on top of the first tubular pier of the wagon bridge from the right bank; elevation, 41.30 feet. (2) 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; elevation, 82.51 feet. (3) The top of the granite water table 2½ feet west of the southeast corner of the court-house; elevation, 80.97 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: Ann 19, iv, pp 227-228; WS 15, p 42; 27, p 31; 36 p 133; 48, p 152; 65, p 259; 83, p 96; 98, pp 84-85; 127, pp 81-82.

Discharge: WS 15, p 42; 27, p 44; 36, p 133; 48, p 152; 65, p 259; 83, p 97; 98, p 85; 127, p 83.

Discharge, monthly: Ann 20, iv, pp 161, 170; 21, iv, p 136; 22, iv, p 164; WS 75, pp 68, 75; 83, p 98; 98, p 87; 127, p 85.

Discharge, yearly: Ann 20, iv, p 51.

Gage heights: WS 11, pp 19-20; 15, p 42; 27, p 43; 36, p 134; 48, p 153; 65, p 260; 83, p 97; 98, pp 85-86; 127, p 84.

Hydrographs: Ann 20, iv, p 170; 21, iv, p 137; 22, iv, p 164; WS 75, p 68.

Rainfall and run-off relation: Ann 20, iv, p 161.

Rating tables: WS 27, p 46; 39, p 444; 52, p 513; 65, p 321; 83, p 98; 98, p 86; 127, p 84.

Discharge measurements of Oconee River at Dublin, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 15	W. E. Hall	260	2,760	3.00	7.03	8,283
April 25	F. A. Murray	210	1,166	2.26	1.14	2,631
April 25	do	226	1,187	2.12	1.11	2,518
June 13	A. T. Mitchelson	194	872	1.36	−.60	1,187
June 13	do	215	789	1.51	−.60	1,192
July 31	F. A. Murray	192	726	1.65	−.62	1,201
November 6	do	196	661	1.40	−.97	929
November 6	do	204	683	1.29	−.98	882
November 9	do	204	678	1.26	−.99	856

Daily gage height, in feet, of Oconee River at Dublin, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.1	0.7	5.4	1.8	1.4	2.2	0.8	−0.7	−0.5	−1.2	−0.7	−0.3
2	1.7	.7	4.4	1.7	1.7	1.6	1.3	− .6	− .3	−1.2	− .6	− .4
3	1.1	.7	3.9	1.7	1.9	1.2	.9	− .8	1.2	−1.3	− .6	− .2
4	1.0	.6	3.6	1.6	2.5	.9	3.3	− .8	2.8	−1.2	− .8	.5
5	.4	.6	3.3	1.5	3.9	.6	4.3	− .9	1.8	−1.1	− .9	4.0
6	.4	.7	3.0	1.6	4.0	.6	2.2	−1.0	1.6	.4	− .9	5.8
7	1.2	1.1	2.8	1.8	4.2	.6	.9	−1.1	.8	− .1	− .9	6.4
8	1.5	1.8	2.7	2.3	3.3	.1	1.1	−1.0	.1	− .4	− .9	6.6
9	1.5	3.8	2.5	2.1	3.3	− .1	4.4	−1.0	− .3	− .6	− .9	5.4
10	1.6	5.9	2.8	2.1	3.3	− .3	5.5	− .8	− .5	− .6	− .8	3.4
11	1.5	7.7	3.3	3.1	2.4	− .4	5.0	.1	− .7	− .8	− .4	5.5
12	1.5	8.8	4.3	3.9	1.8	− .5	3.0	3.0	− .8	− .9	.0	6.4
13	1.1	12.5	5.8	3.7	1.3	− .5	3.0	3.0	− .7	− .9	1.4	6.8
14	1.7	14.5	7.3	5.0	.9	− .5	3.8	4.2	− .6	− .7	1.2	7.1
15	4.2	16.8	7.3	5.3	.6	− .5	2.7	5.0	− .7	− .7	.2	7.0
16	5.0	19.5	6.6	4.0	.3	− .1	2.3	4.0	− .6	− .6	.1	6.7
17	4.5	19.5	5.4	3.3	.6	− .3	1.4	3.8	− .7	− .7	− .1	6.0
18	3.3	18.0	4.4	2.9	1.2	− .3	.6	2 8	− .8	− .8	− .2	5.5
19	2.6	16.0	3.5	2.2	1.2	− .3	.2	4.9	− .9	− .9	− .4	4.2
20	1.6	13.8	3.0	2.0	.8	+ .3	− .1	5.8	− .9	− .9	− .5	3.0
21	1.6	10.5	3.8	1.6	.4	− .1	− .2	3.0	−1.0	− .9	− .5	6.3
22	1.6	8.5	4.8	1.6	.2	− .2	− .3	1.0	−1.1	− .9	− .6	8.7
23	1.6	8.8	5.2	1.6	.4	+ .2	− .2	.5	−1.1	−1.0	− .7	9.5
24	1.4	9.4	4.3	1.4	1.9	1.4	− .3	− .1	−1.0	−1.1	− .5	11.0
25	1.2	9.8	3.8	1.2	4.0	2.0	− .4	.1	−1.2	−1.1	− .2	13.5
26	1.2	10.3	3.3	1.1	5.5	1.7	− .5	1.2	−1.2	−1.0	− .4	14.6
27	.9	9.8	2.9	1.3	5.8	1.0	+ .3	1.3	−1.2	−1.0	− .4	14.0
28	.7	7.5	2.6	1.3	4.3	.4	− .1	1.5	−1.2	− .8	− .5	12.0
29	.6	.....	2.3	1.2	2.8	.3	− .3	.8	−1.2	− .7	− .4	8.0
30	.6	.....	2.2	1.0	1.9	.3	− .5	.1	−1.2	− .7	− .4	7.0
31	.7	.....	1.9	.....	1.7	.....	− .5	− .3	.....	− .7	.....	7.2

Station rating table for Oconee River at Dublin, Ga., from January 1 to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
−1.30	690	0.80	2,280	2.90	4,060	6.00	7,090
−1.20	750	.90	2,360	3.00	4,150	6.20	7,310
−1.10	810	1.00	2,440	3.10	4,240	6.40	7,530
−1.00	875	1.10	2,520	3.20	4,330	6.60	7,750
− .90	945	1.20	2,605	3.30	4,420	6.80	7,970
− .80	1,015	1.30	2,690	3.40	4,510	7.00	8,190
− .70	1,090	1.40	2,775	3.50	4,600	7.50	8,790
− .60	1,165	1.50	2,860	3.60	4,695	8.00	9,390
− .50	1,240	1.60	2,945	3.70	4,790	8.50	9,990
− .40	1,320	1.70	3,030	3.80	4,885	9.00	10,640
− .30	1,400	1.80	3,115	3.90	4,980	9.50	11,290
− .20	1,480	1.90	3,200	4.00	5,075	10.00	11,990
− .10	1,560	2.00	3,285	4.20	5,265	10.50	12,690
0.00	1,640	2.10	3,370	4.40	5,455	11.00	13,430
.10	1,720	2.20	3,455	4.60	5,650	11.50	14,180
.20	1,800	2.30	3,540	4.80	5,850	12.00	14,930
.30	1,880	2.40	3,625	5.00	6,050	12.50	15,700
.40	1,960	2.50	3,710	5.20	6,250	13.00	16,500
.50	2,040	2.60	3,795	5.40	6,450	13.50	17,300
.60	2,120	2.70	3,880	5.60	6,650	14.00	18,100
.70	2,200	2.80	3,970	5.80	6,870		

The above table is based on discharge measurements made during 1903-1905. It is well defined between gage heights −1 foot and + 7 feet. The table has been extended beyond these limits. Above gage height 14 feet the rating curve is a tangent, the difference being 170 per tenth.

Estimated monthly discharge of Oconee River at Dublin, Ga., for 1905.

[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	6,050	1,960	3,021	.722	.832
February	27,450	2,120	11,260	2.69	2.80
March	8,550	3,200	5,082	1.22	1.41
April	6,350	2,440	3,506	.838	.935
May	6,870	1,800	3,538	.846	.975
June	3,455	1,240	1,947	.466	.520
July	6,550	1,240	2,839	.679	.783
August	6,055	810	2,685	.642	.740
September	3,970	750	1,346	.322	.359
October	1,960	690	1,019	.244	.281
November	2,775	945	1,346	.322	.359
December	19,120	1,320	8,121	1.94	2.24
The year	27,450	690	3,810	.911	12.23

OHOOPEE RIVER NEAR REIDSVILLE, GA.

This station was established June 13, 1903, by F. A. Murray. It is located at the wooden highway bridge known as Sheppards Bridge, 4½ miles west of Reidsville, Ga.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is the outer edge of the first cross beam at the left end of the bridge, downstream side.

The original gage consisted of two 5-foot sections spiked to the bridge and a third section fastened to a cypress tree on the left bank above the bridge. June 10, 1905, the gage was changed to the right side of the second bent from the left bank. It is fastened to the bent in four 5-foot sections. The gage is read by J. D. Swain, who is paid by the Georgia Geological Survey. Bench marks were established as follows: (1) 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; elevation, 20.00 feet. (2) Two nails driven horizontally into the downstream side of a cypress tree on the left bank, about 120 feet above the bridge; elevation, 8.00 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 98, pp 81–82; 127, pp 85–86.
Discharge: 98, p 82; 127, p 86.
Discharge, monthly; 98, p 84; 127, p 88.
Gage heights: 98, pp 82–83; 127, p 87.
Rating table: 98, p 83; 127, p 87.

Discharge measurements of Ohoopee River near Reidsville, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 16	W. E. Hall	141	1,755	2.39	11.90	4,204
March 17	do	141	1,755	2.37	11.90	4,163
April 27	F. A. Murray	114	1,137	1.44	6.38	1,635
June 10	A. T. Mitchelson	118	533	.21	1.01	114
July 28	F. A. Murray	110	638	.57	2.31	363
November 8[a]	do	69	96	.59	.36	57
November 8[a]	do	70	93	.60	.34	56

[a] Made at different section.

Daily gage height, in feet, of Ohoopee River near Reidsville, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.8	3.6	9.7	6.2	5.3	1.9	1.0	2.5	1.7	0.7	0.7	0.6
2	2.9	3.7	9.1	5.9	5.3	1.7	1.2	2.4	1.5	.8	.6	.6
3	2.7	3.5	8.7	5.4	5.2	1.5	1.3	2.1	1.3	1.0	.6	.9
4	2.5	3.4	8.2	5.2	5.1	1.4	1.3	2.0	1.4	.9	.5	1.0
5	2.4	3.5	7.9	5.1	5.3	1.4	1.2	1.7	1.7	.8	.4	1.9
6	2.3	3.7	7.5	5.3	5.2	1.4	3.4	1.0	2.0	.7	.4	2.6
7	2.4	4.2	7.2	5.6	4.8	1.3	5.1	1.1	1.7	.6	.4	2.6
8	2.7	4.5	7.0	5.4	4.0	1.1	5.8	1.0	1.4	.6	.4	2.2
9	3.0	5.0	6.8	5.0	3.7	1.0	6.0	1.0	1.1	.5	.4	1.8
10	3.3	5.7	7.1	4.9	3.5	1.0	6.3	1.0	.9	.5	.4	1.9
11	3.3	5.9	7.4	5.2	3.2	.9	5.9	1.4	.8	.5	.4	2.0
12	3.5	6.8	8.9	5.5	2.9	.9	5.8	1.8	.8	.5	.4	2.1
13	3.9	8.6	10.5	6.1	2.7	.8	5.2	2.0	.7	.4	1.5	2.1
14	4.8	10.2	11.3	6.7	2.4	1.8	4.5	2.8	.7	.4	1.8	1.8
15	5.0	12.7	11.7	7.6	2.1	1.4	3.7	3.7	.9	.4	1.6	1.9
16	5.2	15.9	11.9	7.9	1.9	1.8	4.8	3.7	1.4	.4	1.2	2.3
17	5.5	19.0	11.9	8.2	1.9	1.3	5.0	3.5	1.3	.4	1.1	2.3
18	5.5	15.0	11.6	7.3	2.3	1.4	4.7	3.3	1.5	.4	.9	3.2
19	5.1	14.6	11.3	7.2	2.7	1.4	5.0	3.3	1.3	.4	.9	3.3
20	4.9	13.7	11.1	7.2	2.8	1.5	5.7	3.1	1.0	.4	.8	3.0
21	4.7	11.8	10.4	6.5	2.7	1.3	4.7	3.0	.9	.4	.8	3.3
22	4.6	11.6	9.6	6.1	2.6	1.3	3.8	2.7	.8	.4	.7	4.1
23	4.5	12.0	9.0	6.8	2.4	1.3	3.0	2.5	.8	.4	.6	5.6
24	4.3	12.5	8.5	7.0	2.6	1.3	2.6	2.5	.6	.3	.6	6.8
25	4.2	12.2	8.3	7.2	3.0	1.2	2.1	2.1	.5	.3	.6	8.0
26	4.2	11.7	8.0	6.9	3.2	1.0	1.8	2.1	.5	.3	.6	7.9
27	4.1	11.1	7.9	6.2	3.2	1.2	1.7	2.8	.5	.4	.6	7.9
28	4.0	10.5	7.8	5.9	2.8	1.2	2.3	3.1	.5	.4	.6	7.6
29	3.8	.....	7.4	5.6	2.2	1.0	2.9	2.9	.5	.7	.6	7.5
30	3.6	.....	7.1	5.4	2.0	1.0	2.7	2.5	.6	.9	.6	7.8
31	3.6	.....	6.7	.....	2.0	.....	2.6	2.1	.....	.8	.....	8.2

Station rating table for Ohoopee River near Reidsville, Ga., from January 1, 1904, to December 31, 1905.

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	50	2.30	321	4.40	895	8.20	2,531
.40	57	2.40	341	4.60	968	8.40	2,633
.50	65	2.50	361	4.80	1,043	8.60	2,737
.60	74	2.60	382	5.00	1,120	8.80	2,843
.70	83	2.70	403	5.20	1,198	9.00	2,950
.80	93	2.80	425	5.40	1,277	9.20	3,058
.90	104	2.90	447	5.60	1,357	9.40	3,167
1.00	115	3.00	470	5.80	1,438	9.60	3,277
1.10	127	3.10	494	6.00	1,520	9.80	3,388
1.20	140	3.20	519	6.20	1,602	10.00	3,500
1.30	153	3.30	545	6.40	1,685	10.20	3,617
1.40	167	3.40	572	6.60	1,771	10.40	3,738
1.50	182	3.50	600	6.80	1,860	10.60	3,862
1.60	197	3.60	629	7.00	1,950	10.80	3,989
1.70	213	3.70	659	7.20	2,042	11.00	4,120
1.80	230	3.80	690	7.40	2,136	11.50	4,460
1.90	247	3.90	722	7.60	2,232	12.00	4,820
2.00	265	4.00	755	7.80	2,330	12.50	5,198
2.10	283	4.20	824	8.00	2,430	13.00	5,590
2.20	302						

The above table is based on 26 discharge measurements made during 1903–1905. It is well defined between gage heights 0.0 and 11 feet. Above gage height 11 feet the table is determined by one measurement at 14 feet. The discharge is only approximate above 13 feet.

Estimated monthly discharge of Ohoopee River near Reidsville, Ga., for 1905.

[Drainage area, 1,280 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	1,317	321	744	0.581	0.670
February	10,390	572	3,512	2.74	2.85
March	4,746	1,815	2,989	2.34	2.70
April	2,531	1,081	1,625	1.27	1.42
May	1,237	247	588	.459	.529
June	247	93	154	.120	.134
July	1,643	115	750	.586	.676
August	659	115	349	.273	.315
September	265	65	126	.098	.109
October	115	50	69.4	.054	.062
November	230	57	89.9	.070	.078
December	2,531	74	860	.672	.775
The year	10,390	50	988	.772	10.32

MISCELLANEOUS MEASUREMENTS IN ALTAMAHA RIVER DRAINAGE BASIN.

The following is a list of miscellaneous discharge measurements made in Altamaha River drainage basin during 1905:

Brazzell Creek near Reidsville, Ga.—A measurement was made by wading at a narrow channel one-fourth mile above the mouth and one-half mile from the regular gaging station on Ohoopee River at Reidsville, Ga. The gage height by the gage at the Ohoopee River station at the same time was 2.35 feet.

Width, 12 feet; area, 6.6 square feet; mean velocity, 0.85 foot per second; discharge, 5.6 second-feet.

Jacks Creek at Anniestown, Ga.—A measurement was made from a foot log on the river road about one-fourth mile above Hayden's Bridge, about one-half mile from Anniestown, Ga. The bench mark is the head of a large wire nail driven into the downstream face of a double-trunk birch tree on the right bank, 20 feet below the road; elevation, 5.00 feet above the datum of the assumed gage.

Width, 8.5 feet; area, 3.7 square feet; mean velocity, 1.32 feet per second; gage height, 1.88 feet; discharge, 4.9 second-feet.

Little River near Milledgeville, Ga.—This stream enters Oconee River from the right. It was measured from the downstream side of a wooden highway bridge 9 miles north of Milledgeville, Ga., 1 mile above the mouth. The initial point for soundings is the end of the hand rail at the left bank. The bench mark is a copper brand in the top of the downstream end of the cross beam at the first pier from the left bank; elevation, 15.00 feet above the datum of the assumed gage.

September 15: Width, 99 feet; area, 92 square feet; mean velocity, 1.23 feet per second; gage height, 3.51 feet; discharge, 113 second-feet.

November 24: Width, 119 feet; area, 132 square feet; mean velocity, 1.55 feet per second; gage height, 3.86 feet; discharge, 205 second-feet.

Little Ocmulgee River at Lumber City, Ga.—A measurement was made July 26, 1905, by wading about 90 feet upstream from the wagon bridge on which a bench mark was established in September, 1904, three-fourths mile northeast of Lumber City, Ga. The bench mark is the top of the downstream end of the cap of the second bent from the right bank; elevation, 23.00 feet above the datum of the assumed gage.

Width, 48 feet; area, 25 square feet; mean velociy, 1.64 feet per second; gage height, 1.46 feet; discharge, 41 second-feet.

Little Ocmulgee River at Wilcox, Ga.—A measurement was made July 25, 1905, at a wooden wagon bridge 2½ miles from Lumber City and one-eighth mile from Wilcox Station, Ga. The bench mark is the center of a lag screw driven into the end of the second floor beam from the right bank on the downstream side; elevation, 18.00 feet above the datum of the assumed gage.

Width, 52.5 feet; area, 61.5 square feet; mean velocity, 0.58 foot per second; gage height, 1.25 feet; discharge, 35.5 second-feet.

Ohoopee River near Ohoopee, Ga.—A measurement was made July 29, 1905, from the downstream side of a wooden highway bridge about 2 miles southeast of Ohoopee, Ga., above the mouth of Pendletons Creek. The initial point for soundings is the end of the hand rail at the left bank, downstream side. The bench mark is the top of the upstream end of the cap of the bent, 64 feet from the left end of the hand rail; elevation, 19.00 feet above the datum of the assumed gage.

Width, 84 feet; area, 314 square feet; mean velocity, 0.57 foot per second; gage height, 4.22 feet; discharge, 180 second-feet.

Pendletons Creek near Lyons, Ga.—A measurement was made July 29, 1905, from a new wooden highway bridge 3½ miles east of Lyons, Ga., about one-half mile above the crossing of the Seaboard Air Line. Bench marks established for former measurements at this point were carried away by a flood. A new bench mark was established, the top of the down-

stream end of the cap of the third bent from the right-bank end of the bridge; elevation, 17.00 feet above the datum of the assumed gage.

Width, 74 feet; area, 341 square feet; mean velocity, 1.23 feet per second; gage height, 7.58 feet; discharge, 438 second-feet.

Snapping Shoals Creek at Snapping Shoals, Ga.—A measurement was made October 24, 1905, at a bridge about 80 feet above the mouth of Snapping Shoals Creek, 400 feet below the gage on South River at Snapping Shoals, Ga. The bench mark is the top of the wooden stringer 13½ feet from the left-bank end; elevation, 12.00 feet above the datum of the assumed gage.

Width, 21 feet; area, 12 square feet; mean velocity, 1.17 feet per second; gage height, 0.54 foot; discharge, 14 second-feet.

South River at Snapping Shoals, Ga.—A measurement was made on South River October 24, 1905, from a boat, just below the mouth of Snapping Shoals Creek, and about 500 feet below the wagon bridge at Snapping Shoals, Ga. The bench mark is the top of the downstream end of the first floor beam of the bridge to the left of the center pier; elevation, 26.00 feet above the datum of the assumed gage.

Width, 78 feet; area, 122 square feet; mean velocity, 1.18 feet per second; gage height, 3.00 feet; discharge, 144 second-feet.

Sugar Creek at Wilcox, Ga.—A measurement was made July 25, 1905, at a new wagon bridge 75 feet upstream from the Southern Railway bridge at Wilcox, Ga. The bench mark is the top of the downstream wooden stringer 126 feet from the right end of the downstream hand rail of the bridge; elevation, 22.06 feet above the datum of the assumed gage.

Width, 15 feet; area, 18 square feet; mean velocity, 0.30 foot per second; gage height, 3.88 feet; discharge, 5.5 second-feet.

Yellow River near Lithonia, Ga.—Measurements were made from a wagon bridge about 4 miles north of Lithonia, Ga. The bench mark is the top of the downstream corner of the right-bank stone abutment; elevation, 16.55 feet above the datum of the assumed gage.

September 15: Width, 28 feet; area, 40 square feet; mean velocity, 1.70 feet per second; gage height, 1.96 feet; discharge, 68 second-feet.

APALACHICOLA RIVER DRAINAGE BASIN.

DESCRIPTION OF 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, southeastward to Macon County, southward to Worth County, and southwestward to Apalachicola River. It drains the south-central portion of Georgia, extending from Atlanta south to the Florida line. The tributaries of 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 southeast corner of Troup County, Ga. Thence 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 the north-central, middle-western, and southwestern 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 West Point and Columbus. All along its course there are many small tributaries flowing from a high, hilly country. These have much fall, and many water powers are available.

The following pages give the results of data collected in this drainage during 1905:

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.

The channel is slightly curved for 600 feet above and 700 feet below the station. The current is sluggish at low stages, but not excessively so, and the discharge measurements are considered good at the 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.

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 the right of the center of the downstream tubular pier on the right bank.

The original gage was a vertical staff attached to an oak tree on the right bank 100 feet above the bridge. A chain gage, established March 14, 1903, was read in connection with the vertical gage until June 28, 1905, when a standard chain gage was attached to the downstream lower chord of the first panel from the right bank; length of chain, 30.36 feet. The gage is read twice each day by W. O. Medlock, who is paid by the Georgia Geological Survey. Bench marks were established as follows: (1) The top of the iron pier on the right bank, downstream side; elevation, 27.00 feet. (2) 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, in line with the downstream side of the bridge and 145 feet from the center of the pier at the right-bank end of the bridge; elevation, 26.92 feet. (3) The bottom of the gage box at the pulley; elevation, 28.36 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 98, pp 121–122; 127, pp 92–93.
Discharge: 83, p 127; 98, p 122; 127, p 93.
Discharge, monthly: 98, p 124; 127, p 95.
Gage heights: 98, p 123; 127, p 94.
Rating table: 98, p 123; 127, p 94.

Discharge measurements of Chattahoochee River near Norcross, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
January 13	B. S. Drane	224	3,221	5.00	12.26	16,120
January 13	do	224	3,179	4.96	12.10	15,780
January 13	do	224	3,129	4.73	11.82	14,790
January 14	do	184	1,811	2.57	5.29	4,653
January 14	do	184	1,770	2.54	5.05	4,501
March 2	M. R. Hall	163	1,342	1.45	2.94	1,949
May 27	A. T. Mitchelson	166	1,403	1.65	3.19	2,320
May 27	M. R. Hall	165	1,339	1.65	3.16	2,209
June 28	F. A. Murray	160	1,135	1.00	2.01	1,139
September 22	M. R. Hall	159	938	.76	1.51	713
September 22	do	159	1,040	.70	1.52	733
October 28	do	163	1,018	1.02	1.90	1,035
October 28	F. A. Murray	163	1,025	1.03	1.92	1,054
October 28	do	163	1,018	1.02	1.90	1,042
December 9	do	197	2,375	4.01	8.56	9,521

Daily gage height, in feet, of Chattahoochee River near Norcross, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.0	2.15	3.0	2.4	2.65	2.5	10.5	2.0	1.8	1.72	1.72	1.48
2	1.98	2.1	2.95	2.35	2.4	2.4	6.1	1.95	2.15	1.82	1.7	1.6
3	2.0	2.05	2.85	2.3	2.6	2.35	3.3	1.9	2.25	1.68	1.68	8.4
4	1.93	2.05	2.8	2.35	3.3	2.3	2.7	1.85	1.95	1.72	1.68	7.6
5	1.83	2.0	2.7	2.45	3.0	2.25	3.2	1.9	1.85	1.95	1.65	3.6
6	2.02	2.2	2.65	2.6	3.1	2.2	3.8	1.85	1.8	1.72	1.68	2.9
7	3.15	2.95	2.65	2.6	5.3	2.2	4.2	1.9	1.75	1.6	1.82	2.65
8	2.9	3.3	2.7	2.45	4.5	2.1	3.2	2.3	1.72	1.55	2.2	2.85
9	2.35	5.1	2.7	2.5	4.6	2.1	2.85	2.6	1.73	1.5	1.92	7.2
10	2.2	6.7	2.9	2.5	3.5	2.05	3.7	2.7	1.7	1.58	2.1	8.1
11	2.2	5.1	3.3	2.4	3.0	2.0	5.2	3.6	1.68	2.7	1.88	4.4
12	6.5	4.3	3.1	2.4	2.8	2.0	7.4	3.8	1.9	3.5	1.25	3.4
13	11.9	7.7	2.9	2.6	2.7	2.3	6.0	4.2	1.75	2.2	1.2	3.0
14	5.3	6.7	2.8	2.5	2.6	2.1	4.0	3.6	1.72	1.9	1.25	2.85
15	3.7	4.3	2.8	2.4	2.5	2.1	4.2	3.8	1.63	1.82	2.15	2.95
16	3.1	3.6	2.7	2.6	3.9	2.35	3.6	2.9	1.6	1.82	1.92	3.1
17	2.8	3.3	2.6	2.45	4.0	2.45	2.9	2.65	1.6	1.88	1.98	2.9
18	2.65	3.1	2.55	2.35	3.1	2.3	2.8	2.4	1.6	1.78	1.82	2.75
19	2.55	2.95	2.55	2.3	2.8	2.15	2.6	2.3	1.6	1.75	1.75	2.6
20	2.55	4.1	2.55	2.3	2.7	2.1	2.5	2.25	1.6	1.75	1.75	3.2
21	2.5	11.5	2.65	2.3	2.6	2.6	2.7	2.2	1.55	1.7	1.95	5.8
22	2.35	6.9	3.2	2.3	2.8	2.6	2.7	2.1	1.52	1.68	1.88	5.2
23	2.2	5.1	2.85	2.3	4.0	2.7	2.4	2.25	1.53	1.62	1.78	3.8
24	2.2	4.2	2.7	2.2	6.0	2.3	2.2	2.5	1.5	1.62	1.57	3.8
25	2.1	3.8	2.6	2.2	4.0	2.15	2.25	2.4	1.47	1.68	1.52	3.4
26	2.1	3.6	2.6	2.2	3.4	2.0	2.2	2.2	1.48	1.82	1.8	3.2
27	2.25	3.3	2.5	2.3	3.2	2.1	2.15	2.3	1.6	2.2	1.8	2.95
28	2.35	3.2	2.5	2.4	3.0	2.05	2.1	2.0	1.25	1.95	1.75	2.9
29	2.1	.....	2.4	2.4	2.9	2.4	2.1	1.9	1.42	1.8	1.75	3.0
30	2.1	.....	2.5	2.6	2.8	2.25	2.2	1.85	1.47	1.75	1.52	3.1
31	2.1	.....	2.5	.....	2.6	.....	2.2	1.85	.....	1.75	.....	2.85

NOTE.—Low gage heights can be accounted for as resulting from storage at the Gainesville water-power plant.

Station rating table for Chattahoochee River near Norcross, Ga., from January 1, 1904, to December 31, 1905.

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	2.50	1,645	3.90	3,205	5.60	5,345
1.20	515	2.60	1,750	4.00	3,320	5.80	5,615
1.30	560	2.70	1,860	4.10	3,440	6.00	5,885
1.40	615	2.80	1,970	4.20	3,560	6.20	6,160
1.50	680	2.90	2,080	4.30	3,680	6.40	6,440
1.60	750	3.00	2,190	4.40	3,800	6.60	6,720
1.70	830	3.10	2,300	4.50	3,920	6.80	7,005
1.80	920	3.20	2,410	4.60	4,045	7.00	7,295
1.90	1,015	3.30	2,520	4.70	4,170	7.20	7,585
2.00	1,120	3.40	2,630	4.80	4,295	7.40	7,885
2.10	1,225	3.50	2,745	4.90	4,425	7.60	8,185
2.20	1,330	3.60	2,860	5.00	4,555	7.80	8,495
2.30	1,435	3.70	2,975	5.20	4,815	8.00	8,805
2.40	1,540	3.80	3,090	5.40	5,075	8.20	9,125

The above table is based on discharge measurements made during 1902–1905 and is well defined.

Estimated monthly discharge of Chattahoochee River near Norcross, Ga., for 1905.

[Drainage area, 1,170 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	15,570	948	2,238	1.91	2.20
February	14,820	1,120	3,753	3.21	3.34
March	2,520	1,540	1,899	1.62	1.87
April	1,750	1,330	1,540	1.32	1.47
May	5,885	1,540	2,552	2.18	2.51
June	1,860	1,120	1,381	1.18	1.32
July	13,030	1,225	2,786	2.38	2.74
August	3,560	968	1,609	1.38	1.59
September	1,382	538	824	.704	.786
October	2,745	680	991	.847	.976
November	1,330	515	893	.763	.851
December	9,445	667	3,225	2.76	3.18
The year	15,570	515	1,974	1.69	22.85

CHATTAHOOCHEE RIVER NEAR VININGS, GA.

This station was established in 1905, for the purpose of making a series of miscellaneous measurements, at a new iron highway bridge 1 mile east of Vinings, Ga., and about 10 miles northwest of Atlanta, Ga. It is about 10 miles below the developed power at Bull Sluice.

The current of the section is fairly good, and regular, and while the bed is probably somewhat shifting there is a stretch of swift water immediately below, running among permanent rocks which will probably control the water level at the station. The left bank is high and will not overflow; the right bank is only about 20 feet above low water for a width of 900 feet and will overflow during very high floods.

Discharge measurements are made from the bridge of two 140-foot spans, with 50 feet of wooden approach at the left bank and 100 feet at the right bank.

No gage has been established. The effect of the water power above being to cause a great amount of fluctuation in the flow, the mean daily gage height can be obtained only by the use of an automatic recording gage, and until this is accomplished the measurements are made mainly as investigations relative to the accuracy of the rating in case the original Chattahoochee River station which was located at Oakdale, 4 miles below, should be continued at this place. Gage heights are determined directly from the bench mark, which is the top of the upstream end of the second floor beam from the left bank; elevation, 31.00 feet above the datum of the assumed gage.

Discharge measurements of Chattahoochee River near Vinings, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
May 4	W. E. Hall	249	1,130	1.74	4.51	1,966
August 18	do	256	1,081	1.85	4.68	2,003
August 18	do	256	1,057	1.76	4.57	1,861
October 17	M. R. Hall	238	761	1.12	3.43	856
November 27	do	242	820	1.22	3.74	1,002

CHATTAHOOCHEE RIVER (LOWER GAGE) NEAR OAKDALE, GA.

This station was established in 1905, for the purpose of making a series of miscellaneous measurements, at a new iron highway bridge just below the old Mason and Turners Ferry, where the Oakdale "lower gage" was maintained as a regular station during parts of the years 1898 and 1899. It is 1½ miles below the Southern Railway bridge where the Oakdale station was located.

Discharge measurements are made from the bridge of two 130-foot spans, with 300 feet of wooden approach at the right bank and 730 feet at the left. At high floods both banks will overflow to the extent of the bridge approaches, but can not get beyond at either end. The current is mostly swift and is irregular at places.

Gage heights are determined directly from the bench mark, which is the top of the downstream end of the second-floor beam from the right bank; elevation, 35.00 feet above the datum of the assumed gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; Bull=Bulletin; WS=Water-Supply Paper):

Description: Ann 18, iv, pp 85–87; Bull 140, pp 75–76; WS 15, p 46; 27, p 47; 36, pp 139–140; 48, p 158; 65, p 269; 83, p 122; 98, pp 119–120; 127, pp 95–96.

Discharge: Ann 18, iv, p 87; Bull 140, p 76; WS 15, p 46; 27, p 57; 36, p 140; 48, p 158; 65, p 269; 83, p 122; 98, p 120; 127, p 96.

Discharge, monthly: Ann 18, iv, p 89; 19, iv, p 236; 20, iv, pp 180, 182; 21, iv, p 140; 22, iv, p 191; WS 75, p 79; 83, p 124; 98, p 121; 127, p 98.

Discharge, yearly: Ann 20, iv, p 51.

Gage heights: Bull 140, p 77; WS 11, pp 23–24; 15, p 46; 27, p 50; 36, pp 141–142; 48, p 159; 65, p 270; 83, p 123; 98, p 120; 127, p 97.

Hydrographs: Ann 18, iv, p 89; 19, iv, p 236; 20, iv, p 182; 21, iv, p 141; 22, iv, p 191.

Rainfall and run-off relation: Ann 20, iv, p 181.

Rating tables: Ann 18, iv, p 88; 19, iv, p 235; WS 27, p 58; 39, pp 444, 445; 52, p 513; 65, p 322; 83, p 124; 98, p 121; 127, p 97.

Discharge measurements of Chattahoochee River (lower gage) near Oakdale, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
April 28	M. R. Hall	236	553	2.32	4.11	1,284
May 25	W. E. Hall	254	1,572	2.98	8.16	4,687
May 25	A. T. Mitchelson	254	1,625	2.98	8.30	4,845

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 the Montgomery street wagon 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.

The 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.

A standard chain gage is fastened to the outside of the iron railing of the downstream footway at a point 122 feet from the initial point for soundings; length of chain, 29.26 feet. Bench marks were established as follows: (1) The top of the downstream end of the second iron floor beam under the bridge floor from the right-bank end of the bridge; elevation, 24.19 feet. (2) 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; elevation, 15.68 feet. 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 Episcopal Church. (3) 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 for soundings and 860 feet from the east end of the bridge; elevation, 25.56 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: Ann 18, iv, pp 90–91; WS 15, p 47; 27, p 47; 36, p 142; 48, p 159, 65, p 270; 83, pp 119–120; 98, pp 116–117; 127, pp 98–99.

Discharge: Ann 18, iv, p 91; 19, iv, p 237; WS 15, p 47; 27, p 57; 36, p 142; 48, p 159; 65, p 270; 83, p 120; 98, p 117; 127, p 99.

Discharge, monthly: Ann 18, iv, p 92; 19, iv, p 239; 20, iv, pp 180, 183; 21, iv, p 141; 22, iv, p 192; WS 75, p 80; 83, p 121; 98, p 119; 127, p 101.

Discharge, yearly: Ann 20, iv, p 51.

Gage heights: WS 11, p 24; 15, p 47; 27, p 51; 36, p 143; 48, p 160; 65, p 271; 83, p 120; 98, pp 117–118; 127, p 100.

Hydrographs: Ann 19, iv, p 239; 20, iv, p 183; 21, iv, p 142; 22, iv, p 192; WS 75, p 80.

Rainfall and run-off relation: Ann 20, iv, p 181.

Rating tables: Ann 18, iv, p 91; 19, iv, p 238; WS 27, p 58; 39, p 445; 52, p 514; 65, p 322; 83, p 121; 98 p 118; 127, p 100.

Discharge measurements of Chattahoochee River at West Point, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 24	J. M. Giles	389	3,151	1.28	3.28	4,026
June 6	W. E. Hall	377	2,662	.77	2.30	2,048
October 28	do	377	2,655	.85	2.30	2,252

Daily gage height, in feet, of Chattahoochee River at West Point, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.9	2.6	3.6	2.7	3.3	2.8	2.8	2.2	1.9	1.9	1.88	2.15
2	2.6	2.5	3.5	2.7	2.5	2.5	4.4	2.0	1.8	3.6	1.85	1.98
3	2.3	2.4	3.4	2.7	2.7	2.4	7.8	1.3	2.2	2.7	1.85	10.6
4	2.3	2.4	3.3	2.5	3.0	2.3	4.9	2.0	2.5	2.1	1.85	13.6
5	2.3	2.7	3.2	2.8	2.9	2.3	3.2	1.9	2.9	1.8	1.9	10.2
6	2.2	3.0	3.2	2.9	2.9	2.1	2.9	1.6	2.2	1.7	1.85	6.2
7	2.6	3.2	3.1	2.9	3.1	2.1	3.9	1.5	2.0	1.6	1.76	4.2
8	2.8	4.0	3.1	2.9	2.9	2.1	4.9	1.5	1.8	1.7	1.95	5.3
9	2.6	8.5	3.1	2.9	4.3	2.1	7.8	2.6	1.7	1.5	1.88	9.8
10	3.0	8.3	3.6	3.3	4.0	2.0	4.8	2.7	1.7	1.8	2.0	8.8
11	2.7	7.3	3.3	3.2	3.9	1.9	4.2	3.0	1.6	2.35	2.8	8.9
12	3.4	7.0	3.1	3.2	3.3	1.7	5.8	4.1	1.6	2.7	3.0	6.4
13	12.6	9.2	3.6	3.1	3.0	1.6	8.7	5.2	1.8	2.35	2.5	4.6
14	10.6	8.9	3.6	2.9	2.7	1.6	8.2	5.5	1.7	2.9	2.1	4.0
15	10.2	8.5	3.3	2.8	2.5	1.9	5.4	4.6	1.7	2.5	2.1	3.9
16	5.5	6.1	3.2	3.0	2.4	2.2	3.9	6.2	1.6	2.1	2.1	3.9
17	4.0	4.8	3.1	3.0	2.8	2.5	3.7	4.7	1.5	2.0	2.0	3.8
18	3.6	4.3	3.1	2.5	3.0	2.2	3.2	4.4	1.6	1.8	2.0	3.7
19	3.4	3.9	3.0	2.6	3.7	2.9	2.8	3.5	1.5	1.8	2.0	3.5
20	3.3	3.8	3.0	2.6	3.0	2.4	2.5	2.8	1.6	1.9	2.05	5.4
21	3.2	4.5	3.5	2.6	2.9	2.4	2.7	2.6	1.4	1.7	1.98	9.4
22	3.1	6.9	3.6	2.7	2.8	2.3	2.0	2.2	1.3	1.7	2.0	8.7
23	3.0	9.3	3.3	2.8	2.9	2.5	2.5	2.8	1.3	1.65	1.95	7.1
24	2.7	6.0	3.4	2.8	4.1	2.5	2.3	3.4	1.3	1.72	1.95	6.0
25	2.7	4.9	3.1	2.4	4.0	2.6	2.3	4.0	1.5	1.85	1.95	4.9
26	2.6	4.4	3.0	2.6	5.0	2.9	2.7	3.7	1.4	2.8	1.98	4.4
27	2.3	4.0	3.0	2.6	4.1	2.2	2.5	3.0	1.3	2.7	2.0	4.0
28	2.3	3.8	2.8	2.0	3.5	2.2	2.0	2.6	1.3	2.25	2.1	3.8
29	2.4	.....	2.8	2.0	3.2	2.4	1.4	2.0	1.3	2.1	2.1	3.8
30	2.5	.....	2.8	2.6	3.1	3.1	2.6	2.1	1.5	2.0	2.1	3.6
31	2.5	.....	2.7	.....	2.9	.....	2.3	2.0	.....	1.98	.....	3.6

NOTE.—From October 1 to December 31 two readings a day were made, before that, only one reading

Station rating table for Chattahoochee River at West Point, Ga., from January 1, 1904, to December 31, 1905.

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	2.10	1,970	3.20	3,700	4.60	6,760
1.00	850	2.20	2,100	3.30	3,890	4.80	7,240
1.10	920	2.30	2,240	3.40	4,080	5.00	7,740
1.20	1,000	2.40	2,380	3.50	4,280	5.20	8,240
1.30	1,090	2.50	2,530	3.60	4,500	5.40	8,740
1.40	1,180	2.60	2,680	3.70	4,720	5.60	9,260
1.50	1,280	2.70	2,840	3.80	4,940	5.80	9,780
1.60	1,380	2.80	3,000	3.90	5,160	6.00	10,300
1.70	1,490	2.90	3,170	4.00	5,380	6.20	10,840
1.80	1,600	3.00	3,340	4.20	5,830	6.40	11,380
1.90	1,720	3.10	3,520	4.40	6,290	6.60	11,940
2.00	1,840						

The above table is based on discharge measurements made during 1903–1905. It is well defined between gage heights 1.2 feet and 11.4 feet. Above gage height 6.5 feet the rating curve is a tangent, the difference being 290 per tenth.

Estimated monthly discharge of Chattahoochee River at West Point, Ga., for 1905.

[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	29,340	2,100	5,363	1.63	1.88
February	19,770	2,380	8,915	2.70	2.81
March	4,500	2,840	3,733	1.13	1.30
April	3,890	1,840	2,930	.888	.991
May	7,740	2,380	3,869	1.17	1.35
June	3,520	1,380	2,257	.684	.763
July	18,030	1,180	5,724	1.73	1.99
August	10,840	1,090	3,743	1.13	1.30
September	3,170	1,090	1,505	.456	.509
October	4,500	1,280	2,032	.616	.710
November	3,340	1,556	1,923	.583	.650
December	32,240	1,816	10,380	3.15	3.63
The year	32,240	1,090	4,365	1.32	17.88

SOQUE RIVER NEAR DEMOREST, GA.

This station was established July 16, 1904, by M. R. Hall. It is located at Cannon Bridge, on the road from Cornelia to Acorn, 2½ miles from Demorest and about 4 miles above the mouth of the river.

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.

Discharge measurements are made from the single-span wooden wagon bridge. The bridge has a 28-foot approach on the left bank and a 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 gage is in two sections; the first is a vertical staff, reading from 0 to 10 feet, fastened to the sill and upstream post of the trestle bent at the left bank. An additional section,

established September 12, 1905, is a vertical staff, reading from 0.7 foot to 6 feet, fastened to the stump of an ironwood tree on the right bank about 20 feet above the bridge. The gage is read once each day by Charles Cannon. Bench marks were established as follows: (1) The top of the upstream end of the right-bank wooden pier, marked with white paint; elevation, 21.20 feet. (2) A nail in the stump of the ironwood tree, to which the second section of the gage is attached; elevation, 6.00 feet. Elevations refer to the datum of the gage.

A description of this station, gage-height and discharge data, and rating table, are contained in Water-Supply Paper of the United States Geological Survey No. 127, pages 102–103.

Discharge measurements of Soque River near Demorest, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 2	W. E. Hall	81	235	1.22	2.12	287
May 27	do	81	241	1.38	2.41	334
July 19	Hoyt and Hall	81	237	1.38	2.26	327
September 6	F. A. Murray	81	152	1.29	1.81	196
September 12	M. R. Hall	81	143	1.37	1.81	196
October 23	F. A. Murray	81	156	1.08	1.71	168

Daily gage height, in feet, of Soque River near Demorest, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.7	1.75	2.25	1.9	1.9	2.0	8.6	2.0	1.6	1.8	1.75	1.7
2	1.65	1.75	2.2	1.85	1.95	2.0	3.1	1.9	1.9	1.8	1.75	1.7
3	1.65	1.8	2.1	1.85	2.1	2.1	2.3	2.0	1.9	1.85	1.7	6.8
4	1.6	1.8	2.1	1.8	2.0	2.1	2.0	2.0	1.85	1.75	1.7	3.2
5	1.6	1.85	2.05	2.0	1.95	2.1	1.9	1.9	1.85	1.7	1.7	2.2
6	2.25	1.9	2.0	2.0	3.5	2.0	3.9	1.9	1.8	1.7	1.75	2.1
7	2.7	2.0	2.0	1.9	3.35	2.0	3.1	2.7	1.8	1.7	1.7	2.0
8	1.9	2.0	2.0	1.9	2.4	2.0	2.1	2.7	1.8	1.75	1.7	1.95
9	1.85	3.5	2.1	1.85	2.2	2.9	2.1	2.3	1.8	3.5	1.7	6.6
10	1.85	3.4	2.4	1.8	2.1	3.0	3.1	2.8	1.8	2.4	1.75	3.0
11	1.8	3.1	2.15	1.8	2.05	2.6	3.0	4.2	1.8	2.2	1.75	2.5
12	7.4	3.3	2.2	1.85	2.05	2.4	3.5	3.5	1.75	2.0	1.7	2.3
13	3.8	3.4	2.15	1.85	2.0	2.2	2.7	2.6	1.8	1.9	1.7	2.2
14	2.15	3.1	2.1	1.8	1.9	1.95	6.9	2.5	1.8	1.85	1.7	2.1
15	2.1	2.8	2.1	1.8	3.7	1.8	4.3	3.4	1.8	1.8	1.7	2.1
16	2.0	2.6	2.05	1.8	3.4	1.95	4.3	2.1	1.8	1.8	1.7	2.2
17	1.9	2.2	2.05	1.8	2.9	2.1	2.7	2.1	1.75	1.8	1.65	2.1
18	1.9	2.2	2.0	1.8	2.1	2.0	2.3	2.1	1.75	1.8	1.65	2.1
19	1.85	2.1	2.0	1.8	2.05	2.8	2.2	2.1	1.75	1.8	1.7	2.0
20	1.85	7.1	2.0	1.85	2.0	2.6	4.1	2.1	1.8	1.85	1.7	3.1
21	1.8	5.4	2.0	1.8	2.0	2.6	2.7	2.0	1.8	1.8	1.7	3.6
22	1.8	3.1	2.0	1.85	2.1	2.4	2.6	2.0	1.75	1.75	1.7	2.4
23	1.8	2.8	2.0	1.85	4.0	2.2	2.4	2.2	1.75	1.7	1.7	2.4
24	1.75	2.6	1.95	1.8	2.8	2.1	2.1	2.1	1.75	1.7	1.7	2.4
25	1.75	2.5	1.95	1.8	2.4	1.95	2.1	2.1	1.75	1.75	1.75	2.4
26	1.7	2.4	1.95	2.2	2.4	1.85	2.0	2.3	1.8	2.1	1.9	2.4
27	2.0	2.35	1.95	2.0	2.4	1.8	1.95	2.1	1.8	2.0	1.8	2.2
28	1.9	2.25	1.95	1.9	2.2	1.8	2.0	1.95	1.75	1.8	1.75	2.4
29	1.8	.....	1.95	1.95	2.8	1.85	2.1	2.0	1.7	1.8	1.7	2.2
30	1.7	.....	1.9	1.9	2.7	11.9	2.1	1.75	1.8	1.75	1.7	2.2
31	1.7	.....	1.9	.....	2.1	.....	2.1	1.65	.....	1.75	.....	2.1

Station rating table for Soque River near Demorest, Ga., from January 1 to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.60	151	2.30	330	2.90	531	3.50	770
1.70	171	2.40	361	3.00	568	3.60	815
1.80	193	2.50	393	3.10	606	3.70	860
1.90	217	2.60	426	3.20	645	3.80	905
2.00	243	2.70	460	3.30	685	3.90	950
2.10	271	2.80	495	3.40	725	4.00	1,000
2.20	300						

The above table is based upon discharge measurements made during 1904-1905. It is well defined between gage heights, 1.6 feet and 4.2 feet. The table has been extended beyond these limits. Above gage height 4 feet the rating curve is a tangent, the difference being 50 per tenth.

Estimated monthly discharge of Soque River near Demorest, Ga., for 1905.

[Drainage area, 112 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	2,700	151	314	2.80	3.23
February	2,550	182	527	4.71	4.90
March	361	217	257	2.29	2.64
April	300	193	210	1.88	2.10
May	1,000	217	390	3.48	4.01
June	4,950	193	455	4.06	4.53
July	3,300	217	626	5.59	6.44
August	1,100	161	343	3.06	3.53
September	217	151	190	1.70	1.90
October	770	171	222	1.98	2.28
November	217	161	175	1.56	1.74
December	2,400	171	474	4.23	4.88
The year	4,950	151	349	3.12	42.18

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 which the gage reader is paid.

The channel is straight for about 300 feet above and 200 feet below the gage. The current is sluggish above the gage; below 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.

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 down stream.

The gage is in two sections. The first section is an inclined staff, reading to 8 feet, fastened to solid rock on the right bank. The second section is a vertical staff, reading from 8 to 16 feet, fastened to a maple tree on the right bank about 100 feet upstream. The gage is read twice each day by J. L. Causey. Bench marks were established as follows: (1) A nail in a small maple on the right bank about 200 feet below the gage; elevation, 5.00 feet. (2) A cross cut on a large rock about 10 feet south of the sloping section of the gage; elevation, 10.00 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: Ann 18, iv, p 93; 127, pp 103, 119.
Discharge: Ann 19, iv, p 240; WS 36, p 141; 83, pp 127, 128; 127, pp 104, 119.
Gage heights: WS 127, p 104.

Discharge measurements of Sweetwater Creek near Austell, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean. velocity.	Gage. height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
January 18	W. E. Hall	67	283	0.80	3.02	227
January 18	do	67	280	.78	3.01	220
March 7 [b]	do	65	263	.76	2.80	200
May 10 [a]	M. R. Hall	45	146	1.01	2.13	147
May 10 [a]	do	45	142	.96	2.10	136
August 16 [c]	W. E. Hall	35	126	3.56	4.44	448
August 16 [c]	do	35	126	3.48	4.44	438
October 7 [a]	M. R. Hall	42	119	1.03	1.91	123
October 7 [a]	do	42	118	1.01	1.89	119

[a] At boat landing below gage.
[b] 1,000 feet below gage.
[c] Measurement made one-third mile east of Austell, Ga.

Daily gage height, in feet, of Sweetwater Creek near Austell, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.1	3.0	3.1	2.35	2.75	1.75	4.0	1.8	1.85	7.2	1.85	2.05
2	2.05	2.6	3.0	2.35	2.35	1.7	3.6	1.65	1.95	5.4	1.7	2.45
3	2.1	2.45	3.0	2.35	2.45	1.6	2.55	1.65	2.1	2.8	1.55	9.6
4	2.05	2.55	2.8	2.3	2.55	1.6	2.2	1.65	3.3	2.45	1.75	12.9
5	2.0	2.45	2.8	2.55	2.35	1.65	5.6	1.5	2.7	2.35	1.75	6.7
6	3.3	2.5	2.8	2.9	2.45	1.55	4.6	1.4	2.55	2.05	1.75	4.0
7	2.8	2.55	2.8	2.8	2.1	1.35	7.0	1.7	1.65	1.85	1.75	3.6
8	2.75	4.4	2.8	2.75	2.15	1.45	11.6	1.45	1.55	1.7	1.8	5.8
9	2.55	7.2	2.85	2.8	2.4	1.25	8.6	1.8	1.55	1.6	1.8	10.2
10	2.3	10.2	3.4	2.65	2.1	1.25	8.8	3.1	1.6	1.65	2.6	11.6
11	2.8	8.6	4.0	2.6	1.95	1.05	9.2	3.4	1.1	2.4	3.4	10.4
12	11.2	6.0	4.1	2.6	1.75	1.0	16.7	4.7	1.65	2.35	3.0	6.4
13	14.4	6.5	3.6	2.5	1.65	1.15	10.7	8.2	1.65	2.2	2.5	4.0
14	11.4	6.8	3.2	2.4	1.65	1.45	5.1	4.4	1.7	2.0	2.2	3.4
15	4.7	6.4	3.0	2.55	1.7	1.55	3.4	3.9	1.35	1.95	2.1	3.5
16	3.4	6.0	2.9	2.8	2.85	1.55	2.9	4.4	1.35	2.0	2.0	3.5
17	3.5	5.6	2.8	2.55	4.0	1.45	2.65	3.9	1.45	2.1	1.95	3.6
18	3.0	5.3	2.75	2.5	2.7	1.35	2.3	3.8	1.6	1.4	1.95	3.5
19	3.0	5.2	2.7	2.4	2.05	1.5	2.25	3.6	1.5	1.8	1.95	3.6
20	3.2	6.6	2.85	2.4	1.9	1.95	2.3	2.8	1.4	1.7	2.0	5.2
21	3.0	7.1	3.7	2.3	1.85	1.4	2.1	2.65	1.35	1.75	1.95	6.4
22	2.8	6.9	3.7	2.2	2.45	1.7	2.1	2.85	1.25	1.65	2.05	6.1
23	2.45	5.5	3.1	2.2	2.9	2.3	1.85	3.9	1.25	1.65	1.9	5.7
24	2.4	4.4	2.85	2.2	5.1	2.7	1.75	5.8	1.4	1.65	1.95	5.2
25	2.2	3.7	2.55	2.15	4.5	2.5	2.35	6.5	1.4	1.85	2.1	4.9
26	2.1	3.4	2.5	2.2	3.3	2.1	2.4	4.1	1.35	2.4	2.5	4.4
27	2.25	3.2	2.5	2.2	2.7	2.85	1.9	2.8	1.3	2.4	2.65	4.0
28	2.2	3.2	2.45	2.1	2.4	3.0	1.75	2.05	1.15	2.2	2.6	3.6
29	2.25	.....	2.4	2.5	2.3	3.6	1.9	1.9	1.15	2.0	2.25	3.6
30	2.4	.....	2.5	2.6	2.3	2.7	2.15	1.7	1.65	1.8	2.02	3.4
31	3.2	.....	2.4	.....	2.0	.....	1.8	1.7	.....	1.75	.....	3.4

MULBERRY CREEK NEAR COLUMBUS, GA.

This station was established June 23, 1904, by W. E. Hall, for the purpose of making a series of miscellaneous measurements. It is located at Mitchells 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 west of the station.

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 current to change directions during low water.

Discharge measurements are made from the downstream side of the two-span 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.

Gage heights are determined directly from the bench mark, which is the top of the downstream end of the wooden cap of center pile bent; elevation, 32.00 feet above the datum of the assumed gage.

A description of this station and discharge data are contained in Water-Supply Paper of the United States Geological Survey No. 127, page 105.

Discharge measurements of Mulberry Creek near Columbus, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
June 17	W. E. Hall	41	68	1.13	1.63	77
June 17	do	41	68	1.21	1.63	82
September 26	do	34	38	.44	1.00	16.6
September 26	do	34	38	.46	1.01	17.7

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 June 2, 1898. Two measurements were made in 1899 at the Macon and Birmingham Railroad bridge, near Woodbury, Ga., 5 miles below the Molina station. March 29, 1900, a gage was put in near this bridge and the station was reestablished.

The channel above and below the station is slightly curved for 800 feet. Above gage height 10 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. The bridge and its piers are oblique to the direction of the current, and the bed is rough and irregular and mostly permanent.

Discharge measurements are made from the Macon and Birmingham Railroad bridge. 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 long on the right bank and 225 feet long on the left. The initial point for soundings is the end of the iron bridge, on the right bank, downstream side.

The gage is 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 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. The observer is G. A. Wright, who is paid by the Weather Bureau. Bench marks were established as follows: (1) The top of the downstream end of the second and third crossbeams from the left-bank end of the bridge; elevation, 27.00 feet. (2) 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; elevation, 7.00 feet. (3) 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; elevation, 16.29 feet. Elevations refer to the datum of the gage, which is 660 feet above sea level.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: WS 48, pp 157–158; 65, pp 265–266; 83, p 117; 98, pp 113–114; 127, pp 105–106, 119.
Discharge: Ann 19, iv, p 240; WS 48, p. 158; 65, p 266; 83, p 118; 98, p 114; 127, pp 106, 119.
Discharge, monthly: Ann 22, iv, p 190; WS 75, p 78; 83, p 119; 98, p 116; 127, p 109.
Gage heights: WS 48, p 158; 65, p 266; 83, p 118; 98, p 115; 127, p 107.
Hydrograph: Ann 22, iv, p 190.
Rating tables: WS 52, p 513; 65, p 321; 83, p 119; 98, p 115; 127, p 108.

Discharge measurements of Flint River near Woodbury, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 10	W. E. Hall	253	885	0.95	0.91	844
April 21	M. R. Hall	246	644	.84	.52	544
June 3	Hall and Mitchelson	235	620	.49	.03	307
September 19	W. E. Hall	238	622	.28	−.28	173

Daily gage height, in feet, of Flint River near Woodbury, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.9	0.5	1.0	0.6	0.7	0.1	1.7	0.1	0.0	0.3	0.2	0.4
2	.6	.5	.9	.5	.6	.1	2.6	.0	.0	.6	.1	.3
3	.7	.4	.8	.5	.7	.2	2.6	−.1	.2	.4	.1	2.9
4	.6	.4	.7	.5	1.2	.1	1.5	−.1	.6	.6	.1	4.0
5	.5	.5	.6	1.0	1.4	.2	1.3	−.2	.6	.7	.1	5.0
6	.5	.6	.8	1.2	1.3	.1	1.0	−.2	.3	.4	.0	4.4
7	.6	1.0	.8	1.1	.9	.0	.6	−.3	.3	.2	.1	3.4
8	.7	1.9	.8	1.0	.6	.0	.7	.2	.1	.0	.1	2.1
9	.6	3.0	.8	.9	.8	−.1	.6	.5	.0	−.1	.1	2.7
10	.5	3.2	.9	1.1	.8	−.1	.5	2.2	−.1	.0	.2	2.9
11	.4	2.7	1.0	1.1	.7	−.2	.9	2.3	−.2	.1	.9	3.0
12	.9	3.5	1.1	1.0	.5	−.2	1.2	2.3	−.2	.3	1.1	2.7
13	2.1	5.4	1.3	1.1	.4	−.1	1.2	2.1	.0	.4	1.0	2.1
14	2.0	6.3	1.2	1.0	.3	.1	.7	2.0	.0	.4	.8	1.7
15	1.9	4.9	1.0	.8	.3	.3	.6	1.8	−.1	.3	.6	1.5
16	1.6	3.5	.9	.8	.4	.5	.5	2.6	−.2	.3	.5	1.5
17	1.3	2.5	.9	.8	.5	.2	.4	3.9	−.2	.2	.4	1.4
18	1.0	2.1	.8	.7	.5	.1	.2	2.6	−.3	.1	.3	1.3
19	.8	1.7	.7	.6	.3	.1	.1	1.5	−.3	.1	.2	1.2
20	.8	1.5	.6	.6	.2	.0	.4	.8	−.3	.1	.2	2.5
21	.8	2.0	1.0	.6	.3	.0	.1	.6	−.3	.0	.2	5.3
22	.7	2.0	1.1	.5	.4	.1	.3	.4	−.4	.0	.1	5.4
23	.6	1.8	1.3	.5	.4	.3	.0	.3	−.4	.0	.1	4.8
24	.6	1.7	1.2	.5	.8	.4	−.1	.4	−.4	.0	.2	4.5
25	.5	1.5	1.0	.5	.7	.4	.3	1.2	−.5	−.1	.2	2.8
26	.4	1.3	.8	.4	.5	.2	.1	1.0	−.5	.8	.2	2.2
27	.4	1.1	.7	.4	.4	.2	.0	.9	−.4	.6	.2	1.7
28	.3	1.0	.7	.4	.3	.1	.1	.7	−.4	.5	.2	1.6
29	.3	.....	.6	.5	.3	.2	.3	.3	−.4	.3	.2	1.5
30	.4	.....	.6	.6	.2	.3	.1	.1	−.2	.3	.3	1.4
31	.5	.....	.5	.....	.2	.....	.1	.1	.....	.2	.....	1.3

Station rating table for Flint River near Woodbury, Ga., from January 1, 1904, to December 31, 1905.

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	2.50	2,760	3.90	4,690
−.40	150	1.10	1,115	2.60	2,890	4.00	4,840
−.30	180	1.20	1,225	2.70	3,020	4.20	5,160
−.20	210	1.30	1,340	2.80	3,150	4.40	5,480
−.10	240	1.40	1,455	2.90	3,280	4.60	5,820
.00	280	1.50	1,570	3.00	3,410	4.80	6,160
.10	320	1.60	1,685	3.10	3,545	5.00	6,520
.20	360	1.70	1,800	3.20	3,680	5.20	6,880
.30	410	1.80	1,920	3.30	3,820	5.40	7,260
.40	470	1.90	2,040	3.40	3,960	5.60	7,640
.50	540	2.00	2,160	3.50	4,100	5.80	8,040
.60	620	2.10	2,280	3.60	4,240	6.00	8,450
.70	705	2.20	2,400	3.70	4,390	6.50	9,550
.80	800	2.30	2,520	3.80	4,540	7.00	10,750
.90	900	2.40	2,640				

The above table is based on 21 discharge measurements made during 1901–1905. It is well defined between gage heights −0.3 foot and 4.5 feet. The table has been extended beyond these limits, being based on one measurement at 9.2 feet.

Estimated monthly discharge of Flint River near Woodbury, Ga., for 1905.

[Drainage area, 988 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	2,280	410	837	.847	.976
February	9,100	470	2,454	2.48	2.58
March	1,340	540	885	.896	1.03
April	1,225	470	751	.760	.848
May	1,455	360	627	.635	.732
June	540	210	334	.338	.377
July	2,890	240	789	.799	.921
August	4,690	180	1,164	1.18	1.36
September	620	120	251	.254	.283
October	800	240	412	.417	.481
November	1,115	280	446	.451	.503
December	7,260	410	3,016	3.05	3.52
The year	9,100	120	997	1.01	13.61

FLINT RIVER NEAR MONTEZUMA, GA.

This station is located at the iron highway bridge about 1 mile west of Montezuma, Ga. Some discharge measurements had already been made at this point when the United States Weather Bureau established a standard chain gage on the bridge, late in 1904. During 1905 the daily gage heights have been furnished by the Weather Bureau.

The channel is slightly curved above and below the station, which is near the point of reverse between the curves. The current is moderate. The right bank will overflow for a great distance at about 12 feet above low water. It is mostly covered with a dense growth of brush. The left bank is not apt to overflow. The bed is sandy and probably shifting and the current is slow at low stage, especially near the left bank.

Discharge measurements are made from the bridge of two 100-foot spans, with a short trestle approach on the left bank and a very long one across the marshy ground on the right bank. The initial point for soundings is the end of the left-bank approach, downstream side.

The gage is located on the upstream side of the right span of the bridge near the middle pier. The bench mark is the top of the upstream tubular pier at the middle of the bridge; elevation, 28.00 feet above the datum of the gage.

Discharge measurements of Flint River near Montezuma, Ga.

Date.	Hydrographer.	Width.	Area of section.	Mean. velocity.	Gage. height.	Dis-charge.
1901.		*Feet.*	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
July 18	F. A. Murray	173	1,976	1.21	4.38	2,398
1904.						
September 21	J. M. Giles	188	1,300	.75	1.85	971
1905.						
August 23	F. A. Murray	198	1,553	1.03	3.15	1,608
August 31	do	198	1,393	.90	2.41	1,249
October 12	W. E. Hall	195	1,326	.86	2.25	1,148

Daily gage height, in feet, of Flint River near Montezuma, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.1	3.2	6.0	4.3	3.6	4.0	3.3	1.8	2.3	1.8	2.1	2.4
2	4.4	3.2	5.8	4.0	3.6	3.5	5.1	1.9	3.3	4.1	2.1	2.3
3	4.1	3.2	5.6	4.0	4.5	3.0	6.5	1.9	4.6	4.0	2.0	2.6
4	4.7	3.2	5.5	4.0	5.3	3.0	7.5	1.8	4.2	3.2	2.0	3.9
5	3.4	3.2	5.1	4.0	6.0	3.0	7.5	1.7	4.0	3.3	2.0	7.0
6	3.4	3.5	5.0	4.3	5.7	3.2	5.8	1.6	3.8	3.0	2.0	8.2
7	3.5	3.7	5.0	4.8	5.6	2.9	5.0	1.5	3.4	3.4	2.0	9.0
8	3.6	5.4	4.8	5.2	6.3	2.7	3.9	1.4	3.2	2.9	2.0	9.7
9	3.6	7.4	4.7	5.0	6.2	2.4	3.2	1.3	2.5	2.4	1.9	9.9
10	3.6	9.2	4.7	4.9	5.7	2.2	2.5	2.3	2.0	2.2	2.0	8.8
11	3.5	10.5	6.0	4.7	4.8	2.2	2.5	5.2	1.8	2.0	2.6	8.7
12	3.4	12.0	6.4	4.5	4.3	2.0	3.0	6.6	1.7	2.2	4.1	8.5
13	4.0	14.0	6.7	5.6	3.9	2.0	4.0	7.0	1.6	2.4	4.7	8.6
14	4.6	15.0	8.2	7.6	3.5	2.1	4.4	7.6	2.7	2.4	4.6	8.2
15	7.6	17.3	8.6	8.5	3.2	2.3	4.0	8.2	2.9	2.2	4.6	7.0
16	7.2	17.1	6.7	7.1	3.2	2.4	3.7	7.7	2.3	2.1	4.0	6.2
17	6.4	15.5	6.0	5.7	5.1	2.5	3.0	7.4	1.9	2.1	3.2	5.6
18	5.7	13.9	5.5	5.0	6.6	3.1	2.8	7.1	1.6	2.2	2.9	5.5
19	5.0	12.5	5.2	4.7	5.6	3.2	2.5	7.7	1.5	2.1	2.5	5.4
20	5.0	10.0	5.0	4.3	4.8	2.5	2.3	7.4	1.5	2.0	2.5	5.6
21	5.0	9.0	5.8	4.2	3.6	2.3	2.1	5.0	1.4	2.0	2.5	8.0
22	4.3	8.5	6.4	4.1	3.5	2.2	2.0	3.7	1.4	1.9	3.6	10.0
23	4.0	9.0	8.0	4.1	3.3	2.3	2.0	3.1	1.3	1.9	3.7	11.7
24	4.0	9.3	7.2	4.3	4.6	2.5	2.0	3.0	1.3	1.8	3.8	13.7
25	3.9	9.5	6.6	4.0	6.0	3.4	2.0	3.0	1.2	1.8	3.0	13.9
26	3.7	8.0	6.0	3.7	6.2	2.9	2.1	3.7	1.1	1.8	2.4	13.0
27	3.6	7.2	5.7	3.8	5.2	2.4	2.3	4.3	1.0	2.4	2.5	11.8
28	3.3	6.5	5.2	3.9	5.0	2.4	2.2	3.5	1.2	3.7	2.4	9.4
29	3.2	.....	4.9	3.8	4.2	2.5	2.0	3.2	1.2	3.4	2.4	7.9
30	3.2	.....	4.7	3.7	3.6	2.9	1.9	2.8	1.4	3.0	2.4	6.8
31	3.2	.....	4.5	.....	3.7	.....	1.8	2.5	.....	2.2	.....	6.6

FLINT RIVER AT ALBANY, GA.

This station was originally established by the United States Weather Bureau April 10, 1893, and has been maintained from that date to the present. 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 paid by the United States Weather Bureau.

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.

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 gage was washed out and replaced in 1898. It was again injured in 1902, and was replaced by a new gage June 17, 1902. The new gage was set 0.75 foot lower than the old gage as it existed prior to June 17, 1902. The gage heights were corrected from January 1 to June 17, 1902, inclusive, to correspond with the new gage. The Weather Bureau gage is attached to the Dougherty County Bridge, located about 700 feet below the Atlantic Coast Line bridge. It is in three sections. Section No. 1 is attached to the crib around the middle piers and extends to 4 feet above zero. Section No. 2 is spiked to a green cypress tree just above the bridge on the west bank of the river, and reads from 2 to 17 feet. Section No. 3 is spiked to a cedar post 16 feet high. This section begins at 17 feet and reads to 32 feet.

A standard chain gage belonging to the United States Geological Survey was installed April 20, 1904. It is fastened to the hand railing of the downstream footway of the Dougherty County Bridge near the middle of the west span. The 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 is 47.34 feet.

Bench marks were established as follows: (1) A copper plug set in the downstream corner of the brick abutment on the right bank under the Dougherty County Bridge; elevation, 33.81 feet. (2) The top of the first crossbeam from the right bank, upstream end of the railroad bridge; elevation, 43.20 feet. (3) A chisel mark on the tubular pier of the wagon bridge on the right bank, downstream side; elevation, 10.00 feet. (4) 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; elevation, 61.09 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 27, p 47; 36, p 138; 48, pp 156–157; 65, p 266; 83, pp 114–115; 98, pp 105–107; 127, pp 109–111.
Discharge: 65, p 266; 83, p 115; 98, p 107; 127, p 111.
Discharge, monthly: 83, p 117; 98, p 108; 127, p 113.
Gage heights: 27, pp 49–50; 36, p 139; 48, p 157; 65, p 267; 83, pp 115–116; 98, p 107; 127, p 112.
Rating tables: 83, p 116; 98, p 108; 127, p 113.

Discharge measurements of Flint River at Albany, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
April 26	W. E. Hall	242	2,212	2.89	4.38	6,398
August 25	F. A. Murray	226	1,470	2.09	1.42	3,073
August 28	do	226	1,551	2.34	1.82	3,634
October 14	W. E. Hall	222	1,436	1.84	.79	2,640

Daily gage height, in feet, of Flint River at Albany, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.2	2.2	8.0	5.0	4.6	2.8	1.9	0.5	0.8	0.0	1.2	0.8
2	3.8	2.4	7.2	4.7	4.2	3.1	2.4	.4	.8	1.0	.8	.7
3	3.1	2.3	6.7	4.5	4.9	3.2	3.0	.4	1.1	1.8	.7	1.1
4	2.6	2.3	6.3	4.2	5.9	2.7	4.0	.4	1.6	2.5	.6	1.3
5	2.2	2.2	5.9	4.1	6.4	2.2	4.4	.5	2.5	2.2	.6	2.2
6	2.0	2.2	5.7	4.1	6.7	2.0	4.4	.4	2.0	2.0	.4	3.6
7	2.3	2.6	5.5	4.0	6.6	2.0	4.0	.2	1.6	1.8	.6	4.5
8	2.7	3.2	5.2	4.2	6.1	2.0	2.9	.1	1.5	1.6	.5	5.1
9	2.7	5.2	5.1	5.0	5.5	1.7	2.2	.2	1.1	1.6	.3	6.0
10	2.5	6.7	5.8	5.4	5.4	1.4	1.6	.5	.7	1.2	.4	6.6
11	2.3	8.3	6.0	5.6	4.8	1.2	1.5	1.2	.5	1.7	.8	7.0
12	2.1	10.9	7.8	6.0	4.0	1.1	1.6	3.1	.3	.9	1.2	6.9
13	2.6	15.5	9.6	7.9	3.6	1.0	1.7	4.2	.5	.8	1.9	6.5
14	3.4	18.4	10.7	9.4	3.1	1.0	1.5	5.9	.3	.8	3.1	6.0
15	4.6	21.4	10.3	10.6	2.7	1.4	1.3	5.6	.2	.3	2.4	6.4
16	6.0	25.2	10.1	9.8	2.5	1.5	1.8	5.8	.1	.8	2.7	6.3
17	6.4	25.3	9.3	9.1	2.7	1.6	2.0	5.8	.4	.9	1.7	5.7
18	6.1	24.5	8.1	7.6	3.7	1.9	1.8	5.2	.4	.9	1.6	5.55
19	5.6	23.8	7.0	6.3	4.8	2.0	1.4	4.6	.2	.5	1.2	5.3
20	4.8	22.7	6.3	5.4	5.0	2.4	1.2	4.5	.1	.7	1.2	6.3
21	4.0	21.2	8.0	4.8	4.3	1.8	1.0	4.6	.0	.5	1.0	6.0
22	3.6	19.1	9.3	4.7	3.5	2.0	.9	3.8	.0	.4	.8	6.8
23	3.4	17.0	10.1	4.9	2.8	1.6	.7	2.4	−.1	.4	.6	9.2
24	3.3	14.0	9.7	4.9	4.3	1.9	.7	1.7	−.1	.3	.6	10.9
25	3.3	12.0	9.5	4.7	4.5	2.4	.8	1.4	−.2	.0	.8	11.8
26	3.1	11.1	9.1	4.4	5.1	2.5	.8	1.3	−.2	.5	.7	12.6
27	2.9	10.1	8.2	4.4	5.8	2.2	.7	1.6	−.3	.4	.8	13.4
28	2.8	9.0	7.2	4.4	5.4	1.5	.5	1.7	−.4	.6	1.0	13.6
29	2.5	.....	6.4	4.6	4.4	1.4	.8	1.7	−.2	1.3	1.0	13.3
30	2.3	.....	5.8	4.7	3.7	1.8	.8	1.5	−.3	1.3	.9	11.9
31	2.2	.....	5.4	.....	3.0	.....	.7	1.1	.....	1.4	.....	9.8

Station rating table for Flint River at Albany, Ga., from January 1, 1904, to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
−.50	1,480	1.70	3,425	3.90	5,645	8.00	10,300
−.40	1,560	1.80	3,520	4.00	5,750	8.50	10,900
−.30	1,645	1.90	3,615	4.20	5,970	9.00	11,500
−.20	1,730	2.00	3,710	4.40	6,190	9.50	12,100
−.10	1,815	2.10	3,805	4.60	6,410	10.00	12,700
0.00	1,900	2.20	3,900	4.80	6,630	10.50	13,350
.10	1,985	2.30	4,000	5.00	6,850	11.00	14,000
.20	2,070	2.40	4,100	5.20	7,080	11.50	14,675
.30	2,155	2.50	4,200	5.40	7,310	12.00	15,350
.40	2,240	2.60	4,300	5.60	7,540	12.50	16,050
.50	2,330	2.70	4,400	5.80	7,770	13.00	16,750
.60	2,420	2.80	4,500	6.00	8,000	13.50	17,525
.70	2,510	2.90	4,600	6.20	8,230	14.00	18,300
.80	2,600	3.00	4,700	6.40	8,460	14.50	19,150
.90	2,690	3.10	4,805	6.60	8,690	15.00	20,000
1.00	2,780	3.20	4,910	6.80	8,920	15.50	20,850
1.10	2,870	3.30	5,015	7.00	9,150	16.00	21,700
1.20	2,960	3.40	5,120	7.20	9,380	17.00	23,400
1.30	3,050	3.50	5,225	7.40	9,610	18.00	25,200
1.40	3,140	3.60	5,330	7.60	9,840	19.00	27,000
1.50	3,235	3.70	5,435	7.80	10,070	20.00	28,900
1.60	3,330	3.80	5,540				

The above table is based on 22 discharge measurements made during 1902-1905. It is well defined between gage heights 0 and 6 feet. Above gage height 6 feet the table is approximate.

Estimated monthly discharge of Flint River at Albany, Ga., for 1905.

[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	8,460	3,710	5,156	1.03	1.19
February	38,970	3,900	17,540	3.51	3.66
March	13,610	6,965	9,862	1.97	2.27
April	13,480	5,750	7,622	1.52	1.70
May	8,805	4,200	6,348	1.27	1.46
June	4,910	2,780	3,636	.727	.811
July	6,190	2,330	3,532	.706	.814
August	7,885	1,985	4,140	.828	.955
September	4,200	1,560	2,343	.469	.523
October	4,200	1,900	2,794	.559	.644
November	4,805	2,155	2,854	.571	.637
December	17,680	2,510	9,232	1.85	2.13
The year	38,970	1,560	6,255	1.25	16.79

BIG POTATO CREEK NEAR THOMASTON, GA.

This station was established in 1904 for the purpose of making a series of miscellaneous measurements. It is located at the highway bridge about 5 miles southwest of Thomaston Ga., 200 yards above Daniel's old gristmill.

The channel is curved for about 200 feet above and straight for 300 feet below the station. The current is fairly 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.

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.

Gage heights are determined directly from the bench marks, which are as follows: (1) The top of the downstream end of the first floor beam from the left bank; elevation, 23.00 feet. (2) A chisel mark on the intermediate post at the downstream end of the second floor beam; elevation, 28.00 feet. Elevations refer to the datum of the assumed gage.

A description of this station and discharge data are contained in Water-Supply Paper of the United States Geological Survey No. 127, pp. 114, 120.

Discharge measurements of Big Potato Creek near Thomaston, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
September 21 [a]	W. E. Hall	30	21	1.48	1.60	31
September 21 [b]	do	69	96	.21	1.53	20

[a] 700 feet below bridge.
[b] Measured at Daniel's mill bridge.

NOTE.—There is a mill some distance above this point, which affects the flow more than was at first thought, making the discharge measurement of little or no value.

MUCKALEE CREEK NEAR LEESBURG, GA.

This station was established in 1905 for the purpose of making a series of miscellaneous low-water measurements in connection with the regular station on Kinchafoonee Creek. It is located about 3 miles east of Leesburg, Ga., at a wooden highway bridge consisting of two truss spans, with trestle approaches about 50 feet each.

The current is slow at low water. The right bank will overflow at moderately high water for a long distance.

Gage heights are determined directly from the bench mark, which is the top of the upstream end of the wooden cap of the middle bent of the bridge; elevation, 17.00 feet above the datum of the assumed gage.

Discharge measurements at this station are contained in Water-Supply Paper of the United States Geological Survey No. 98, p. 128.

Discharge measurements of Muckalee Creek near Leesburg, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean. velocity.	Gage. height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
August 30	F. A. Murray	73	244	0.79	2.02	192
October 13	W. E. Hall	68	300	.96	2.75	288

KINCHAFOONEE CREEK NEAR LEESBURG, GA.

This station was established August 30, 1905, by F. A. Murray. It is located at the iron highway bridge 1 mile east of Leesburg, Ga.

The channel is nearly straight for about 400 feet above and below the station, and the current is mostly swift. The right bank is lower than the bridge and will probably overflow at times around the end of the bridge approach. The left bank will not overflow. The bed of the stream is sandy, and the current is good, except for a small amount of sluggish water at the left bank.

Discharge measurements are made from the downstream side of the single-span bridge. The initial point for soundings is the left end of the bridge.

The present gage is a temporary vertical rod, which was intended for low-water observations, attached to a cypress tree at the right edge of the water 150 feet above the bridge. It was read by J. M. Johnson until December 1, 1905. The bench mark is the top of the downstream end of the second floor beam from the left end of the bridge; elevation, 23.00 feet above the datum of the gage.

Discharge data at this station are contained in Water-Supply Paper of the United States Geological Survey, No. 98, p. 128.

Discharge measurements of Kinchafoonee Creek near Leesburg, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
August 30	F. A. Murray	90	180	1.20	0.98	216
October 13	W. E. Hall	90	238	1.35	1.70	323

Daily gage height, in feet, of Kinchafoonee Creek near Leesburg, Ga., for 1905.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.0	1.8	1.45	1.7	17	.....	1.1	1.4	1.8	.....
2	.....	1.0	3.0	1.35	.....	18	.....	1.0	1.35	1.6	.....
3	.....	1.1	2.9	1.3	.....	19	.....	1.0	1.3	1.55	.....
4	.....	1.3	2.6	1.25	.....	20	.....	.9	1.25	1.5	.....
5	.....	1.5	2.4	1.2	.....	21	.....	.8	1.2	1.4	.....
6	.....	1.3	2.0	1.2	.....	22	.....	.8	1.2	1.4	.....
7	.....	1.2	1.9	1.2	.....	23	.....	.7	1.2	1.4	.....
8	.....	1.1	1.8	1.2	.....	24	.....	.7	1.2	1.4	.....
9	.....	1.0	1.7	1.2	.....	25	.....	.7	1.2	1.4	.....
10	.....	1.0	1.6	1.3	.....	26	.....	.6	1.2	1.5	.....
11	.....	.9	1.6	1.9	.....	27	.....	.6	1.3	1.6	.....
12	.....	.8	1.7	1.3	.....	28	.....	.6	1.5	1.7	.....
13	.....	.7	1.8	2.8	.....	29	.....	.8	1.55	1.8	.....
14	.....	.8	1.9	2.5	.....	30	1.0	1.0	1.5	1.7	.....
15	.....	.9	1.7	2.3	.....	31	1.0	.....	1.5	.....	.....
16	.....	1.0	1.6	2.0	.....						

ICHAWAYNOCHAWAY CREEK AT MILFORD, GA.

This station was established August 29, 1905, by F. A. Murray. It is located at the wagon bridge at Milford, Ga., 9 miles east of Leary, Ga., the railway point from which it is reached.

The channel is straight for 800 feet above and below the bridge. The current is moderately swift and is smooth except where it is broken by the bridge bents.

Discharge measurements are made from the downstream side of the bridge, an old wooden structure supported by bents, six of which are in the water at ordinary stages. The initial point for soundings is the end of the hand rail at the left bank, downstream side.

The present gage is a temporary staff for low-water observations attached to the downstream post of the first bent from the left bank. It is read once each day by W. J. Kidd. Bench marks were established as follows: (1) The top of the upstream cap of the first bent from the left bank; elevation, 15.00 feet. (2) A nail in a cypress tree at the left edge of the water, 30 feet below the bridge; elevation, 10.00 feet. Elevations refer to the datum of the gage.

Discharge measurements of Ichawaynochaway Creek at Milford, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
August 29	F. A. Murray	111	458	0.79	2.89	364
October 16	W. E. Hall	116	452	.85	3.05	386

Daily gage height, in feet, of Ichawaynochaway Creek at Milford, Ga., for 1905.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.8	3.2	3.05	2.95	17	.....	2.8	3.05	3.55	4.05
2	.....	2.8	3.4	3.0	2.9	18	.....	2.75	3.2	3.5	4.0
3	.....	2.8	3.5	3.0	2.9	19	.....	2.7	3.2	3.4	4.0
4	.....	2.75	3.6	3.0	2.95	20	.....	2.65	3.1	3.3	4.15
5	.....	2.7	3.6	3.1	3.0	21	.....	2.6	3.1	3.25	4.7
6	.....	2.7	3.7	3.1	3.1	22	.....	2.6	3.0	3.2	5.0
7	.....	2.65	3.7	3.15	3.25	23	.....	2.55	3.1	3.15	5.5
8	.....	2.6	3.5	3.25	3.4	24	.....	2.55	3.2	3.1	6.0
9	.....	2.6	3.1	3.35	3.5	25	.....	2.5	3.35	3.05	5.9
10	.....	2.55	3.15	3.4	3.6	26	.....	2.5	3.5	3.0	5.4
11	.....	2.55	3.2	3.45	3.65	27	.....	2.5	3.45	3.0	4.9
12	.....	2.7	3.3	3.5	3.7	28	.....	2.45	3.3	3.0	4.9
13	.....	2.9	3.4	3.55	3.9	29	2.9	2.62	3.2	3.0	4.7
14	.....	3.0	3.4	3.6	4.0	30	2.85	2.92	3.15	3.0	4.5
15	.....	3.0	3.2	3.6	4.05	31	2.8	.....	3.05	.....	4.4
16	.....	2.9	3.0	3.6	4.05						

MISCELLANEOUS MEASUREMENTS IN APALACHICOLA RIVER DRAINAGE BASIN.

The following is a list of miscellaneous discharge measurements made in Apalachicola River drainage basin during 1905:

Blue Spring near Albany, Ga.—This spring is located about 4 miles below Albany, Ga., on the county road leading to Hardaway. A measurement was made of the two channels through which the water flows from the spring April 26, 1905.

Width, 33 feet; area, 30 square feet; mean velocity, 2.30 feet per second; discharge, 69 second-feet.

Buck Creek near Montezuma, Ga.—This stream enters Flint River from the right about 1 mile west of Montezuma, Ga. A measurement was made August 23, 1905, at an old tramroad trestle about 1 mile above the mouth of the creek. The bench mark is the top of the upstream end of the cap of the first bent from the left edge of the stream; elevation, 12.00 feet above the datum of the assumed gage.

Width, 49 feet; area, 118 square feet; mean velocity, 1.42 feet per second; gage height, 2.20 feet; discharge, 167 second-feet.

Chattahoochee River near Columbus, Ga.—A measurement was made September 25, 1905, from a boat held by cable stretched across the channels of the river about 8 miles upstream from Columbus and about 1½ miles above the mouth of Standingboy Creek. The bench mark is the top of a large wire nail which is driven into the base of an ash tree which stands about 25 feet below Narramore's spring branch; elevation, 5.00 feet above the datum of the assumed gage.

Width, 282 feet; area, 1,150 square feet; mean velocity, 0.98 foot per second; gage height, 1.75 feet; discharge, 1,125 second-feet.

Chickasawhachee Creek near Newton, Ga.—A measurement was made August 26, 1905, at McRainey Bridge, about 10 miles west of Newton, Ga. The initial point for soundings is the end of the bridge at the left bank, downstream side. The bench mark is the top of the downstream end of the middle bent of the bridge; elevation, 12.50 feet above the datum of the assumed gage.

Width, 35 feet; area, 38 square feet; mean velocity, 0.92 foot per second; gage height, 0.80 foot; discharge, 35 second-feet.

Coolawahee Creek near Newton, Ga.—A measurement was made August 28, 1905, from the downstream side of a wooden wagon bridge about 1 mile north of Newton, Ga. The bench mark is the top of the downstream end of the floor plank at a point 1 foot to the left of the center post; elevation, 11.50 feet above the datum of the assumed gage.

Width, 23 feet; area, 24 square feet; mean velocity, 1.62 feet per second; gage height, 0.70 foot; discharge, 25.5 second-feet.

Elkins Creek near Thunder, Ga.—Measurements were made during 1905 at a wooden wagon bridge 1 mile north of Thunder, Ga., about 200 feet below a small gristmill. As the flow at low water depends on the operation of the mill, the measured discharges do not give the natural flow of the stream. The bench mark is a notch and copper nails on the upstream main brace of the truss of the bridge, 8½ feet from the left end of the truss; elevation, 24.00 feet above the datum of the assumed gage.

April 21: Width, 42 feet; area, 38 square feet; mean velocity, 1.79 feet per second; gage height, 2.07 feet; discharge, 68 second-feet.

September 27: Width, 28 feet; area, 10 square feet; mean velocity, 0.73 foot per second; gage height, 1.45 feet; discharge, 7.3 second-feet.

Flint River near Thomaston, Ga.—A measurement was made September 20, 1905, at Parkers Bridge, about 7 miles west of Thomaston, Ga. The bench mark is the top of the upstream end of the first floor beam from the middle pier in the first iron span from the right bank; elevation, 35.00 feet above the datum of the assumed gage.

Width, 136 feet; area, 158 square feet; mean velocity, 1.39 feet per second; gage height, 5.00 feet; discharge, 219 second-feet.

Flint River near Woodbury, Ga.—A measurement was made April 21, 1905, from the downstream side of Powells Bridge, about 5 miles above the regular gaging station near Woodbury, Ga. The bench mark is the top of the right upstream post of the first pier from the right bank; elevation, 15 feet above the datum of the assumed gage.

Width, 143 feet; area, 479 square feet; mean velocity, 1.05 feet per second; gage height, 5.47 feet; discharge, 502 second-feet.

Hazel Creek near Demorest, Ga.—Measurements were made from the upstream side of a wooden highway bridge 1 mile north of Demorest, on the Porter Mills road. The bench mark is the top of the upstream end of the second crossbeam from the right-bank end of the bridge; elevation, 15.00 feet above the datum of the assumed gage.

September 5: Width, 27 feet; area, 24 square feet; mean velocity, 1.37 feet per second; gage height, 0.82 foot; discharge, 33 second-feet.

October 23: Width, 27 feet; area, 20 square feet; mean velocity, 1.15 feet per second; gage height, 0.71 foot; discharge, 23 second-feet.

Ichawaynochaway Creek at Barnetts Bridge, near Newton, Ga.—A measurement was made August 26, 1905, from the downstream side of Barnetts Bridge, 10 miles southwest of Newton, Ga. The initial point for soundings is the left end of the bridge approach, downstream side. The bench mark is the top of the downstream end of the second iron crossbeam from the left-bank pier; elevation, 29.50 feet above the datum of the assumed gage.

Width, 84 feet; area, 196 square feet; mean velocity, 2.62 feet per second; gage height, 1.30 feet; discharge, 513 second-feet.

Ichawaynochaway Creek at Rentz Bridge, near Newton, Ga.—A measurement was made August 26, 1905, from the downstream side of Rentz Bridge, about 12 miles west of Newton, Ga. The initial point for soundings is the end of the downstream hand rail at the left bank. The bench mark is the top of the downstream end of the cap of the bent which stands in the middle of the creek; elevation, 14.50 feet above the datum of the assumed gage.

Width, 76 feet; area, 355 square feet; mean velocity, 1.31 feet per second; gage height, 2.20 feet; discharge, 465 second-feet.

Ichawaynochaway Creek near Williamsburg, Ga.—A measurement was made April 27, 1905, at the Central of Georgia Railway bridge, 1¼ miles from Williamsburg, Ga. The bench mark is the top of the downstream end of the third bent from the left bank; elevation, 20.00 feet above the datum of the assumed gage.

Width, 92 feet; area, 727 square feet; mean velocity, 1.06 feet per second; gage height, 7.66 feet; discharge, 767 second-feet.

Red Oak Creek near Woodbury, Ga.—This stream enters Flint River from the right, 5 miles above the regular gaging station on Flint River near Woodbury, Ga. A measurement was made September 27, 1905, at a wooden wagon bridge about 1 mile above the mouth of the creek. 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; elevation, 20.00 feet above the datum of the assumed gage.

Width, 32 feet; area, 12 square feet; mean velocity, 0.83 foot per second; gage height, 2.25 feet; discharge, 10 second-feet.

Warm Springs at Warm Springs, Ga.—These springs are located one-half mile from Warm Springs, Ga., a station on the Southern Railway. Two discharge measurements were made March 10, 1905, about 300 feet below the springs and about 75 feet above the mouth of the branch, which is formed by the united flow of the several springs. April 20, 1905, two measurements were made about 6 feet below the end of the stone walls at the outlet from the bath house.

March 10: Width, 5 feet; area, 2.8 square feet; mean velocity, 1.14 feet per second; discharge, 3.2 second-feet.

April 20: Width, 4 feet; area, 1.52 square feet; mean velocity, 0.97 foot per second; discharge, 1.47 second-feet.

April 20: Width, 2.6 feet; area, 2.12 square feet; mean velocity, 0.69 foot per second; discharge, 1.48 second-feet.

Whitewater Creek near Montezuma, Ga.—This stream enters Flint River from the right. A measurement was made August 31, 1905, from the downstream side of a wooden highway bridge, locally known as the Lower Whitewater Bridge, about 4 miles northwest of Montezuma, Ga. The bench mark is the top of the downstream end of the cap of the third bent from the right bank; elevation, 12.00 feet above the datum of the assumed gage.

Width, 71 feet; area, 275 square feet; mean velocity, 0.94 foot per second; gage height, 2.14 feet; discharge, 260 second-feet.

CHOCTAWHATCHEE RIVER DRAINAGE BASIN.

DESCRIPTION OF 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 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.

The following pages give the results of the data collected in this drainage during 1905.

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 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 was maintained only temporarily for low-water measurements. Daily gage readings were discontinued December 31, 1904, since which time the station has been maintained for miscellaneous low-water measurements.

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. 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 but one channel at all but very high stages, when both banks overflow and a second channel is formed by lower ground some distance from the river on the right bank.

Discharge measurements are made from the downstream side of the three-span 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 gage is a vertical scale, reading from 1 to 9 feet, and continued on the timber to which it is attached. This timber is fastened to the upstream side of a heavy pile which was a part of the right bent of an old bridge that occupied the site of the present one. This pile is the second from the downstream end of a line of five set up and down stream. Bench marks were established as follows: (1) 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; elevation, 32.00 feet. (2) A large wire nail in the river side of a cypress tree on the right bank about 140 feet below the bridge; elevation, 12.07 feet. Elevations refer to the datum of the gage.

A description of this station and gage-height and discharge data are contained in Water-Supply Paper of the United States Geological Survey No. 127, pp. 121–122.

Discharge measurements of Choctawhatchee River near Geneva, Ala., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 29	J. M. Giles	118	1,215	1.83	6.05	2,223
June 14	W. E. Hall	117	1,134	1.25	5.50	1,416

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 of a mile above the mouth of the creek. During high water the gage heights are affected by backwater from Choctawhatchee River, and the station was maintained only temporarily for low-water measurements. Daily gage readings were discontinued December 31, 1904, since which time the station has been maintained for miscellaneous low-water measurements.

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 the 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.

Discharge measurements are made from the upstream side of the single-span iron bridge. The initial point for soundings is the upstream side of the left end of the bridge.

The gage is a vertical staff fastened to the upstream side of a cypress tree on the left bank, about 100 feet below the bridge. Bench marks were established as follows: (1) The bottom of the upstream end of the first floor beam from the left end of the bridge; elevation, 19.80 feet. (2) A chisel cut and white-paint mark on the intermediate post 6 feet above bench mark No. 1; elevation, 25.80 feet. Elevations refer to the datum of the gage.

A description of this station and gage-height and discharge data are contained in Water-Supply Paper of the United States Geological Survey No. 127, pp. 122–123.

Discharge measurements of Double Bridges Creek at Geneva, Ala., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 29	J. M. Giles	55	156	1.45	3.15	227
June 14	W. E. Hall	60	268	1.93	4.25	518

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.

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.

Discharge measurements are made from the downstream side of the single-span bridge. The initial point for soundings is the outside of the downstream tubular iron pier at the right bank.

A standard chain gage is fastened to the top plank of the upstream railing of the bridge, with the pulley end of the box abutted against the intermediate post over the second floor beam from the right bank; length of chain, 48.20 feet. The gage is read once each day by W. G. Early, who is paid by the Alabama Geological Survey. Bench marks were established as follows: (1) The top of the downstream end of the first floor from the right pier; elevation, 42.00 feet. (2) A chisel mark on the intermediate post at the downstream end of the first floor beam from the right bank, 5 feet above bench mark No. 1; elevation, 47.00 feet. (3) The top of the upstream end of the second floor beam from the right bank;

elevation, 42.03 feet. (4) A chisel mark on the post 4.97 feet above bench mark No. 3; elevation, 47.00 feet. (5) A chisel mark on the iron cap of the downstream tubular pier at the right end of the bridge; elevation, 41.04 feet. (6) A wire nail in a cut on the root of a large water-oak tree on the left bank, about 50 feet from the river and 40 feet above the end of the bridge approach; elevation, 34.73 feet. Elevations refer to the datum of the gage.

A description of this station and gage height and discharge data are contained in Water-Supply Paper of the United States Geological Survey No. 127, pp. 123–124.

Discharge measurements of Pea River at Pera, Ala., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 28	J. M. Giles	89	686	2.14	6.81	1,468
March 28	do	89	687	2.14	6.84	1,473
March 30	do	84	617	1.97	6.13	1,213
March 30	do	84	620	1.98	6.14	1,225
June 15	W. E. Hall	73	456	1.27	3.99	579
June 15	do	73	456	1.32	4.00	604
October 18	do	75	425	1.27	4.07	638

Daily gage height, in feet, of Pea River at Pera, Ala., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.6	5.0	8.1	5.7	4.6	5.4	5.9	5.2	3.0	5.3	3.1	3.2
2	5.2	4.9	7.6	5.6	4.9	5.9	5.0	10.9	2.9	4.6	3.0	3.3
3	4.7	4.8	7.5	5.4	4.4	5.8	4.6	8.4	2.6	4.6	3.0	7.4
4	4.4	4.6	7.3	5.2	4.7	5.0	4.3	7.1	5.8	4.0	2.9	12.0
5	4.1	4.7	7.1	5.8	4.7	4.7	3.9	6.7	5.6	3.7	2.7	8.7
6	4.1	6.1	6.9	9.6	4.6	4.4	3.9	5.6	3.5	3.4	2.7	8.6
7	6.0	7.0	6.7	8.0	4.3	3.8	3.2	4.2	3.1	3.5	3.4	7.7
8	4.9	9.4	6.7	7.4	4.1	3.3	2.9	3.5	2.8	3.0	3.3	6.6
9	4.6	14.7	6.6	6.6	4.3	3.2	2.8	4.1	2.6	2.9	3.0	8.5
10	4.3	15.2	9.2	6.0	4.4	3.0	3.0	4.0	2.5	3.7	3.1	8.7
11	4.1	12.1	9.0	6.0	4.3	2.7	5.3	6.3	2.4	7.1	4.4	8.6
12	4.0	16.2	9.3	8.6	4.0	2.6	5.0	7.5	2.4	6.1	4.5	8.6
13	9.0	22.5	10.1	14.2	3.9	2.5	4.2	8.7	5.1	4.9	4.4	7.8
14	11.7	26.0	9.5	15.2	3.5	2.8	3.4	7.6	4.8	4.7	4.4	8.5
15	8.8	27.1	8.7	14.1	3.7	3.9	3.0	6.8	3.5	3.9	4.1	10.1
16	7.6	29.4	7.7	11.5	8.7	3.4	2.8	6.1	3.5	4.9	3.9	9.4
17	6.9	28.8	7.4	9.2	13.3	3.0	2.8	6.6	2.9	4.5	3.8	8.4
18	6.3	24.0	7.2	7.8	10.3	3.0	3.0	7.4	2.8	4.0	3.6	7.6
19	6.0	18.8	7.1	7.0	8.2	3.9	3.0	7.4	2.7	3.7	3.2	6.8
20	5.9	13.9	6.8	6.4	7.0	3.7	2.6	7.0	2.8	3.4	3.1	9.1
21	5.6	12.5	10.8	6.0	6.1	5.7	2.4	6.7	2.4	3.3	3.1	18.8
22	5.1	12.0	9.6	5.8	5.3	4.5	2.2	5.0	2.3	3.1	3.1	19.8
23	4.9	11.0	8.7	5.5	4.9	3.4	2.1	4.4	2.3	3.0	3.0	18.8
24	5.0	10.3	8.3	5.5	4.3	3.2	2.1	3.8	2.1	2.8	3.0	20.7
25	8.5	9.7	8.6	5.4	5.9	3.1	2.6	3.6	2.1	2.7	3.0	22.4
26	6.6	9.4	7.9	5.5	5.7	2.9	2.9	5.4	2.0	3.0	3.7	22.8
27	5.9	8.8	7.4	5.5	6.2	2.7	3.3	6.1	2.1	3.3	3.7	16.6
28	5.4	8.5	6.8	5.0	5.9	2.7	2.6	5.1	2.0	3.4	3.7	13.7
29	5.2	.....	6.4	4.7	5.3	3.7	3.4	4.0	2.3	3.3	3.5	13.5
30	5.2	.....	6.1	4.5	4.7	6.2	4.2	3.5	2.8	3.3	3.4	12.2
31	5.1	.....	5.9	.....	5.1	.....	4.3	3.3	.....	3.2	.....	10.7

Station rating table for Pea River at Pera, Ala., from August 27, 1904, to December 31, 1905.

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	150	2.70	360	4.20	656	6.20	1,245
1.30	160	2.80	378	4.30	680	6.40	1,315
1.40	171	2.90	396	4.40	704	6.60	1,385
1.50	182	3.00	414	4.50	728	6.80	1,460
1.60	194	3.10	432	4.60	754	7.00	1,540
1.70	206	3.20	450	4.70	780	7.20	1,620
1.80	218	3.30	468	4.80	806	7.40	1,700
1.90	230	3.40	488	4.90	834	7.60	1,780
2.00	242	3.50	508	5.00	862	7.80	1,860
2.10	258	3.60	528	5.20	920	8.00	1,940
2.20	274	3.70	548	5.40	980	8.20	2,030
2.30	290	3.80	568	5.60	1,040	8.40	2,120
2.40	306	3.90	590	5.80	1,105	8.60	2,210
2.50	324	4.00	612	6.00	1,175	8.80	2,300
2.60	342	4.10	634				

The above table is based on discharge measurements made during 1904–1905. It is well defined between gage heights 4 feet and 7 feet. Above 7 feet the curve is uncertain. High-water estimates are rough approximations. Above gage height 8.8 feet the rating curve is a tangent, the difference being 50 per tenth.

Estimated monthly discharge of Pea River at Pera, Ala., for 1904–1905.

[Drainage area, 1,180 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1904.					
August 27-31	1,740	780	1,369	1.16	0.216
September	950	171	375	.318	.355
October	258	150	176	.149	.172
November	342	160	267	.226	.252
December	1,940	274	791	.670	.772
1905.					
January	3,750	612	1,186	1.01	1.16
February	12,600	754	4,745	4.02	4.19
March	3,300	1,140	1,910	1.62	1.87
April	5,500	728	1,779	1.51	1.68
May	4,550	508	1,115	.945	1.09
June	1,245	324	600	.508	.567
July	1,140	258	517	.438	.505
August	3,350	468	1,214	1.03	1.19
September	1,105	242	431	.365	.407
October	1,580	360	606	.514	.593
November	728	360	499	.423	.472
December	9,300	450	3,623	3.07	3.54
The year	12,600	242	1,519	1.29	17.26

MISCELLANEOUS MEASUREMENTS IN CHOCTAWHATCHEE RIVER DRAINAGE BASIN.

The following is a list of miscellaneous discharge measurements made in Choctawhatchee River drainage basin during 1905:

Choctawhatchee River near Elba Junction, Ala.—A measurement was made October 17, 1905, from the downstream side of the Atlantic Coast Line bridge near Elba Junction, Ala. The initial point for soundings is the right end of the bridge on the dowstream side. The bench mark is the top of the downstream end of the first floor beam from the right end of the bridge; elevation, 40.00 feet above the datum of the assumed gage.

Width, 93 feet; area, 582 square feet; mean velocity, 0.74 foot per second; gage height, 5.53 feet discharge, 430 second-feet.

Pea River at Elba, Ala.—A measurement was made October 17, 1905, from the downstream side of a single-span iron highway bridge at Elba, Ala. The initial point for soundings is the center of the downstream pier at the right end of the bridge. The bench mark is a chisel mark and the letters "B. M." cut in the top of the outer member of the downstream chords between the second and third floor beams at a point 45 feet from the initial point for soundings; elevation, 48.00 feet above the datum of the assumed gage.

Width, 100 feet; area, 202 square feet; mean velocity, 2.25 feet per second; gage height, 3.59 feet; discharge, 455 second-feet.

Whitewater River near Elba, Ala.—This stream enters Pea River from the right. It was measured October 17, 1905, from the downstream side of an iron highway bridge near Elba, Ala., 150 feet above the mouth of the river. The bench mark is the center of a steel pin which connects the second downstream vertical post from the right end of the bridge to the second floor beam; elevation, 42.44 feet above the datum of the assumed gage.

Width, 58 feet; area, 148 square feet; mean velocity, 1.57 feet per second; gage height, 3.59 feet; discharge, 232 second-feet.

ESCAMBIA RIVER DRAINAGE BASIN.

DESCRIPTION OF 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 southwestward 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 and rapids.

The following pages give the results of the data collected in this drainage during 1905.

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., 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.

The channel is straight for 600 feet above and for 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.

Discharge measurements are made from the upstream side of the iron bridge. The bridge consists of a main span of 125 feet, 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.

A standard chain gage is fastened to the channel-iron railing 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; length of chain, 53.50 feet. The gage is read once each day by W. R. Duggan, who is paid by the Alabama Geological Survey. Bench marks were established as follows: (1) The top of the upstream end of the first iron floor beam of the main span from the left pier; elevation, 47.50 feet. (2) The top of the iron channel-bar post to which the gage is fastened; elevation, 52.17 feet. (3) A cross chisled on the upper side of the upstream tubular pier at the left end of the main span; elevation, 47.13 feet. (4) A copper plug set in the concrete filling of the short tubular pier at the left end of the iron bridge, downstream side; elevation, 42.21 feet. Elevations refer to datum of the gage.

A description of this station and gage-height and discharge data are contained in Water-Supply Paper of the United States Geological Survey No. 127, pp. 125–126.

Discharge measurements of Conecuh River at Beck, Ala., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 27	J. M. Giles	121	686	2.42	5.03	1,658
March 31	do	117	521	2.02	3.77	1,055
June 13	W. E. Hall	108	249	1.16	1.43	288
October 19	do	114	332	1.23	2.03	.408

Daily gage height, in feet, of Conecuh River at Beck, Ala., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.4	3.5	5.7	3.6	2.6	4.7	2.7	1.75	1.8	1.1	1.65	2.0
2	3.4	3.4	5.4	3.6	2.55	3.0	3.0	4.1	1.7	1.1	1.6	2.2
3	3.1	3.2	5.2	3.4	2.45	3.0	2.4	2.85	1.5	1.4	1.6	4.6
4	2.7	3.3	4.9	3.3	2.5	2.95	2.2	2.9	1.8	1.7	1.6	3.4
5	2.5	3.2	4.8	3.9	2.45	2.9	2.1	3.0	1.8	1.75	1.5	4.0
6	2.7	4.6	4.7	4.0	2.35	2.9	2.0	2.7	2.05	1.75	1.5	4.4
7	3.0	5.0	4.6	3.9	2.3	2.75	1.8	2.35	1.8	1.7	1.55	4.2
8	3.4	7.4	4.4	3.8	2.2	2.7	1.75	2.0	1.7	1.6	1.4	4.0
9	3.0	10.8	4.6	3.5	3.0	2.6	1.7	2.4	1.65	1.7	1.35	3.8
10	3.2	10.6	4.6	3.8	2.35	2.3	1.7	2.7	1.45	2.4	1.5	3.5
11	2.9	9.0	4.8	3.4	2.2	1.8	2.7	2.1	1.4	3.6	2.4	3.5
12	3.4	15.6	5.5	4.2	2.5	1.7	2.4	3.4	1.4	3.1	2.2	3.7
13	5.6	20.2	5.6	7.0	2.2	1.5	2.15	4.4	2.0	3.0	2.3	3.8
14	5.8	21.9	5.6	6.8	2.05	1.9	1.85	3.8	1.7	2.9	2.7	4.2
15	5.3	22.5	5.3	5.8	3.6	2.3	1.8	3.6	1.65	2.5	2.4	4.4
16	5.1	21.6	5.3	5.8	5.8	1.8	1.8	4.9	2.0	2.2	2.3	4.5
17	4.9	23.3	5.0	5.7	5.3	1.75	1.85	4.3	1.9	2.0	2.2	4.7
18	4.4	24.1	4.8	5.7	5.5	1.7	2.0	4.3	1.6	2.1	2.1	4.7
19	4.6	21.1	4.5	5.5	5.0	1.7	1.6	4.1	1.7	1.85	2.0	4.6
20	4.1	19.5	5.3	4.6	4.5	2.5	1.4	3.9	1.7	2.0	1.9	7.1
21	3.9	13.2	6.0	3.6	4.0	1.9	1.2	3.8	1.5	2.3	1.9	8.9
22	3.7	10.8	6.0	3.4	3.6	1.85	1.2	3.8	1.4	1.8	1.85	8.3
23	3.5	9.1	6.0	3.2	3.7	2.0	1.2	3.6	1.35	1.6	1.7	8.1
24	4.3	8.2	6.0	3.2	3.6	2.25	1.2	2.4	1.2	1.6	1.7	9.0
25	4.5	7.5	5.6	3.0	4.5	2.1	1.5	2.2	1.2	1.55	1.65	8.9
26	4.8	6.7	5.6	2.95	3.1	2.05	1.6	2.4	1.1	2.0	1.6	8.5
27	4.3	6.4	5.2	2.85	3.1	2.15	1.4	2.2	1.1	1.7	1.6	8.4
28	3.9	6.0	4.6	2.75	3.1	3.5	1.35	2.4	1.05	1.7	1.9	10.0
29	3.8	.....	4.2	2.75	3.1	3.0	1.4	2.4	1.2	1.75	2.0	10.4
30	3.7	.....	4.0	2.65	3.0	4.2	2.0	2.2	1.3	1.8	2.0	9.3
31	3.6	.....	3.8	.....	3.4	.....	2.4	2.0	.....	1.7	.....	8.2

Station rating table for Conecuh River at Beck, Ala., from August 24, 1904, to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.70	187	2.00	395	3.20	800	4.40	1,340
0.80	197	2.10	418	3.30	840	4.50	1,390
0.90	208	2.20	443	3.40	885	4.60	1,440
1.00	220	2.30	470	3.50	930	4.70	1,490
1.10	233	2.40	500	3.60	975	4.80	1,540
1.20	247	2.50	530	3.70	1,020	4.90	1,590
1.30	262	2.60	565	3.80	1,065	5.00	1,640
1.40	278	2.70	600	3.90	1,110	5.20	1,750
1.50	295	2.80	640	4.00	1,155	5.40	1,860
1.60	313	2.90	680	4.10	1,200	5.60	1,970
1.70	332	3.00	720	4.20	1,245	5.80	2,080
1.80	352	3.10	760	4.30	1,290	6.00	2,190
1.90	373						

The above table is based on discharge measurements made during 1904–5. It is well defined between gage heights 1.2 feet and 5 feet. Above 6 feet the table is uncertain. High-water estimates are rough approximations. Above gage height 6 feet the rating curve is a tangent, the difference being 60 per tenth.

Estimated monthly discharge of Conecuh River at Beck, Ala., for 1904–5.

[Drainage area, 1,290 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1904.					
August 24–31	2,025	680	1,176	0.912	0.271
September	1,832	220	454	.352	.393
October	262	187	210	.163	.188
November	362	197	282	.219	.244
December	1,340	295	601	.466	.537
1905.					
January	2,080	530	1,123	.871	1.00
February	13,050	800	5,537	4.29	4.47
March	2,190	1,065	1,698	1.32	1.52
April	2,790	582	1,221	.947	1.06
May	2,080	406	873	.677	.780
June	1,490	295	556	.431	.481
July	720	247	377	.292	.337
August	1,590	342	780	.605	.698
September	406	226	309	.240	.268
October	975	233	411	.319	.368
November	600	270	371	.288	.321
December	4,830	395	2,181	1.69	1.95
The year	13,050	226	1,286	.997	13.25

MOBILE RIVER DRAINAGE BASIN.

DESCRIPTION OF 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 1905.

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. It is located at the iron highway bridge one block from Water street, Selma, Ala.

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.

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 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 fastened to the draw pier. Bench marks were established as follows: (1) The top of the capstone of the pivot pier; elevation, 56.00 feet. (2) The edge of the coping on the right-bank abutment, just under the downstream side of the drawbridge; elevation, 59.51 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 36, p 155; 48, p 169; 65, p 282; 83, p 131; 98, pp 131-132; 127, pp 127-128.
Discharge: 48, p 169; 65, p 282; 98, p 132; 127, p 128.
Discharge, monthly: 75, p 92; 83, p 133; 98, p 134; 127, p 130.
Gage heights: 36, p 155; 48, p 170; 65, p 282; 83, p 131; 98, p 132; 127, p 129.
Hydrograph: 75, p 94.
Rating tables: 65, p 323; 83, p 132; 98, p 133; 127, p 129.

Discharge measurements of Alabama River at Selma, Ala., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean. velocity.	Gage. height.	Dis-charge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
February 7[a]	J. M. Giles	432	7,870	4.12	11.05	32,420
February 8[a]	do	439	9,259	4.32	14.00	40,370
February 8[a]	do	440	9,648	4.32	14.90	41,650
May 20	M. R. Hall	457	7,799	3.94	11.94	30,740
December 19	W. E. Hall	462	7,633	3.86	11.00	29,440

[a] Measurement made at Louisville and Nashville Railroad bridge during rapid rise of the river.

Daily gage height, in feet, of Alabama River at Selma, Ala., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.0	4.3	19.9	7.0	5.2	12.6	5.0	2.2	2.4	−1.4	0.8	0.0
2	6.9	6.0	17.0	6.4	6.0	10.4	6.8	2.5	2.4	−1.4	.8	.2
3	6.5	6.2	13.0	6.0	6.0	8.0	6.5	2.5	1.0	−1.4	.8	2.4
4	5.4	5.7	10.5	6.0	6.5	6.0	5.0	2.5	1.0	−1.2	.4	4.6
5	4.2	5.6	9.0	5.7	6.8	6.0	5.0	2.0	1.0	.8	.4	13.8
6	3.3	6.2	8.2	5.6	6.8	4.5	4.5	1.6	1.0	.0	.4	16.7
7	3.0	9.7	7.8	5.6	6.2	3.8	4.5	1.6	1.0	.0	.2	17.5
8	2.5	13.7	7.2	6.0	6.0	3.0	4.2	1.6	1.0	.9	.2	17.5
9	2.5	18.5	7.2	6.7	6.0	2.8	2.5	1.6	1.0	.9	.2	16.6
10	2.5	24.0	7.7	8.3	7.8	2.4	2.5	1.6	1.0	.9	.2	14.6
11	3.7	29.5	8.6	8.5	8.5	1.8	3.0	2.0	.8	1.1	.4	14.6
12	5.0	33.6	9.7	7.5	7.5	1.6	3.5	2.0	.6	1.4	.4	16.0
13	13.2	37.5	9.5	7.3	6.3	1.4	4.8	4.0	.6	1.4	.6	18.4
14	25.5	39.9	9.5	7.5	5.5	1.4	7.0	5.0	.4	1.4	1.0	19.0
15	30.3	41.4	9.5	8.1	5.0	1.4	7.6	8.4	.2	1.9	1.2	18.6
16	32.8	42.0	9.3	8.3	6.0	1.4	8.6	7.6	.0	2.9	1.2	16.4
17	33.0	41.4	8.5	8.3	8.2	1.4	8.4	7.6	− .4	3.0	1.2	12.6
18	33.0	39.2	7.8	7.9	11.4	1.4	7.6	8.5	− .4	3.0	1.0	11.0
19	27.0	34.7	7.2	7.0	12.0	1.4	4.8	9.5	.4	2.4	.6	9.5
20	22.1	29.3	8.0	6.0	12.0	2.0	4.5	10.0	.4	1.8	.6	10.5
21	17.0	22.2	13.5	5.6	11.3	2.5	3.5	9.6	.4	1.5	.6	12.6
22	10.6	17.6	20.9	5.5	10.0	2.5	3.0	8.7	.0	1.5	.6	17.9
23	8.5	17.4	23.0	5.3	10.0	2.5	1.6	7.4	− .2	1.5	.4	20.7
24	7.2	20.2	22.6	5.3	10.0	2.0	1.6	5.0	− .4	1.0	.2	23.6
25	7.0	21.9	20.0	5.1	10.0	2.0	1.6	4.7	− .4	.5	.2	25.0
26	6.6	22.4	16.3	5.0	12.8	1.5	1.6	4.5	− .6	.5	.2	25.4
27	5.8	22.2	13.6	4.8	13.8	2.0	1.6	4.3	−1.0	.5	.2	24.0
28	5.0	21.4	11.0	4.8	15.9	2.0	1.6	3.0	−1.4	1.0	.0	20.8
29	4.5	.....	9.5	4.8	16.8	2.0	1.6	2.8	−1.4	.5	.0	17.0
30	4.0	.....	8.2	5.0	17.3	2.5	1.6	2.6	−1.4	.5	.0	14.6
31	3.8	.....	7.6	.....	14.0	.....	1.6	2.6	.....	1.0	.....	13.5

Station rating table for Alabama River at Selma, Ala., from January 1, 1904, to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
−2.00	3,000	.30	6,610	2.50	10,550	6.40	18,340
−1.90	3,150	.40	6,780	2.60	10,740	6.60	18,760
−1.80	3,300	.50	6,950	2.70	10,930	6.80	19,180
−1.70	3,450	.60	7,120	2.80	11,120	7.00	19,600
−1.60	3,600	.70	7,290	2.90	11,310	7.50	20,700
−1.50	3,750	.80	7,460	3.00	11,500	8.00	21,800
−1.40	3,900	.90	7,630	3.20	11,880	8.50	22,900
−1.30	4,050	1.00	7,800	3.40	12,260	9.00	24,000
−1.20	4,200	1.10	7,980	3.60	12,640	9.50	25,150
−1.10	4,350	1.20	8,160	3.80	13,020	10.00	26,300
−1.00	4,500	1.30	8,340	4.00	13,400	10.50	27,450
−.90	4,660	1.40	8,520	4.20	13,800	11.00	28,600
−.80	4,820	1.50	8,700	4.40	14,200	11.50	29,800
−.70	4,980	1.60	8,880	4.60	14,600	12.00	31,000
−.60	5,140	1.70	9,060	4.80	15,000	12.50	32,200
−.50	5,300	1.80	9,240	5.00	15,400	13.00	33,450
−.40	5,460	1.90	9,420	5.20	15,820	13.50	34,700
−.30	5,620	2.00	9,600	5.40	16,240	14.00	36,000
−.20	5,780	2.10	9,790	5.60	16,660	15.00	38,600
−.10	5,940	2.20	9,980	5.80	17,080	16.00	41,300
0.00	6,100	2.30	10,170	6.00	17,500	17.00	44,000
.10	6,270	2.40	10,360	6.20	17,920	18.00	46,700
.20	6,440						

The above table is fairly well defined to gage height 34 feet. It has been extended beyond this limit. 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 1905.

[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	87,950	10,550	31,290	2.03	2.34
February	112,700	14,000	60,380	3.92	4.08
March	60,450	20,040	30,840	2.00	2.31
April	22,900	15,000	18,290	1.19	1.33
May	44,810	15,400	25,000	1.62	1.87
June	32,450	8,520	12,100	.786	.877
July	23,120	8,880	13,780	.895	1.03
August	26,300	8,880	14,660	.952	1.10
September	10,360	3,900	6,651	.432	.482
October	11,500	3,900	7,728	.502	.579
November	8,160	6,100	6,952	.451	.503
December	67,050	6,100	39,670	2.58	2.97
The year	112,700	3,900	22,280	1.45	19.47

ETOWAH RIVER NEAR BALLGROUND, GA.

This station was established in 1905 for the purpose of making a series of miscellaneous discharge measurements. It is located at an iron highway bridge about 2½ miles south of Ballground, Ga., and half a mile below the mouth of Long Swamp Creek.

The channel is nearly straight for 300 feet above and 600 feet below the station. The current is moderately swift and fairly good for measurement. The left bank is high and will not overflow, but the right bank is low and cultivated for about 500 feet and will overflow at a gage height of about 16 feet above low water. The bed of the river is partly rock.

Discharge measurements are made from the bridge of two iron spans. The left span is 110 feet long, and spans the entire river except at floods. The other span, which is over low ground on the right bank, is 100 feet long, and there is also 90 feet of wooden trestle on the right bank.

Gage heights are determined directly from the bench mark, which is the top of the upstream end of the first floor beam to the left of the middle pier; elevation, 28.00 feet above the datum of the assumed gage.

Discharge measurements of Etowah River near Ballground, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
June 24	O. P. Hall	81	314	2.43	3.10	763
November 15	M. R. Hall	78	239	1.71	2.24	408

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 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 has caused much trouble by being occasionally washed away and built up again. Up to gage height, 3 feet, 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 ends of the approaches. Above this point it begins to overflow the bottom lands. The bed is fairly constant.

Discharge measurements are made from the upstream side of the iron highway bridge. The initial point for soundings is the river side of the right-bank pier at the end of the main span.

The gage is a heavy vertical timber, fastened to the edge of the left-bank pier, on the upstream side. 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. Bench marks were established as follows: (1) 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; elevation, 20.36 feet. (2) 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; elevation, 16.88 feet. (3) The center of the head of a large wire nail, driven horizontally into the river side of a walnut tree on the east side of the road, 25 feet north of the north end of the bridge; elevation, 18.52 feet. (4) The top of the iron bar on the top of the left-bank pier at the end of the center span of the bridge, upstream side; elevation, 23.39 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: Ann 18, iv, pp 94-95; WS 15, p 48; 27, pp 47-48; 36, pp 143-144; 48, p 160; 65, p 275; 83, p 148; 98, pp 153-154; 127, pp 130-131, 175.

Discharge: Ann 18, iv, p 95; WS 15, p 48; 27, p 57; 36, p. 144; 48, p 160; 65, p 275; 83, p 149; 98, p 154; 127, p 131, 175.

Discharge, monthly: Ann 18, iv, p 96; 19, iv, p 242; 20, iv, pp 181, 189; 21, iv, p 145; 22, iv, p 193; WS 75, p 89; 83, p. 151; 98, p 156; 127, p 133.

Discharge, yearly: Ann 20, iv, p 51.

Gage heights: WS 11, pp 25-27; 15, p 48; 27, p 51; 36, p 144; 48, p 161; 65, p 276; 83, p 149; 98, p 155 127, p 132.

Hydrographs: Ann 18, iv, p 96; 19, iv, p 243; 20, iv, p 190; 21, iv, p 145; 22, iv, p 193.

Rainfall and run-off relation: Ann 20, iv, p 181.

Rating tables: Ann 18, iv, p 95; 19, iv, p 242; WS 27, p 58; 39, p 445; 52, p 514; 65, p 322; 83, p 150; 98, pp 155-156; 127, p 132.

Discharge measurements of Etowah River at Canton, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
January 21	J. M. Giles	112	545	1.30	0.67	720
January 21	B. S. Drane	112	545	1.30	.67	710
January 21	W. E. Hall	112	545	1.26	.67	689
April 20	O. P. Hall	113	502	1.43	.61	716
June 3	M. R. Hall	111	514	1.53	.49	786
October 18	do	106	449	1.18	.14	531
October 18	do	106	449	1.18	.14	531
November 17	do	108	445	.98	.14	434
November 17	do	108	445	.98	.14	434

Daily gage height, in feet, of Etowah River at Canton Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.5	0.5	0.7	0.7	0.8	0.6	1.7	0.5	0.2	0.5	0.1	0.3
2	.5	.5	.7	.7	.7	.6	1.0	.4	2.0	.4	.0	.3
3	.6	.5	.6	.7	.6	.5	.8	.3	.6	.4	.0	15.2
4	.5	.5	.6	.7	1.5	.5	.6	.2	.5	.3	.0	7.5
5	.5	.6	.6	.8	.9	.5	1.8	.2	.4	.3	.0	1.8
6	.6	.8	.7	.9	.9	.5	.7	.2	.3	.2	.0	1.2
7	1.4	1.2	.8	.9	2.5	.5	1.7	.2	.2	.2	.0	.9
8	.8	1.2	.8	.9	1.4	.5	.9	.4	.2	.1	.1	1.0
9	.7	3.7	.8	1.3	2.3	.4	1.7	.7	.1	.0	.1	6.5
10	.6	4.0	1.7	1.0	1.1	.4	2.1	.4	.1	.1	.2	3.4
11	.7	2.0	1.0	.7	.9	.4	7.0	2.0	.1	3.0	.3	1.8
12	9.4	1.5	1.0	1.0	.7	.4	4.0	2.5	.5	1.1	.2	1.0
13	10.0	4.8	.9	1.0	.7	1.2	2.0	2.0	.3	.4	.2	.8
14	2.2	2.8	.9	.7	.6	.5	1.5	1.0	.2	.2	.2	.6
15	1.0	1.8	.8	.7	1.0	.7	1.2	1.5	.0	.1	.1	.8
16	1.0	1.0	.8	1.0	4.0	.6	.9	1.0	.0	.3	.1	.7
17	.8	1.0	.7	.7	.9	.7	.7	.8	.0	.2	.1	.6
18	.8	.9	.7	.7	.8	.6	.5	.5	.0	.1	.1	.6
19	.8	.9	.7	.7	.7	.6	.5	.5	.0	.1	.1	.6
20	.7	1.8	.7	.6	.7	1.4	.7	.4	.0	.0	.2	.9
21	.7	9.9	3.0	.6	.7	2.3	.4	.4	.0	.0	.4	3.1
22	.6	3.9	1.5	.7	.7	3.7	.4	.3	.0	.0	.3	2.0
23	.6	2.0	1.0	.6	1.0	2.0	.4	.3	−.1	.0	.2	1.6
24	.5	1.3	1.0	.6	6.5	1.1	.4	.3	−.1	.0	.2	1.3
25	.5	1.0	.9	.6	1.9	.9	.4	.8	−.1	.1	.4	1.0
26	.5	.8	.9	.6	1.2	.9	.4	.4	−.1	.2	.5	.8
27	.5	.8	.9	.6	1.1	.8	.3	.3	−.1	.5	.3	.7
28	.5	.8	.8	.6	1.0	1.2	.3	.2	−.1	.3	.3	.7
29	.5	.....	.8	.6	.9	1.1	1.3	.2	.0	.2	.3	1.2
30	.6	.....	.8	1.3	.9	.9	.5	.2	.0	.1	.2	1.0
31	.6	.....	.8	.....	.8	.....	.7	.2	.....	.1	.....	.8

ETOWAH RIVER NEAR ROME, GA.

This station was established August 17, 1904, by M. R. Hall. It is located at Freemans Ferry, about 5 miles above Rome, Ga.

The channel is straight for about 3,000 feet above and 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.

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 original gage, reading from 0 to 7 feet, is securely attached to a sycamore tree at left edge of river, about 250 feet below the ferry. A second section, reading from 7 to 20 feet, is attached to a post located 10 feet upstream from the first section and 10 feet from the edge of the river at low water. A third section, reading from 20 to 30 feet, is attached

to a maple tree opposite the post and 15 feet farther from the water's edge. The gage is read once each day by W. A. Gresham, who is paid by the Georgia Geological Survey. Bench marks were established as follows: (1) Head of lag screw driven into root of maple, to which gage 20 to 30 feet is attached; elevation, 19.26 feet. (2) Head of nail driven into root of maple tree 100 feet up river from gage; elevation, 22.18 feet. (3) 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. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: WS 98, pp 151–152; 127, pp 133–134.
Discharge: Ann 18, iv, p 109; 19, iv, p 252; WS 98, p 152; 127, p 134.
Discharge, monthly: WS 98, p 153; 127, p 135.
Gage heights: WS 98, p 152; 127, p 135.
Rating table: WS 98, p 153; 127, p 135.

Discharge measurements of Etowah River near Rome, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean. velocity.	Gage. height.	Dis-charge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
February 28	W. E. Hall	297	1,077	2.29	3.10	2,468
May 12	M.R. Hall	300	873	1.84	2.40	1,613
July 24	W. E. Hall	300	761	1.53	2.11	1,168
October 9	F. A. Murray	293	681	1.27	1.76	862
October 9	do	293	681	1.25	1.76	850

Daily gage height, in feet, of Etowah River near Rome, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.0	2.3	3.0	2.5	2.9	2.4	2.4	2.1	1.9	2.7	1.9	2.0
2	2.0	2.3	2.9	2.5	2.5	2.3	3.2	2.1	2.0	2.8	1.8	2.1
3	1.9	2.2	2.8	2.5	2.4	2.3	2.9	2.1	2.5	2.1	1.7	15.2
4	2.0	2.1	2.8	2.4	2.4	2.3	2.4	2.1	3.0	2.0	1.7	16.2
5	1.9	2.1	2.7	2.4	3.0	2.4	2.5	2.1	2.9	1.8	1.6	9.1
6	2.3	2.2	2.7	2.7	2.7	2.3	2.8	2.1	2.0	1.8	1.6	3.9
7	2.6	2.25	2.6	2.7	2.7	2.3	4.6	2.1	1.9	1.7	1.6	3.0
8	2.35	3.0	2.6	2.7	3.3	2.2	4.1	2.1	1.9	1.7	1.5	4.1
9	2.3	7.7	2.7	2.6	2.8	2.2	4.4	2.0	1.8	1.6	1.6	13.5
10	2.2	8.4	2.9	2.8	3.3	2.2	4.8	2.5	1.8	2.1	2.1	9.4
11	3.4	5.9	3.3	2.6	2.7	2.2	3.9	2.9	1.8	3.0	2.1	4.5
12	4.7	4.3	2.9	2.6	2.5	2.2	7.0	3.8	2.9	3.7	2.0	3.8
13	15.7	4.5	2.9	3.0	2.4	2.2	6.0	3.1	3.0	2.6	2.0	4.1
14	9.3	7.4	2.8	2.9	2.3	2.3	4.0	2.9	2.1	2.5	1.9	4.5
15	6.2	4.7	2.7	2.7	2.3	2.6	2.9	5.1	2.0	2.3	1.8	4.9
16	3.1	3.7	2.6	2.7	4.9	2.5	2.7	4.0	1.9	2.4	1.8	3.8
17	2.8	3.3	2.5	2.9	4.8	2.5	2.5	3.4	1.8	2.3	1.7	3.6
18	2.5	3.2	2.5	2.6	3.8	2.3	2.4	2.6	1.8	2.3	1.6	3.2
19	2.5	3.0	2.5	2.5	2.7	2.3	2.4	2.5	1.8	2.3	3.3	2.9
20	2.5	3.3	2.6	2.4	2.4	2.5	2.3	2.5	1.7	2.2	2.0	4.0
21	2.5	11.0	4.2	2.4	2.8	2.9	2.3	2.4	1.8	2.1	1.9	.....
22	2.5	10.0	4.5	2.5	3.5	2.5	2.4	2.3	1.7	2.0	1.8	.....
23	2.4	5.8	3.5	2.5	4.2	2.6	2.3	2.3	1.7	1.9	1.8	.....
24	2.35	4.5	3.0	2.4	9.0	3.8	2.1	3.0	1.7	1.9	1.9	4.2
25	2.35	3.8	2.9	2.4	4.8	2.6	2.1	3.0	1.7	2.0	2.1	3.8
26	2.2	3.5	2.8	2.4	3.6	2.3	2.2	2.6	1.6	2.2	2.0	3.5
27	2.0	3.2	2.7	2.4	3.6	2.3	2.1	2.3	1.6	2.3	2.4	3.2
28	2.0	3.1	2.7	2.4	3.2	2.8	2.1	2.3	1.6	2.4	2.3	3.2
29	2.0	.....	2.6	2.3	2.8	3.0	2.3	2.2	1.6	1.9	2.3	3.3
30	1.9	.....	2.5	.....	2.6	2.8	2.3	2.0	1.7	1.9	2.0	3.3
31	2.4	.....	2.5	.....	2.5	.....	2.2	1.9	.....	.....	.....	3.0

Station rating table for Etowah River near Rome, Ga., from August 17, 1904, to December 31, 1905.

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	1.70	735	2.20	1,260	2.70	1,890
1.30	425	1.80	830	2.30	1,380	2.80	2,030
1.40	495	1.90	930	2.40	1,500	2.90	2,175
1.50	570	2.00	1,035	2.50	1,625	3.00	2,320
1.60	650	2.10	1,145	2.60	1,755		

The above table is based on 10 discharge measurements made during 1904–1905. It is well defined.

NOTE.—This station was established for low-water records, and these only are reliable. The above rating table is applicable only to gage heights less than 3 feet. As it does not apply to the higher gage heights, no monthly estimates have been made.

AMICALOLA RIVER NEAR BALLGROUND, GA.

This station was established in 1905 for the purpose of making miscellaneous discharge measurements. It is located at Hollensheds Bridge, one-fourth of a mile above Heard's mill and about 15 miles northeast of Ballground, Ga.

Discharge measurements are made from the two-span covered bridge, about 150 feet in total length. The meter can be let down through the floor at the side of the bridge, but the current under the bridge is rough and not good for measurements. Some of the measurements were made about 40 feet below the bridge. The stream is important, and a good section is difficult to find, but it is probable that a better place than this will be found.

Gage heights are determined directly from the bench mark, which is a point on top of the downstream end of the wooden floor beam, 25 feet from the left-bank pier; elevation, 17.00 feet above the datum of the assumed gage.

Discharge data at this station are contained in Water-Supply Paper of the United States Geological Survey No. 27, page 45.

Discharge measurements of Amicalola Creek near Ballground, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
June 23	O. P. Hall	66	75	2.46	1.58	184
November 16 [a]	M. R. Hall	38	67	1.61	1.35	108
November 16 [a]	do	40	65	1.54	1.35	100

[a] Made at different section.

LONG SWAMP CREEK NEAR BALLGROUND, GA.

This station was established in 1905 for the purpose of making a series of miscellaneous discharge measurements. It is located at a wooden wagon bridge about 2 miles southeast from Ballground, Ga., and half a mile above the mouth of the creek which empties into Etowah River.

The current is swift at the station and above and below it. The bed is sandy, and the water is shallow.

Measurements are made from the downstream side of the wooden bridge of three spans The middle span, which includes all of the creek at all but high stages, is 50 feet long, and the two end spans are 35 feet each.

Gage heights are determined directly from the bench mark, which is a nail driven horizon tally into the upstream side of a large sycamore tree on the right bank, about 100 feet below the bridge. Elevation, 8.00 feet above the datum of the assumed gage.

Discharge data at this station are contained in the Nineteenth Annual Report of the United States Geological Survey, Part IV, page 252.

Discharge measurements of Long Swamp Creek near Ballground, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
June 24	O. P. Hall	33	54	1.72	1.27	93
November 15	M. R. Hall	30	43	1.19	.84	50

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 channel is straight above the station for about 400 feet and below for about 3,000 feet. The current is swift, but 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.

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.

A standard chain gage is fastened to the downstream guard rail at a point 570 feet from the initial point for soundings. Length of the chain, 35.02 feet. The gage is read once a day by S. T. Waits, who is paid by the Alabama Geological Survey.

Bench marks were established as follows: (1) The capstone on the circular pier of the turn span; elevation, 26.80 feet. (2) A copper plug set in solid rock on the right bank, about 100 feet above the bridge; elevation, 11.95 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: Ann 18, iv, pp 99–100; WS 15, p 51; 27, p 48; 36, p 149; 48, p 164; 65, p 279; 83, pp 143–144; 98, p 146; 127, p 136.

Discharge: Ann 18, iv, p 100; 19, iv, p 247; WS 15, p 51; 27, p 57; 36, pp 149–150; 48, p 164; 65, p 279; 83, p 144; 98, p 147; 127, p 136.

Discharge, monthly: Ann 18, iv, p 101; 19, iv, p 248; 20, iv, p 187; 21, iv, p 150; 22, iv, p 200; WS 75, p 91; 83, p 145; 98, p 148; 127, p 138.

Discharge, yearly: Ann 20, iv, p 51.

Gage heights: WS 11, p 30; 15, p 52; 27, p 54; 36, p 150; 48, p 165; 65, p 280; 83, p 144; 98, p 147; 127, p 137.

Hydrographs: Ann 19, iv, p 249; 20, iv, p 187; 21, iv, p 150; 22, iv, p 200; WS 75, p 91.

Map: Ann 19, iv, p 246.

Rating tables: Ann 18, iv, p 101; 19, iv, p 248; WS 27, p 58; 39, p 445; 52, p 514; 65, p 322; 83, p 145; 98, p 148; 127, p 137.

Discharge measurements of Coosa River at Riverside, Ala., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean. velocity.	Gage. height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
February 28....	J. M. Giles	563	7,000	3.33	7.75	23,320
February 28....	....do	563	6,546	3.23	7.20	21,150
August 11.....	B. S. Drane	539	4,111	1.58	2.75	6,483
September 25...	F. A. Murray	503	3,203	.83	1.14	2,643
November 29...	W. E. Hall	514	3,451	.94	1.51	3,256

Daily gage height, in feet, of Coosa River at Riverside, Ala., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.2	3.3	5.6	3.0	3.6	3.9	3.8	2.05	1.75	1.0	1.5	1.5
2	4.0	3.2	4.9	3.0	4.0	3.4	3.7	2.1	1.6	1.2	1.45	1.5
3	3.8	3.0	4.4	2.9	4.3	3.0	3.6	1.9	1.6	1.5	1.4	3.6
4	3.4	2.7	4.0	2.85	4.1	2.7	3.2	1.65	1.8	1.85	1.4	6.1
5	3.0	3.5	3.8	2.8	3.8	2.55	3.0	1.5	2.0	1.8	1.3	8.3
6	2.25	5.4	3.7	2.9	3.7	2.45	2.85	1.5	2.05	1.65	1.2	9.7
7	2.6	7.2	3.5	3.0	3.8	2.4	2.8	1.5	2.1	1.6	1.2	9.7
8	2.95	9.2	3.5	3.1	4.0	2.3	2.75	1.45	1.8	1.5	1.2	6.1
9	3.1	13.1	3.5	3.4	4.0	2.25	3.1	1.45	1.4	1.45	1.2	5.0
10	3.5	14.8	3.8	3.6	3.6	2.15	3.7	1.65	1.4	1.55	1.25	6.3
11	4.0	14.5	4.5	3.6	3.5	2.1	3.0	2.7	1.3	1.75	1.4	8.9
12	6.3	13.8	4.9	3.5	3.4	2.05	4.5	3.1	1.25	2.4	1.4	10.7
13	11.5	13.1	4.9	3.2	3.4	2.0	5.2	3.5	1.2	2.6	1.3	9.0
14	12.8	12.9	4.6	3.4	3.0	2.0	6.3	4.1	1.4	3.0	1.3	7.6
15	13.0	12.3	4.2	3.4	2.65	2.0	6.2	5.1	1.9	3.1	1.35	5.8
16	12.5	10.2	3.8	3.4	3.9	2.1	6.0	4.7	2.25	2.8	1.3	6.4
17	11.1	9.0	3.5	3.2	6.7	2.25	5.0	5.1	2.05	2.2	1.25	6.8
18	8.3	7.6	3.3	3.0	6.9	2.45	3.4	5.2	1.8	2.2	1.2	6.8
19	5.2	7.0	3.2	3.0	6.9	2.45	2.5	5.0	1.25	2.1	1.2	6.1
20	4.6	7.9	3.1	3.0	5.6	2.5	2.4	4.7	1.2	2.1	1.2	5.3
21	4.0	10.0	5.5	2.7	4.6	2.65	2.3	3.7	1.15	1.8	1.2	6.8
22	3.6	12.4	5.9	2.75	4.4	2.8	2.1	3.0	1.15	1.5	1.15	8.6
23	3.2	12.6	6.4	2.75	4.1	2.8	2.05	2.5	1.15	1.45	1.2	10.4
24	3.0	12.6	6.7	2.65	6.2	3.1	2.0	2.3	1.15	1.4	1.4	10.9
25	2.9	12.6	6.4	2.6	8.4	3.2	1.9	2.05	1.15	1.3	1.5	8.6
26	2.7	12.0	4.8	2.6	9.9	3.3	1.8	2.0	1.1	1.3	1.35	8.0
27	2.6	9.6	4.2	2.7	10.5	3.0	1.75	2.0	1.0	1.3	1.3	6.9
28	2.6	7.2	3.8	2.75	8.8	2.8	1.7	2.0	1.0	1.3	1.25	6.2
29	3.0	.....	3.4	2.85	7.0	3.6	1.7	2.0	1.0	1.3	1.5	6.0
30	3.2	.....	3.2	3.4	5.7	3.9	1.7	2.0	1.0	1.45	1.5	5.8
31	3.2	.....	3.1	.....	4.5	.....	1.7	1.9	.....	1.5	.....	5.4

Station rating table for Coosa River at Riverside, Ala., from January 1, 1904, to December 31, 1905.

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	1,150	1.60	3,430	2.90	6,835	4.40	11,920
.40	1,300	1.70	3,655	3.00	7,135	4.60	12,640
.50	1,450	1.80	3,890	3.10	7,440	4.80	13,360
.60	1,605	1.90	4,130	3.20	7,750	5.00	14,080
.70	1,760	2.00	4,380	3.30	8,070	5.20	14,800
.80	1,920	2.10	4,635	3.40	8,400	5.40	15,530
.90	2,085	2.20	4,895	3.50	8,740	5.60	16,270
1.00	2,255	2.30	5,160	3.60	9,080	5.80	17,010
1.10	2,435	2.40	5,425	3.70	9,430	6.00	17,750
1.20	2,620	2.50	5,695	3.80	9,780	6.20	18,490
1.30	2,810	2.60	5,970	3.90	10,130	6.40	19,230
1.40	3,010	2.70	6,250	4.00	10,480	6.60	19,970
1.50	3,215	2.80	6,540	4.20	11,200	6.80	20,710

The above table is based on discharge measurements made during 1904-5 and several older measurements. It is well defined between gage heights 0.4 foot and 4 feet. Above 4 feet the table is not so well defined, as the high-water measurements are more scattered. The high-water discharge is only approximate.

Estimated monthly discharge of Coosa River at Riverside, Ala., for 1905.

[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	43,650	5,028	14,500	2.05	2.36
February	50,310	6,250	30,340	4.29	4.47
March	20,340	7,440	11,710	1.66	1.91
April	9,080	5,970	7,266	1.03	1.15
May	34,400	6,110	14,650	2.07	2.39
June	10,130	4,380	6,259	.886	.988
July	18,860	3,655	7,990	1.13	1.30
August	14,800	3,112	6,813	.964	1.11
September	5,028	2,255	3,203	.453	.505
October	7,440	2,255	3,921	.555	.640
November	3,215	2,528	2,838	.402	.448
December	35,880	3,215	• 21,330	3.02	3.48
The year	50,310	2,255	10,900	1.54	20.75

OOSTANAULA RIVER AT RESACA, GA.

This station was maintained by the United States Geological Survey from August 1, 1896, to April 30, 1899, and was reestablished at the beginning of the year 1905. It is located at the bridge of the Western and Atlantic Railway, in the town of Resaca, 800 feet south of the depot.

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 the water, and has a 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.

Discharge measurements are made from the downstream side of the iron bridge. The bridge consists of three spans of 120 feet each, and 480 feet of trestle approach at the left bank. The left 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.

Gage heights are observed from the United States Weather Bureau gage, which is a heavy timber attached vertically to the downstream side of the center pier of the bridge. Bench marks were established as follows: (1) The top of the downstream end of the second crossbeam from the right bank; elevation, 38.94 feet. (2) 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; elevation, 34.23 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: Ann 18, iv, p 98; WS 15, p 50; 27, p 48; 36, pp 146-147; 48, p 162; 65, p 277; 127, pp 138-139.
Discharge: Ann 18, iv, p 99; WS 15, p 50; 27, p 57; 36, p 147; 48, p 162.
Discharge, monthly: Ann 19, iv, p 245; 20, iv, pp 181-190; 21, iv, p 147; 22, iv, p 198; WS 75, p 90.
Discharge, yearly: Ann 20, iv, p 51.
Gage heights: WS 11, pp 28-30; 15, p 50; 27, p 52; 36, p 147; 48, p 163; 65, p 278.
Hydrographs: Ann 19, iv, p 246; 20, iv, p 190; 21, iv, p 148; 22, iv, p 198.
Rainfall and run-off relation: Ann 20, iv, p 181.
Rating tables: Ann 18, iv, p 99, 19, iv, p 245, WS 27, p 58; 39, p 445; 52, p 514; 65, p 322.

Discharge measurements of Oostanaula River at Resaca, Ga.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1904.		*Feet.*	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
September 26[a]	O. P. Hall	.....	676	0.40	0.95	273
November 25[a]	.....do	.....	774	.55	1.57	427
December 21	M. R. Hall	.....	614	.97	1.79	598
1905.						
March 14	O. P. Hall	158	1,173	2.15	5.10	2,521
June 7	.....do	138	873	1.53	3.30	1,339
September 26	.....do	177	828	.72	1.91	596
1906.						
January 2	M. R. Hall	156	1,079	2.01	4.60	2,167

[a] Made at different section.

Daily gage height, in feet, of Oostanaula River at Resaca, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	3.4	5.4	4.0	8.2	4.2	6.0	2.6	2.0	1.9	2.2	2.4
2	3.0	3.2	5.2	4.0	5.8	4.0	5.6	2.3	3.2	1.9	2.1	2.5
3	2.6	3.0	5.0	4.0	5.0	3.8	4.4	2.0	3.6	1.95	2.1	14.1
4	3.0	3.0	4.5	3.8	5.8	3.8	3.6	1.8	2.6	2.8	2.1	13.8
5	4.0	3.2	4.2	4.2	5.6	3.6	3.2	1.6	2.8	3.1	2.1	9.6
6	3.6	6.5	4.3	4.8	5.2	3.6	3.0	1.8	2.4	2.7	2.1	5.4
7	4.6	9.0	4.5	4.6	4.8	3.4	3.4	2.0	2.2	2.1	2.1	4.6
8	5.4	9.5	4.5	4.4	4.6	3.4	3.6	2.8	2.0	2.0	2.2	8.6
9	4.0	18.0	4.5	4.4	6.4	3.6	3.6	6.0	1.8	1.9	2.2	17.4
10	3.8	19.8	7.6	3.8	5.8	3.2	4.8	4.6	1.8	1.9	2.2	18.2
11	3.8	18.5	8.6	3.8	5.2	3.0	5.0	4.2	1.6	3.1	2.2	12.4
12	9.0	17.0	7.0	4.0	4.8	2.8	7.4	4.6	5.0	5.2	2.2	7.6
13	14.2	13.0	6.8	4.0	4.2	3.2	8.8	7.6	4.0	3.7	2.1	5.4
14	20.2	12.0	5.2	3.8	3.8	3.0	5.8	4.2	3.4	2.9	2.1	5.1
15	13.2	10.0	5.0	4.2	3.6	2.8	4.0	6.2	2.8	2.6	2.0	7.4
16	6.0	7.5	4.7	5.0	10.3	2.8	3.8	6.8	2.2	2.9	2.1	8.6
17	5.0	6.5	4.6	4.8	9.6	3.0	4.0	8.8	2.2	2.9	2.1	7.4
18	4.6	6.0	4.5	4.6	8.0	3.2	3.6	5.4	2.0	2.75	2.1	5.9
19	4.2	5.8	4.2	4.6	6.3	3.8	3.2	4.7	1.8	2.4	2.1	5.2
20	4.8	10.2	4.3	4.4	5.2	3.2	3.0	3.8	1.8	2.3	2.2	5.4
21	4.2	20.2	8.5	3.8	4.6	3.2	3.0	3.4	1.8	2.2	3.0	12.8
22	4.0	22.0	9.2	4.0	4.6	4.0	3.0	2.8	1.8	2.1	2.4	12.4
23	4.0	20.6	6.5	4.0	5.2	6.0	3.0	2.8	1.8	2.1	2.2	11.4
24	3.5	18.6	5.5	3.8	14.0	5.0	2.8	3.0	1.8	2.0	2.2	10.0
25	3.5	8.6	5.2	3.6	11.0	3.8	2.8	4.0	1.8	2.1	2.3	9.6
26	3.4	7.2	4.6	3.6	8.6	3.4	2.8	3.8	1.9	2.4	2.9	7.6
27	3.2	6.5	4.6	4.0	6.8	3.2	2.4	3.4	1.9	2.9	2.5	6.4
28	3.2	6.0	4.4	6.6	5.4	5.2	2.4	2.8	1.85	2.7	2.3	5.6
29	3.0	.....	4.2	6.2	5.0	4.2	4.0	2.6	1.85	2.4	2.3	6.1
30	3.2	.....	4.2	9.2	4.6	4.2	3.0	2.4	1.85	2.4	2.5	5.9
31	3.5	.....	4.0	.....	4.6	.....	2.8	2.2	.....	2.4	.....	5.2

Station rating table for Oostanaula River at Resaca, Ga., from January 1 to December 31, 1905.

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	420	3.30	1,335	5.10	2,530	7.80	4,640
1.60	455	3.40	1,395	5.20	2,600	8.00	4,800
1.70	495	3.50	1,455	5.30	2,675	8.20	4,980
1.80	540	3.60	1,520	5.40	2,750	8.40	5,160
1.90	585	3.70	1,585	5.50	2,825	8.60	5,340
2.00	630	3.80	1,650	5.60	2,900	8.80	5,520
2.10	680	3.90	1,715	5.70	2,975	9.00	5,700
2.20	730	4.00	1,780	5.80	3,050	9.20	5,880
2.30	780	4.10	1,845	5.90	3,125	9.40	6,060
2.40	830	4.20	1,910	6.00	3,200	9.60	6,240
2.50	880	4.30	1,975	6.20	3,360	9.80	6,420
2.60	935	4.40	2,040	6.40	3,520	10.00	6,600
2.70	990	4.50	2,110	6.60	3,680	10.20	6,780
2.80	1,045	4.60	2,180	6.80	3,840	10.40	6,960
2.90	1,100	4.70	2,250	7.00	4,000	10.60	7,140
3.00	1,155	4.80	2,320	7.20	4,160	10.80	7,320
3.10	1,215	4.90	2,390	7.40	4,320	11.00	7,500
3.20	1,275	5.00	2,460	7.60	4,480		

The above table is based on six discharge measurements made during 1904-5 and one high-water measurement in 1906. It is well defined between gage heights 1.6 feet and 6 feet. Above 6 feet the table is uncertain, the high-water estimates being rough approximations. Above gage height 11 feet the rating curve is a tangent, the difference being 100 per tenth.

Estimated monthly discharge of Oostanaula River at Resaca, Ga., for 1905.

[Drainage area, 1,614 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	16,700	935	2,876	1.78	2.05
February	18,500	1,155	7,512	4.65	4.84
March	5,880	1,780	2,756	1.71	1.97
April	5,880	1,520	2,123	1.32	1.47
May	10,500	1,520	3,476	2.15	2.48
June	3,200	1,045	1,572	.974	1.09
July	5,520	830	1,793	1 11	1.28
August	5,520	455	1,735	1.07	1.23
September	2,460	455	818	.507	.566
October	2,600	585	922	.571	.658
November	1,155	630	752	.466	.520
December	14,700	830	5,409	3.35	3.86
The year	18,500	455	2,645	1.64	22.01

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. The gaging station was established August 15, 1896, by M. R. Hall, at the iron highway bridge at Carters, Murray County, Ga. 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.

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.

Discharge measurements are made from the single-span highway bridge and its approaches. The initial point for soundings is the land side of the pier on the right bank.

A standard chain gage is attached to the downstream side of the bridge in the third panel from the right bank; length of chain, 36.57 feet. The observer is R. P. Messer, who reads the gage once a day. Bench marks were established as follows: (1) The top of the cylindrical iron pier at the right bank, downstream side; elevation, 30.35 feet. (2) The top of 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; elevation, 22.15 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: Ann 18, iv, pp 96–97; WS 15, p 49; 27, p 48; 36, pp 144–145; 48, p 161; 65, p 276; 83, p 151; 98, pp 156–157; 127, p 139.

Discharge: Ann 18, iv, p 97; WS 15, p 49; 27, p 57; 36, p 145; 48, p 161; 65, p 276; 83, p 151; 98, p 157; 127, p 140.

Discharge, monthly: Ann 19, iv, p 244; 20 iv, pp 180, 191; 21, iv, p 146; 22, iv, p 197; WS 75, p 89; 83, p 153; 98, p 159; 127, p 141.

Discharge, yearly: Ann 20, iv, p 51.

Gage heights: WS 11, p 27; 15, p 49; 27, p 52; 36, p 146; 48, p 162; 65, p 277; 83, p 152; 98, pp 157–158; 127, p 140.

Hydrographs: Ann 19, iv, p 244; 20, iv, p 192; 21 iv, p 147; 22, iv, p 197.

Rainfall and run-off relation: Ann 20, iv, p 181.

Rating tables: Ann 18, iv, p 98; 19, iv, p 243; WS 27, p 58; 39, p 445; 52, p 514; 65, p 322; 83, p 153; 98, p 158; 127, p 141.

Discharge measurements of Coosawattee River at Carters, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
March 18	O. P. Hall	112	372	2.28	2.10	848
March 28	do	112	389	2.36	2.21	917
June 6	do	112	326	2.13	1.77	694
September 28	do	108	212	1.70	1.02	361
December 30	do	111	384	2.45	2.39	942
December 30	M. R. Hall	111	384	2.48	2.39	951

Daily gage height, in feet, of Coosawattee River at Carters, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.3	1.4	3.0	2.4	2.5	2.0	1.9	1.5	1.4	1.0	1.1	1.1
2	1.8	1.5	3.0	2.2	2.0	2.0	1.8	1.5	4.2	1.0	1.1	2.0
3	1.8	1.4	2.8	2.1	2.0	1.95	1.8	1.4	3.5	1.1	1.1	18.2
4	1.8	1.4	2.7	2.0	1.9	1.8	1.8	1.4	2.0	1.0	1.0	9.0
5	1.7	1.4	2.6	2.0	1.9	1.8	1.9	1.35	1.6	1.0	1.0	4.0
6	1.7	1.5	2.3	2.3	2.3	1.75	2.0	1.35	1.4	.9	1.0	3.0
7	1.1	3.0	2.2	2.2	2.3	1.75	2.0	1.35	1.4	.9	1.0	3.0
8	1.2	9.5	2.2	2.2	2.2	1.7	1.9	1.6	1.35	.9	1.0	12.0
9	1.3	13.0	2.5	2.1	2.1	1.7	2.0	1.6	1.3	1.0	1.0	9.6
10	1.2	5.0	3.0	2.1	2.0	1.8	3.0	2.0	1.3	1.0	1.0	4.5
11	1.1	4.0	4.2	2.3	2.0	1.8	5.0	4.0	1.3	3.0	.9	2.5
12	14.5	4.0	3.2	2.5	1.9	1.7	5.5	3.0	6.0	1.8	.9	2.5
13	7.3	6.0	2.4	2.4	1.9	1.7	4.0	2.5	2.0	1.8	.9	2.5
14	4.2	4.0	2.3	2.3	1.85	1.7	2.0	2.0	1.5	1.8	.9	2.5
15	3.6	3.0	2.3	2.2	3.5	1.9	1.9	3.5	1.4	1.6	.9	2.5
16	3.1	3.0	2.2	2.0	5.5	1.8	1.9	3.0	1.3	1.4	.9	2.3
17	3.0	2.6	2.2	2.0	3.3	1.8	1.8	2.5	1.3	1.4	.9	2.2
18	2.8	2.6	2.1	1.95	2.5	1.7	1.8	2.4	1.2	1.4	.9	2.2
19	2.6	2.8	2.0	1.95	2.3	1.8	1.8	2.0	1.2	1.3	1.0	2.1
20	2.4	14.0	2.0	1.8	2.4	1.8	1.7	2.0	1.15	1.3	1.0	2.1
21	2.3	10.0	6.5	1.8	2.2	1.75	1.7	1.8	1.15	1.4	1.0	5.0
22	2.0	6.0	3.5	1.85	7.0	1.9	1.7	1.8	1.1	1.4	.9	4.0
23	1.8	4.0	3.0	1.9	4.0	1.9	1.8	1.7	1.05	1.3	.9	3.6
24	1.6	3.5	2.6	2.0	3.5	1.8	2.0	1.7	1.0	1.3	1.1	3.2
25	1.4	3.0	2.5	2.0	3.0	1.8	1.8	1.6	1.0	1.2	2.0	3.0
26	1.2	3.5	2.4	1.9	2.8	1.9	1.8	1.6	1.0	1.2	2.1	2.5
27	1.1	3.3	2.3	2.5	2.5	3.5	1.7	1.5	1.0	1.2	1.5	2.5
28	1.2	3.2	2.2	2.1	2.3	3.0	1.7	1.4	1.0	1.2	1.1	2.4
29	1.3	.....	2.2	2.0	2.3	2.0	1.6	1.4	1.0	1.3	1.1	2.4
30	1.3	.....	2.5	3.5	2.2	2.0	1.6	1.4	1.0	1.3	1.1	2.4
31	1.4	.....	2.5	.....	2.2	.....	1.5	1.4	.....	1.2	.....	2.4

Station rating table for Coosawattee River at Carters, Ga., from January 1 to December 31, 1905.

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	325	1.90	740	2.80	1,170	3.70	1,680
1.00	360	2.00	785	2.90	1,220	3.80	1,740
1.10	400	2.10	830	3.00	1,275	3.90	1,805
1.20	440	2.20	875	3.10	1,330	4.00	1,870
1.30	480	2.30	920	3.20	1,385	4.20	2,000
1.40	520	2.40	970	3.30	1,440	4.40	2,130
1.50	560	2.50	1,020	3.40	1,500	4.60	2,270
1.60	605	2.60	1,070	3.50	1,560	4.80	2,410
1.70	650	2.70	1,120	3.60	1,620	5.00	2,550
1.80	695						

The above table is based on discharge measurements made during 1902–1905. It is well defined between gage heights 0.9 foot and 4.5 feet. The table has been extended beyond these limits. Above gage height 5 feet the rating curve is a tangent, the difference being 72 per tenth.

Estimated monthly discharge of Coosawattee River at Carters, Ga., for 1905.

[Drainage area, 531 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	9,390	400	1,140	2.15	2.48
February	9,030	520	2,264	4.26	4.44
March	3,630	785	1,144	2.15	2.48
April	1,560	695	858	1.62	1.81
May	3,990	718	1,147	2.16	2.49
June	1,560	650	752	1.42	1.58
July	2,910	560	887	1.67	1.92
August	1,870	500	759	1.43	1.65
September	3,270	360	652	1.23	1.37
October	1,275	325	490	.923	1.06
November	830	325	394	.742	.828
December	12,050	400	2,026	3.82	4.40
The year	12,050	325	1,043	1.96	26.51

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 upstream from Ellijay, Ga., and 1½ miles northwest of 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 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 bowlders and is probably permanent, the water flowing in one channel.

Discharge measurements are made from the downstream side of the single 60-foot span wooden bridge. The bridge has an approach on the right bank of 24 feet and on the left bank of 26 feet. The initial point for soundings is the edge of the abutment on the right bank, downstream side.

The gage is a vertical 10-foot timber, fastened to the sill and downstream post of the 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. 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; elevation, 16.50 feet above the datum of the gage.

A description of this station and gage height and discharge data are contained in Water-Supply Paper of the United States Geological Survey No. 127, pp. 142–143 .

Discharge measurements of Cartecay River near Cartecay, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
April 19	O. P. Hall	55	69	2.42	1.20	167
June 22	do	56	82	2.80	1.45	230
October 16	do	55	69	1.99	1.07	137

Daily gage height, in feet, of Cartecay River near Cartecay, Ga., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.9	0.95	1.45	1.3	1.7	1.5	1.6	1.1	1.15	1.3	0.9	1.1
2	.95	.95	1.4	1.3	1.7	1.4	1.5	1.0	1.15	1.2	1.3	1.3
3	.95	.9	1.4	1.25	1.6	1.35	1.4	1.0	1.2	1.2	1.2	4.6
4	.95	.85	1.3	1.2	1.5	1.2	1.4	.95	1.25	1.7	1.2	3.2
5	.9	.9	1.35	1.6	1.45	1.2	1.35	.9	1.2	1.4	1.1	2.0
6	1.55	1.1	1.4	1.5	1.4	1.15	1.2	.9	1.2	1.3	1.1	1.8
7	1.2	1.1	1.45	1.3	1.4	1.1	1.2	.95	1.15	1.2	1.1	1.4
8	1.1	2.1	1.3	1.25	1.9	1.15	1.2	1.6	1.1	1.1	.95	1.3
9	1.1	2.9	1.3	1.2	1.6	1.1	1.15	1.9	1.15	1.0	.95	2.5
10	1.2	2.8	1.65	1.1	1.5	1.1	1.15	1.8	1.15	1.0	.9	2.0
11	1.2	1.6	1.3	1.1	1.35	1.1	1.2	1.6	1.2	1.0	.9	1.7
12	9.7	1.4	1.3	1.7	1.3	1.0	4.3	1.5	1.9	1.1	.85	1.6
13	2.5	2.8	1.25	1.4	1.3	1.0	3.6	1.5	1.4	1.1	.85	1.6
14	1.7	1.6	1.2	1.3	1.25	1.1	2.7	1.6	1.3	1.1	.9	1.6
15	1.6	1.5	1.2	1.35	1.3	1.1	2.1	1.6	1.2	1.0	.9	1.5
16	1.4	1.5	1.2	1.3	2.1	1.6	1.9	3.6	1.2	.9	.9	1.5
17	1.45	1.4	1.25	1.3	1.6	1.4	1.3	2.9	1.15	.9	.9	1.4
18	1.35	1.4	1.25	1.3	1.4	1.2	1.3	2.1	1.15	.95	1.0	1.4
19	1.3	1.35	1.2	1.25	1.4	1.2	1.25	1.6	1.1	1.0	1.7	1.4
20	1.2	6.5	1.6	1.25	1.3	1.2	1.25	1.5	1.1	1.0	1.5	2.0
21	1.2	3.6	2.6	1.25	1.3	1.6	1.2	1.4	1.1	.9	1.3	1.7
22	1.15	2.2	1.8	1.2	2.6	2.3	1.2	1.35	.9	1.1	1.1	1.7
23	1.15	1.9	1.6	1.2	1.8	1.9	1.2	1.3	.9	1.1	1.1	1.6
24	1.2	1.7	1.5	1.25	1.7	1.6	1.1	1.3	.9	1.1	1.1	1.5
25	1.1	1.7	1.5	1.2	1.6	1.5	1.1	1.25	.95	1.3	1.5	1.4
26	1.1	1.65	1.5	1.25	1.6	1.5	1.1	1.2	.95	1.2	1.4	1.4
27	1.0	1.65	1.4	1.5	1.5	1.4	1.2	1.2	.9	1.1	1.3	1.3
28	1.0	1.5	1.3	1.3	1.4	1.4	1.2	1.2	1.0	1.1	1.2	1.3
29	1.0	.....	1.3	1.9	1.4	1.3	1.15	1.15	1.0	1.1	1.4	1.25
30	1.15	.....	1.6	1.8	1.35	1.9	1.15	1.1	1.6	.9	1.2	1.2
31	1.1	.....	1.4	.....	1.6	.....	1.15	1.1	.....	.9	.....	1.2

Station rating table for Cartecay River near Cartecay, Ga., from July 1, 1904, to December 31, 1905.

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	80	1.20	158	1.50	249	1.80	366
.90	95	1.30	185	1.60	286	1.90	411
1.00	113	1.40	215	1.70	326	2.00	456
1.10	134						

The above table is based on eight discharge measurements made during 1904–5. It is well defined between gage heights 0.8 foot and 1.5 feet. As the highest measurement is at 1.5 feet the table has not been extended beyond 2 feet. For that reason no monthly estimates have been made. The table as given covers the low-water period.

ELLIJAY RIVER AT 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.

The channel is 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 conposed of rock, and the current ranges from very swift above the station to sluggish below.

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 the right bank, on the downstream side.

A gage staff, reading 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. The bench mark is a small nail and white paint mark in the downstream vertical post at the right bank; elevation, 7.00 feet above datum of the assumed gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 127, p 143.
Discharge: 27, p 45; 36, p 145; 43, p 209; 98, p 293; 127, p 144.

Discharge measurements of Ellijay River at Ellijay, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
April 18	O. P. Hall	70	85	1.71	1.70	145
June 21	do	72	90	1.73	1.78	156
October 16	do	69	70	1.63	1.42	114

MOUNTAINTOWN CREEK NEAR ELLIJAY, GA.

This station was established May 10, 1904, by O. P. Hall for the purpose of making a series of miscellaneous discharge measurements. 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 channel is straight for about 500 feet above and 100 feet below the station. 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 bridge consists of a single span of 54 feet, with short trestle approaches at either end. Discharge measurements are made either from the bridge, where the meter is lowered through holes in the floor, or at a foot log half a mile below the bridge. The initial point for soundings is the end of the trestle approach at the right bank.

Gage heights are determined directly from the bench mark, which 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; elevation, 7.00 feet above the datum of the assumed gage.

A description of this station and gage-height and discharge data are contained in Water-Supply Paper of the United States Geological Survey No. 127, page 144.

Discharge measurements of Mountaintown Creek near Ellijay, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
April 19	O. P. Hall	58	44	3.45	1.05	152
October 17	do	53	36	2.55	.93	92

TALKING ROCK CREEK NEAR CARTERS, GA.

This station was established May 26, 1904, by O. P. Hall for the purpose of making a series of miscellaneous discharge measurements. Numerous measurements of the creek had previously been made 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.

Both banks are high and will probably not overflow. There is one channel at all stages. The section is a good one.

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.

Gage heights are determined directly from the bench mark, which is a nail in a large elm tree on the left bank at R. L. Hill's boat landing; elevation, 7.50 feet above the datum of the assumed gage.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann = Annual Report; WS = Water-Supply Paper):

Description: WS 127, pp. 144–145.
Discharge: Ann 18, iv, p 97; 19 , iv, p 252; WS 27, p 45; 36, p 145; 49, p 209; 127, p 145.

Discharge measurements of Talking Rock Creek near Carters, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
June 6	O. P. Hall	33	36	3.97	1.59	143
September 28	do	40	42	1.21	1.16	51

BIG CEDAR CREEK NEAR CAVESPRING, GA.

This station was established in 1905 for the purpose of making a series of miscellaneous discharge measurements. It is located at the wagon bridge about 3 miles north of Cavespring, Ga., 1 mile below the Southern Railway bridge and half a mile below the mouth of Little Cedar Creek.

The channel is straight for about 200 feet above and 300 feet below the bridge. The right bank is low and will overflow to the extent of the 100-foot wooden approach. The left bank is high and will not overflow. The bed is of sand and mud, and is therefore probably shifting. The current is sluggish at low stages.

Measurements are made from the single iron span 91 feet long. The initial point for soundings is the end of the bridge at the left bank, upstream.

Gage heights are determined directly from the bench mark, which is the top of the upstream end of the second floor beam from the right-bank end of the bridge; elevation, 20.00 feet above the datum of the assumed gage.

A description of this station and discharge data are contained in Water-Supply Paper of the United States Geological Survey No. 127, page 176.

Discharge measurement of Big Cedar Creek near Cavespring, Ga., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
July 25	W. E. Hall	48	211	0.55	2.70	117

CHOCCOLOCCO CREEK NEAR JENIFER ALA.

The gage at this station was established August 20, 1902, by J. M. Giles. Measurements were first made by M. 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 channel is straight for 1,500 feet above and below the station, and has a width of 100 feet at low water. The right bank overflows at a gage height 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.

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.

The gage consists of a vertical timber fastened to a birch tree 20 feet upstream from the bridge on the left bank. It reads from 0.3 foot to 10 feet. The observer is W. J. Tolbert, who is paid by the Alabama Geological Survey.

Bench marks were established as follows: (1) The top of the upstream end of the second floor beam from the left bank; elevation, 22.91. feet. (2) A copper plug in the upstream wing of the left abutment; elevation, 14.19 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 98, p 144; 127, p 145.
Discharge: 98, p 145; 127, p 146.
Discharge, monthly: 98, p 146; 127, p 148.
Gage heights: 98, p 145; 127, p 147.
Rating table: 98, p 145; 127, p 147.

Discharge measurements of Choccolocco Creek near Jenifer, Ala., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
January 31	J. M. Giles	103	225	1.72	2.80	387
January 31	do	103	225	1.77	2.78	399
May 16	M. R. Hall	111	317	2.48	3.72	785
May 16	do	111	316	2.48	3.74	783
September 22	F. A. Murray	88	120	.73	1.76	88
December 18	W. E. Hall	103	224	1.83	2.83	409

Daily gage height, in feet, of Choccolocco Creek near Jenifer, Ala., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.0	2.6	2.7	2.5	2.2	2.5	2.45	2.0	1.9	1.9	1.8	1.9
2	1.95	2.5	2.65	2.4	2.2	2.4	2.8	2.0	1.9	1.95	1.8	1.85
3	1.95	2.4	2.6	2.4	2.3	2.4	2.6	2.0	2.0	1.9	1.8	4.7
4	1.9	2.4	2.6	2.4	2.2	2.35	2.3	1.9	1.9	1.85	1.6	5.0
5	1.9	2.4	2.5	2.4	2.2	2.3	2.2	1.9	1.9	1.8	1.8	4.0
6	1.9	3.5	2.5	2.5	2.2	2.2	2.1	1.9	1.85	1.75	1.8	2.7
7	2.0	3.6	2.5	2.55	2.2	2.2	2.3	1.9	1.9	1.75	1.7	2.5
8	2.1	4.2	2.4	2.5	2.25	2.2	2.3	1.9	1.9	1.8	1.8	2.4
9	2.0	6.8	2.6	2.4	2.2	2.2	2.25	2.1	1.9	1.75	1.7	3.6
10	2.0	7.5	3.4	2.4	2.2	2.15	2.2	2.2	1.9	1.8	1.75	4.6
11	2.0	5.7	3.1	2.4	2.2	2.1	2.9	2.3	1.85	2.0	1.8	4.0
12	5.7	4.2	2.8	2.6	2.1	2.1	3.5	2.1	2.4	2.1	1.9	3.0
13	7.5	5.1	2.75	2.55	2.1	2.1	3.2	3.3	2.0	2.0	1.9	2.7
14	7.1	5.0	2.6	2.45	2.1	2.1	2.3	2.6	1.95	1.8	1.85	2.6
15	3.9	4.3	2.6	2.4	2.1	2.1	2.3	2.5	1.9	1.8	1.8	2.6
16	3.1	3.6	2.5	2.4	3.6	2.5	2.3	2.6	1.85	1.8	1.75	3.1
17	2.8	3.4	2.45	2.4	2.7	2.3	2.2	2.9	1.85	1.9	1.75	3.0
18	2.7	3.2	2.4	2.35	3.0	2.2	2.1	2.4	1.8	1.9	1.75	2.8
19	2.6	3.2	2.4	2.3	2.6	2.2	2.1	2.3	1.8	1.9	1.8	2.6
20	2.6	3.3	2.8	2.3	2.45	2.65	2.3	2.2	1.8	1.85	1.8	2.8
21	2.5	4.3	5.1	2.3	2.6	2.6	2.1	2.2	1.8	1.8	1.8	4.6
22	2.4	4.6	5.4	2.3	2.55	2.3	2.1	2.1	1.8	1.8	1.8	4.8
23	2.4	3.8	4.0	2.3	3.0	2.3	2.1	2.0	1.8	1.8	1.8	5.0
24	2.3	3.5	2.35	2.3	3.1	2.35	2.1	2.1	1.8	1.8	1.8	4.1
25	2.5	3.2	2.1	2.2	3.5	2.7	2.0	2.0	1.75	1.8	1.8	3.8
26	2.2	3.1	2.9	2.2	3.6	2.35	2.0	2.0	1.8	1.8	1.85	3.3
27	2.2	2.9	2.8	2.25	3.5	2.35	2.0	2.0	1.7	1.7	1.9	3.1
28	2.1	2.8	2.6	2.2	3.3	2.3	2.0	2.0	1.65	1.8	1.9	2.9
29	2.1	.....	2.6	2.2	3.0	3.5	2.0	1.9	1.7	1.8	1.9	3.2
30	2.5	.....	2.6	2.2	2.7	2.5	2.2	1.9	1.8	1.8	1.9	3.2
31	2.7	.....	2.5	.....	2.6	.....	2.1	1.9	.....	1.8	.....	3.0

Station rating table for Choccolocco Creek near Jenifer, Ala., from January 1 to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.60	68	1.90	108	2.20	170	2.50	272
1.70	80	2.00	124	2.30	202	2.60	310
1.80	94	2.10	144	2.40	236	2.70	350

The above table is based on discharge measurements made during 1903–1905. It is well defined between gage heights 1.7 feet and 3.8 feet. Above gage height 2.7 feet the rating curve is a tangent, the difference being 42 per tenth.

Estimated monthly discharge of Choccolocco Creek near Jenifer, Ala., for 1905.

[Drainage area, 272 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	2,366	108	410	1.50	1.73
February	2,366	236	824	3.03	3.16
March	1,484	144	411	1.51	1.74
April	310	170	226	.831	.927
May	770	144	338	1.24	1.43
June	686	144	225	.827	.923
July	686	124	216	.794	.915
August	602	108	175	.643	.741
September	236	74	105	.386	.431
October	144	80	99.8	.367	.423
November	108	68	94.5	.347	.387
December	1,316	101	625	2.30	2.65
The year	2,366	68	312	1.15	15.46

TALLAPOOSA RIVER AT STURDEVANT, ALA.

This station was established July 19, 1900, by M. R. Hall. It is located at the Columbus and Western Railroad bridge, one-fourth mile west of Sturdevant. The station, being above the dams at Tallassee, is intended to replace the Milstead station. A map and profile of Tallapoosa River is published in the Twenty-second Annual Report of the United States Geological Survey, Part IV.

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.

At ordinary stages discharge measurements are made from a footway supported by the bracing of the lower chord of the bridge. At low stages measurements are made from a boat of 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.

The original gage was a staff in two sections. June 10, 1905, a standard chain gage was fastened to the lower chord on the downstream side of the second span of the bridge; length of the chain, 39.49 feet. The bottom of the gage box is 37.49 feet above the datum of the gage. Bench marks were established as follows: (1) A wire nail driven into the southwest corner of the second pier on the east bank; elevation, 14.20 feet. (2) 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, the rock projecting above the water at ordinary stages; elevation, 4.89 feet. (3) A white-paint mark on the downstream end of the lower crossbeam at a point 278 feet from the initial point for soundings; elevation, 37.65 feet. (4) A cross mark cut on the left side of the second stone pier from the left bank, 7 feet from the downstream corner and 6 feet above the ground; elevation, 15.00 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 48, p 167; 65, p 272; 83, p 137; 98, pp 136–137; 127, p 153.
Discharge: 48, p 167; 65, p 272; 83, p 137; 98, p 137; 127, p 154.

Discharge, monthly: 83, pp 138-139; 98, p 139; 127, p 156.
Gage heights: 48, p 167; 65, p 272; 83, pp 137-138; 98, pp 137-138; 127, p 155.
Rating tables: 83, p 138; 98, p 138; 127, p 155.

Discharge measurements of Tallapoosa River at Sturdevant, Ala., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
January 30	J. M. Giles	364	2,461	0.81	2.28	2,001
February 9	do	428	5,556	3.81	9.75	21,150
February 9	do	428	5,607	3.80	9.80	21,290
February 10	do	420	4,929	3.16	8.15	15,570
February 10	do	422	5,103	3.27	8.60	16,670
February 11	do	406	4,254	2.64	6.60	11,240
May 17	M. R. Hall	394	2,947	1.43	3.88	4,212
June 10	W. E. Hall	290	2,008	.46	1.39	932
September 23[a]	F. A. Murray	175	739	.52	.34	385
October 26	W. E. Hall	342	2,300	.80	2.33	1,838

[a] Measured from a boat one-fourth mile above bridge.

Daily gage height, in feet, of Tallapoosa River at Sturdevant, Ala., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.1	2.7	3.2	2.7	2.75	2.3	2.9	2.5	2.3	0.4	1.1	1.6
2	1.9	2.6	3.1	2.7	2.55	2.2	2.2	2.0	1.4	1.5	1.1	1.4
3	1.8	2.4	3.0	2.7	2.7	2.0	1.9	1.6	1.7	1.4	1.0	8.4
4	1.75	2.35	2.9	2.6	2.9	1.85	1.6	1.2	2.2	1.3	1.0	10.3
5	1.6	2.5	2.9	2.7	3.0	1.8	1.45	1.1	1.9	1.9	1.0	7.4
6	1.7	3.7	2.9	2.8	2.7	1.7	1.3	.9	1.49	1.3	.95	5.5
7	2.2	4.0	2.8	2.8	2.4	1.65	1.2	.8	1.2	1.1	.95	3.8
8	1.9	5.4	2.8	3.1	3.0	1.6	1.3	.7	1.1	.8	.9	3.4
9	1.7	9.5	3.3	3.3	3.5	1.5	1.8	1.6	.9	.75	1.0	8.4
10	2.1	8.8	3.8	3.1	3.1	1.4	2.0	1.5	.8	.9	1.2	8.2
11	1.9	6.6	3.9	3.6	2.7	1.4	2.45	3.0	.7	1.5	1.8	6.8
12	9.0	6.0	3.6	3.4	2.5	1.35	3.9	4.4	1.0	1.7	2.0	5.8
13	15.8	8.6	3.5	3.9	2.3	1.3	4.1	6.7	.9	1.4	2.0	3.6
14	10.5	7.7	3.4	3.8	2.1	1.8	3.2	4.0	.75	1.25	1.8	3.2
15	8.0	5.8	3.3	3.4	2.0	2.25	2.6	2.9	1.0	1.2	1.6	3.1
16	5.1	4.9	3.1	3.4	3.6	1.85	2.1	3.4	.9	1.4	1.45	3.3
17	3.8	4.3	3.0	3.2	3.9	1.7	1.65	7.5	.7	1.65	1.3	3.4
18	3.1	4.0	2.9	3.0	3.6	2.4	1.4	4.6	.6	1.6	1.2	3.3
19	3.0	3.9	2.8	2.85	2.9	2.4	1.3	3.7	.6	1.55	1.1	3.5
20	3.2	4.2	3.3	2.7	2.6	2.2	1.5	3.1	.5	1.4	1.1	4.6
21	3.0	4.8	6.4	2.65	2.6	2.3	1.2	2.6	.5	1.15	1.1	8.4
22	2.8	5.8	6.2	2.85	3.2	2.0	1.25	2.9	.45	1.0	1.0	7.7
23	2.7	4.9	5.1	2.8	3.6	1.8	1.1	2.4	.4	.9	1.1	6.1
24	2.5	4.3	4.0	2.8	3.4	2.2	1.0	2.2	.3	.8	1.1	5.4
25	2.4	4.0	3.6	2.65	3.6	1.8	1.95	2.0	.25	.9	1.2	4.6
26	2.2	3.7	3.4	2.55	4.0	2.0	1.7	2.2	.2	2.4	1.2	4.0
27	2.1	3.4	3.2	2.55	3.5	2.2	1.4	2.1	.1	1.8	1.3	3.6
28	2.1	3.3	3.1	2.5	3.4	3.0	1.35	2.3	.1	1.7	1.25	3.4
29	2.0	.....	3.0	2.6	2.9	2.5	2.65	1.8	.1	1.6	1.4	3.6
30	2.2	.....	2.9	3.0	2.75	2.3	2.2	1.7	.2	1.4	1.85	3.5
31	2.5	.....	2.8	.....	2.4	.....	2.1	2.2	.....	1.2	.....	3.3

Station rating table for Tallapoosa River at Sturdevant, Ala., from January 1 to December 31, 1905.

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	296	1.50	1,020	2.90	2,580	4.60	5,770
.20	334	1.60	1,100	3.00	2,730	4.80	6,250
.30	374	1.70	1,180	3.10	2,880	5.00	6,760
.40	416	1.80	1,270	3.20	3,030	5.20	7,280
.50	460	1.90	1,360	3.30	3,190	5.40	7,800
.60	506	2.00	1,460	3.40	3,350	5.60	8,330
.70	554	2.10	1,560	3.50	3,520	5.80	8,880
.80	604	2.20	1,670	3.60	3,690	6.00	9,440
.90	656	2.30	1,790	3.70	3,870	6.20	10,000
1.00	710	2.40	1,910	3.80	4,060	6.40	10,560
1.10	766	2.50	2,040	3.90	4,250	6.60	11,140
1.20	824	2.60	2,170	4.00	4,450	6.80	11,740
1.30	885	2.70	2,300	4.20	4,870	7.00	12,350
1.40	950	2.80	2,440	4.40	5,310		

The above table is based on discharge measurements made during 1904-5. It is well defined between gage heights 0.4 foot and 10 feet. Above gage height 7 feet the rating curve is a tangent, the difference being 320 per tenth.

Estimated monthly discharge of Tallapoosa River at Sturdevant, Ala., for 1905.

[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	40,510	1,100	4,977	1.99	2.29
February	20,350	1,850	6,897	2.76	2.87
March	10,560	2,440	3,647	1.46	1.68
April	4,250	2,040	2,694	1.08	1.20
May	4,450	1,460	2,744	1.10	1.27
June	2,730	885	1,459	.584	.652
July	4,660	710	1,540	.616	.710
August	13,950	554	2,754	1.10	1.27
September	1,790	296	677	.271	.302
October	1,910	416	929	.372	.429
November	1,460	656	889	.356	.397
December	22,910	950	7,411	2.96	3.41
The year	40,510	296	3,052	1.22	16.48

CAHABA RIVER AT CENTERVILLE, ALA.

This station was established 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 channel is straight for 1,500 feet above the station and 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, broken by the piers of the bridge.

Discharge measurements are made from the single-span highway bridge supported by

tubular iron piers. The initial point for soundings is the end of the bridge on the left bank, downstream side.

The original chain gage was fastened to the timber railing along the downstream side of the bridge, about 100 feet from the initial point for soundings. July 12, 1905, a standard chain gage was fastened to the downstream side of the fourth panel from the left-bank end of the bridge; length of the chain, 48.87 feet. The bottom of the gage box at the pulley is 46.87 feet above the datum of the gage. The datum is the same as that of the original gage. The observer is W. C. Edwards, who is paid by the Alabama Geological Survey. Bench marks were established as follows: (1) The downstream end of the fourth floor beam from the right bank; elevation, 42.85 feet. (2) A chisel cut on the downstream side of the downstream pier at the left bank; elevation, 10.00 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 65, p 283; 83, p 129; 98, p 129; 127, pp 157–158.
Discharge: 65, p 283; 83, p 129; 98, p 129; 127, p 158.
Discharge, monthly: 83, p 130; 98, p 131; 127, p 160.
Gage heights: 65, p 283; 83, p 129; 98, p 130; 127, p 159.
Rating tables: 83, p 130; 98, p 130; 127, p 159.

Discharge measurements of Cahaba River at Centerville, Ala., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
February 20	J. M. Giles	182	1,642	2.36	8.85	3,882
February 21	do	202	2,274	2.23	12.15	5,204
February 21	do	202	2,352	2.14	12.25	5,082
February 24	do	173	1,399	2.03	7.36	2,842
February 25	do	172	1,297	1.93	6.77	2,504
February 25	do	172	1,274	1.91	6.70	2,431
June 27	W. E. Hall	120	289	1.38	1.90	398
June 28	do	120	281	1.38	1.82	388
June 28	do	120	281	1.40	1.82	393
July 11	do	155	701	1.84	4.44	1,287

Daily gage height, in feet, of Cahaba River at Centerville, Ala., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.2	6.7	4.4	3.4	6.2	4.0	4.2	2.4	1.8	1.3	1.1	1.3
2	2.1	5.4	4.3	3.3	5.3	3.8	3.9	2.1	1.6	1.2	1.0	1.4
3	2.0	4.6	4.0	3.1	4.7	3.2	3.5	1.8	1.8	1.2	1.2	11.9
4	1.9	4.8	3.7	3.0	4.2	2.5	2.6	1.6	1.9	1.2	1.1	7.1
5	1.8	7.0	3.6	4.4	3.7	2.4	2.3	1.5	2.3	1.2	1.2	4.0
6	1.9	16.5	3.4	4.4	3.4	2.3	2.0	1.3	2.2	1.3	1.3	2.6
7	2.0	15.9	3.3	4.0	4.0	2.2	2.5	1.3	1.8	1.2	1.3	2.6
8	2.0	17.3	3.2	4.8	7.7	2.0	2.1	1.3	1.7	1.3	1.2	2.5
9	2.0	25.9	3.4	11.5	9.4	2.0	2.0	1.4	1.6	1.2	1.2	2.5
10	2.0	23.9	4.6	6.7	5.3	1.9	2.3	1.6	1.4	2.0	1.3	2.4
11	1.9	19.3	4.0	5.0	4.0	1.8	4.5	2.4	1.4	2.6	1.7	2.2
12	25.5	13.6	3.5	5.0	3.4	1.8	5.8	3.1	1.8	2.1	1.6	2.1
13	24.2	22.8	3.3	4.3	3.1	1.8	4.6	2.8	1.5	1.7	1.3	2.1
14	21.3	19.5	3.0	3.9	2.8	1.8	3.0	3.1	1.5	1.6	1.4	2.1
15	11.0	15.6	2.9	4.1	2.9	3.2	2.5	3.0	1.4	1.6	1.5	3.1
16	7.0	11.2	2.8	5.2	9.5	2.0	2.1	1.9	1.3	1.6	1.4	3.9
17	5.5	9.1	2.8	4.3	7.2	2.5	1.9	3.7	1.3	1.7	1.3	3.8
18	4.7	7.3	2.7	3.8	5.4	1.9	1.8	4.6	1.3	1.5	1.2	3.5
19	4.3	6.5	2.6	3.5	4.4	2.0	1.6	2.8	1.3	1.5	1.2	3.2
20	4.2	7.5	6.6	3.3	3.6	1.9	1.6	4.8	1.7	1.4	1.4	3.5
21	3.9	12.2	20.4	3.2	5.8	2.0	1.5	4.6	1.5	1.3	1.3	6.5
22	3.5	12.5	14.7	4.2	10.3	1.8	1.6	3.5	1.3	1.2	1.3	7.5
23	3.2	9.6	11.5	3.7	12.0	1.7	3.3	3.4	1.2	1.2	1.3	7.9
24	3.0	7.5	8.3	3.3	12.2	1.8	2.5	3.0	1.1	1.1	1.3	10.5
25	2.8	6.7	6.7	3.1	8.8	1.7	3.3	3.1	1.1	1.3	1.4	8.5
26	2.6	5.9	5.4	5.1	6.6	1.6	2.7	3.7	1.2	1.9	1.4	6.4
27	2.4	5.3	4.7	5.5	5.7	2.0	2.3	4.1	1.2	1.6	1.3	4.8
28	2.3	4.6	4.5	6.7	5.2	1.8	1.8	3.0	1.2	1.4	1.3	4.5
29	2.6	.....	4.3	6.7	4.4	2.2	1.7	2.4	1.2	1.3	1.4	6.3
30	6.5	.....	4.0	6.5	3.8	4.4	1.8	2.1	1.3	1.2	1.5	5.4
31	8.5	.....	3.7	.....	3.8	.....	2.5	1.9	.....	1.2	.....	4.6

Station rating table for Cahaba River at Centerville, Ala., from January 1 to December 31, 1905.

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	160	2.30	519	3.60	957	4.90	1,491
1.10	185	2.40	549	3.70	995	5.00	1,540
1.20	211	2.50	580	3.80	1,033	5.20	1,640
1.30	237	2.60	611	3.90	1,071	5.40	1,740
1.40	263	2.70	643	4.00	1,110	5.60	1,842
1.50	290	2.80	675	4.10	1,149	5.80	1,946
1.60	317	2.90	707	4.20	1,189	6.00	2,050
1.70	345	3.00	740	4.30	1,229	6.20	2,158
1.80	373	3.10	775	4.40	1,269	6.40	2,266
1.90	401	3.20	811	4.50	1,310	6.60	2,374
2.00	430	3.30	847	4.60	1,352	6.80	2,482
2.10	459	3.40	883	4.70	1,397	7.00	2,590
2.20	489	3.50	920	4.80	1,442		

The above table is based on discharge measurements made during 1903–1905. It is well defined between gage heights 1 foot and 7 feet. Above gage height 7 feet the rating curve is a tanget, the difference being 55 per tenth.

Estimated monthly discharge of Cahaba River at Centerville, Ala., for 1905.

[Drainage area, 1,040 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	12,760	373	2,102	2.02	2.33
February	12,980	1,352	5,129	4.93	5.13
March	9,960	611	1,774	1.71	1.97
April	5,065	740	1,440	1.38	1.54
May	5,450	675	2,024	1.95	2.25
June	1,269	317	521	.501	.559
July	1,946	290	653	.628	.724
August	1,442	237	665	.639	.737
September	519	185	291	.280	.312
October	611	185	280	.269	.310
November	345	160	241	.232	.259
December	5,285	237	1,496	1.44	1.66
The year	12,980	160	1,385	1.33	17.78

TOMBIGBEE RIVER AT COLUMBUS, MISS.

This station is located at the county highway bridge at the south end of Main street in the city of Columbus, Miss.

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 only under the bridge approach at a gage height of 18 to 22 feet. The bed of the stream is of soft limestone or chalk. 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.

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

Prior to 1905 the records of the United States Weather Bureau gage were used. This gage is located about 1,000 feet below the bridge and 1 mile from the Southern Railway station. It is a vertical timber set in a cross cut in the nearly vertical bluff on the left bank. July 13, 1905, a standard chain gage was attached to the upstream lower chord, 30 feet to the right of the center of the draw span of the bridge; length of chain, 48.01 feet. The bottom of the gage box is 41.01 feet above gage datum. The new gage was set to accord with bench mark No. 1 on the bridge, the elevation of which is 39.85 feet above datum. This bench mark was established several years ago by measuring down to the water surface and reading the height of the water on the vertical gage at the same time. It has been used for determining the gage height for most of the discharge measurements, as the position of the vertical gage makes it difficult to read accurately at low stages. The new gage will therefore read with the vertical gage at low and ordinary stages. The gage is read by C. R. Shackelford, the bridge watchman. Bench marks were established as follows: (1) The top of the downstream girder at a point 250 feet from the initial point for soundings; elevation, 39.85 feet. This point is on the movable portion of the drawbridge and may vary in elevation. (2) A copper plug in a tree at the southeast corner of First street and Second avenue; elevation, 18.04 feet. (3) The top of the rail at the depot of the Southern Railway; elevation, 55.20 feet. Elevations refer to the datum of the gage. Bench mark No. 3 is 191 feet above sea level.

Information in regard to this station is contained in the following Water-Supply Papers of United States Geological Survey:

Description: 48, pp 174–175; 65, p 285; 83, p 161; 98, pp 166–167; 127, pp 160–161.
Discharge: 65, p 285; 83, p 162; 98, p 167; 127, p 161.
Discharge, monthly: 75, p 97; 83, p 163; 98, p 169; 127, p 163.
Gage heights: 48, p 175; 65, p 285; 83, p 162; 98, pp 167–168; 127, p 162.
Rating tables: 65, p 323; 83, p 163; 98, p 168; 127, p 162.

Discharge measurements of Tombigbee River at Columbus, Miss., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
February 15	J. M. Giles	409	7,440	4.28	20.32	31,880
February 15	do	389	7,295	4.23	20.05	30,890
February 18	do	305	5,172	3.76	13.70	19,430
June 22	W. E. Hall	115	1,210	1.49	− .82	1,808
July 13	do	182	1,522	2.23	1.11	3,403
November 23	do	101	1,068	.92	− 2.00	987

Daily gage height, in feet, of Tombigbee River at Columbus, Miss., for 1905.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	−0.0	−0.9	−2.7	−1.9	−2.2
2	.....	−1.1	−2.0	−2.9	−2.2	−2.0
3	.....	−1.45	−1.9	− .9	−2.3	−1.3
4	.....	−1.45	−2.1	− .2	−2.4	− .4
5	.....	−1.5	−1.8	−1.0	−2.5	− .0
6	.....	−1.95	−2.0	−1.2	−2.4	.4
7	.....	−2.4	−2.2	−1.0	−2.4	.4
8	.....	−2.25	−2.05	−1.4	−2.3	.0
9	.....	−1.8	−2.0	−2.1	−2.4	− .4
10	.....	−1.55	−2.9	−1.9	−2.1	− .9
11	.....	4.9	−2.7	−1.4	.7	−1.1
12	.....	5.7	−2.1	− .9	.7	−1.2
13	1.1	4.7	−2.0	−1.0	.8	−1.1
14	.95	4.6	−1.6	− .7	.9	−1.0
15	− .3	3.3	−1.7	− .7	.6	4.8
16	−1.25	3.1	−1.7	1.9	− .2	6.8
17	−1.9	3.3	−1.9	1.3	− .9	6.0
18	−2.2	3.2	−2.3	.6	−1.4	5.9
19	−2.5	2.55	−2.6	.2	−1.6	5.9
20	−2.65	1.3	−2.4	− .6	−1.7	5.9
21	−2.8	3.5	−1.5	−1.6	−1.9	7.1
22	−2.95	.7	−2.4	−2.1	−2.0	7.0
23	−3.0	.4	−2.6	−2.3	−2.0	6.4
24	−2.95	− .05	−2.7	−2.4	−2.0	7.1
25	−2.05	− .25	−2.6	−2.5	−2.0	6.8
26	−2.3	1.75	−2.6	−1.6	−2.1	6.5
27	−2.4	2.2	−2.9	−1.8	−2.2	6.0
28	−2.15	1.9	−3.0	−1.9	−2.3	5.0
29	−2.05	.8	−3.1	−1.4	−2.3	4.8
30	−2.55	− .7	−3.2	−1.6	−2.2	4.1
31	−2.15	−1.5	.....	−1.8	.....	3.5

Station-rating table for Tombigbee River at Columbus, Miss., from July 13 to December 31, 1905.

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	360	−1.40	1,375	0.40	2,800	3.40	5,830
−3.10	405	−1.30	1,440	.50	2,890	3.60	6,060
−3.00	450	−1.20	1,510	.60	2,980	3.80	6,300
−2.90	500	−1.10	1,580	.70	3,070	4.00	6,540
−2.80	550	−1.00	1,650	.80	3,160	4.20	6,780
−2.70	605	− .90	1,725	.90	3,250	4.40	7,020
−2.60	660	− .80	1,800	1.00	3,340	4.60	7,270
−2.50	715	− .70	1,880	1.20	3,540	4.80	7,530
−2.40	770	− .60	1,960	1.40	3,740	5.00	7,790
−2.30	825	− .50	2,040	1.60	3,940	5.20	8,050
−2.20	880	− .40	2,120	1.80	4,140	5.40	8,310
−2.10	940	− .30	2,200	2.00	4,340	5.60	8,570
−2.00	1,000	− .20	2,280	2.20	4,540	5.80	8,830
−1.90	1,060	− .10	2,360	2.40	4,740	6.00	9,090
−1.80	1,120	.00	2,440	2.60	4,950	6.50	9,740
−1.70	1,180	.10	2,530	2.80	5,170	7.00	10,440
−1.60	1,245	.20	2,620	3.00	5,390	7.50	11,140
−1.50	1,310	.30	2,710	3.20	5,610		

The above table is based on discharge measurements made during 1904–5. It is well defined between gage heights −2 feet and +2 feet. The table has been extended above 2 feet, being based on the general direction of the 1904 curve.

Estimated monthly discharge of Tombigbee River at Columbus, Miss., for 1905.

[Drainage area, 4,440 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
July 13–31	3,440	450	1,142	0.257	0.182
August	8,700	770	3,576	.805	.928
September	1,725	360	868	.195	.218
October	4,240	500	1,578	.355	.409
November	3,250	715	1,369	.308	.344
December	10,580	880	5,738	1.29	1.49

TOMBIGBEE RIVER AT EPES, ALA.

This station was established November 29, 1904, by M. R. Hall. It is located at the bridge of the Alabama Great Southern Railway, one-half mile from Epes, Ala. The river at this point is navigable.

The channel is straight for 400 feet above and 1,000 feet below the station. The current is swift. The right bank is a high stone bluff, clean, and not subject to overflow. The left bank is a high earth bank, which begins to overflow at gage height 38 feet. In floods it overflows for seven-eighths of a mile under the trestle. The bed of the stream is composed of soft blue stone, free from vegetation, and permanent. There is but one channel, broken by piers, until the left bank overflows. The depth of the stream is about 9 feet at low water.

Discharge measurements are made from the downstream side of the bridge, consisting of stationary span and draw span, with a trestle approach seven-eighths of a mile long at

the left bank. The initial point for soundings is the end of the draw span at the right bank, downstream side.

A standard chain gage is fastened to the downstream chord of the bridge, 150 feet from the right bank; length of the chain, 68.72 feet. A gage, graduated from 3.5 to 59 feet, is painted on the brick center pier. The chain gage is set to accord with the pier gage at 20 feet, the graduations of the latter not being accurate. The bench mark is the downstream end of the third crossbeam from the right end of the bridge; elevation, 65.65 feet above the datum of the gage.

Information in regard to a station formerly maintained at this point is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 48, pp 175–176; 65, p 286.
Discharge: 65, p 286.
Discharge, monthly: 75, p 98.
Gage heights: 48, p 176; 65, p 286.
Hydrograph: 75, p 98.
Rating table: 65, p 323.

Discharge measurements of Tombigbee River at Epes, Ala.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1904.		*Feet.*	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
November 29..	M. R. Hall	102	699	1.39	0.95	969
1905.						
February 22....	J. M. Giles	576	12,500	3.57	43.0	44,630
February 23....	.....do	576	11,860	3.45	42.3	40,960
February 23....	.....do	576	12,150	3.51	42.4	42,580
May 19.....	M. R. Hall	180	1,687	3.05	6.43	5,149
June 26.....	W. E. Hall	173	1,587	3.14	5.69	4,976
December 22...	.....do	250	3,630	4.15	15.57	15,070

Daily gage height, in feet, of Tombigbee River at Epes, Ala., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.0	15.5	39.6	7.2	16.6	5.7	5.9	2.9	4.4	1.3	2.8	2.2
2	8.5	15.0	37.8	6.8	18.8	5.3	7.8	4.0	3.2	2.45	2.55	2.2
3	8.0	15.3	34.7	6.4	18.8	4.4	8.8	5.6	2.75	2.4	2.35	2.25
4	7.5	15.7	28.5	6.2	17.6	3.6	8.6	4.6	3.0	1.95	2.25	2.35
5	6.5	21.5	22.0	7.8	16.4	3.2	8.8	4.1	2.6	4.7	2.05	3.6
6	6.0	26.5	14.7	10.2	15.0	2.85	9.2	3.7	2.6	4.0	1.9	4.4
7	5.5	28.5	11.2	11.5	12.7	2.6	8.5	3.15	2.6	3.5	1.9	4.8
8	5.5	38.3	9.2	11.4	13.6	2.35	7.8	3.05	2.8	3.3	1.8	4.9
9	5.5	39.9	8.8	11.1	16.6	2.3	7.1	2.8	2.8	3.3	1.8	4.7
10	7.5	41.5	14.4	10.8	18.1	2.65	6.1	2.85	2.4	2.9	1.8	4.3
11	19.5	42.6	18.0	11.0	18.1	2.4	5.7	3.4	2.0	2.8	2.25	3.95
12	24.0	43.6	18.6	14.4	17.6	2.05	7.7	8.2	2.0	3.9	3.85	3.65
13	26.5	44.7	18.8	16.7	17.1	2.0	8.1	12.6	2.7	4.3	5.4	3.45
14	27.0	45.2	19.8	16.2	15.8	2.4	7.0	13.1	4.5	4.3	5.5	3.45
15	26.5	45.5	20.6	15.2	13.5	2.9	6.2	12.0	3.25	4.2	5.6	4.5
16	25.9	45.6	20.8	15.2	9.6	2.1	5.0	10.8	3.2	4.3	5.6	9.8
17	25.0	45.5	18.7	14.0	7.7	2.0	4.1	9.9	3.05	6.6	4.8	13.6
18	24.5	45.5	15.1	12.2	6.9	3.35	3.15	10.6	2.85	6.8	4.0	13.7
19	24.0	44.9	12.0	10.8	6.6	4.3	2.8	10.6	2.5	5.9	3.45	11.9
20	22.0	44.2	12.1	10.0	5.9	4.2	2.5	10.2	2.15	5.4	3.1	12.3
21	15.5	43.5	16.3	9.2	5.6	4.2	1.95	8.6	1.9	4.8	2.85	14.0
22	13.0	42.9	19.6	10.0	5.9	3.85	1.65	6.9	2.6	3.65	2.75	15.6
23	10.5	42.2	22.8	10.5	8.4	3.8	1.6	6.4	2.6	2.8	2.55	15.7
24	9.5	41.5	22.4	10.2	9.3	4.2	1.7	6.2	2.2	2.4	2.5	15.4
25	8.5	41.0	21.5	12.2	7.9	5.0	1.65	6.1	2.0	2.2	2.4	15.1
26	6.5	40.5	19.2	16.6	10.5	5.8	2.2	6.9	1.85	2.0	2.4	14.6
27	6.1	40.2	17.2	15.0	13.9	6.6	2.5	7.6	1.65	1.85	2.25	13.8
28	6.5	40.0	14.6	12.6	11.8	6.9	2.6	8.8	1.6	2.25	2.2	13.8
29	10.0	.....	11.2	11.8	8.2	6.0	2.6	8.4	1.5	2.5	2.2	13.6
30	13.5	.....	9.3	12.6	6.8	6.2	3.3	7.5	1.3	2.7	2.2	12.7
31	14.5	.....	8.0	.....	6.7	.....	3.25	6.2	.....	3.0	.....	11.8

Station-rating table for Tombigbee River at Epes, Ala., from January 1 to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.30	1,195	2.40	1,855	3.50	2,690	4.60	3,680
1.40	1,250	2.50	1,925	3.60	2,780	4.70	3,775
1.50	1,305	2.60	1,995	3.70	2,870	4.80	3,870
1.60	1,360	2.70	2,065	3.80	2,960	4.90	3,965
1.70	1,420	2.80	2,140	3.90	3,050	5.00	4,060
1.80	1,480	2.90	2,215	4.00	3,140	5.20	4,250
1.90	1,540	3.00	2,290	4.10	3,230	5.40	4,450
2.00	1,600	3.10	2,370	4.20	3,320	5.60	4,652
2.10	1,660	3.20	2,450	4.30	3,410	5.80	4,856
2.20	1,725	3.30	2,530	4.40	3,500	6.00	5,060
2.30	1,790	3.40	2,610	4.50	3,590		

The above table is based on seven discharge measurements made during 1904-5. It is fairly well defined between gage heights 1.8 feet and 15 feet. Above gage height 6 feet the rating curve is a tangent, the difference being 104 per tenth.

Estimated monthly discharge of Tombigbee River at Epes, Ala., for 1905.

[Drainage area, 8,830 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	26,900	4,550	13,190	1.49	1.72
February	46,240	14,420	37,330	4.23	4.40
March	40,000	7,140	18,190	2.06	2.38
April	16,190	5,268	10,810	1.22	1.36
May	18,370	4,652	11,500	1.30	1.50
June	5,996	1,600	3,096	.351	.392
July	8,388	1,360	4,313	.488	.563
August	12,440	2,140	6,212	.704	.812
September	3,590	1,195	2,000	.226	.252
October	5,892	1,195	2,796	.317	.364
November	4,652	1,480	2,358	.267	.298
December	15,150	1,725	8,076	.915	1.05
The year	46,240	1,195	9,989	1.13	15.09

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 Mulberry and Sipsey forks and about three-fourths mile from Cordova, Ala. The gage was established by the United States Weather Bureau.

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.

Discharge measurements are made from the downstream side of the three-span railway bridge. The two spans across the river have a total length of 300 feet; the span on the left bank is 150 feet long. At low stages measurements are made from a boat or by wading at a point some distance below the bridge.

From 12 to 55 feet the gage is a vertical timber fastened 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, May 21, 1900, so a section reading from −1.5 feet to +12.5 feet was fastened to a willow tree on the right bank of the river about 200 feet below the bridge. During 1905 this lower section of the gage was replaced by a section fastened to the rock on the right bank just below the bridge. Bench marks were established as follows: (1) The top of the fourth crossbeam from the right bank, on the downstream side; elevation, 60.09 feet. (2) A copper plug in the solid rock about 110 feet above the bridge, 50 feet from the initial point for soundings; elevation, 32.12 feet. (3) The top of the pier at the left bank; elevation, 55.10 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 48, p 171; 83, p 156; 98, p 161; 127, pp 163-164.
Discharge: 48, p 171; 83, p 157; 98, p 162; 127, p 164.
Discharge, monthly: 98, p 163; 127, p 166.
Gage heights: 48, p 172; 83, p 157; 98, p 162; 127, p 165.
Rating table: 65, p 323; 83, p 158; 98, p 163; 127, p 166.

Discharge measurements of Black Warrior River near Cordova, Ala., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
January 25	J. M. Giles	174	1,378	1.73	1.90	2,389
January 27	do	173	1,257	1.21	1.25	1,516
February 14	do	214	2,867	3.78	8.75	10,850
February 14	do	214	2,849	3.80	8.65	10,830
February 18	do	192	2,037	2.80	4.70	5,700
June 14	F. A. Murray	162	908	.43	— .27	389
August 9 [a]	B. S. Drane	183	572	.44	— .46	252
September 27 [b]	F. A. Murray	178	557	.60	— .26	336

[a] Measured from boat one-fourth mile below Frisco bridge.
[b] Measured from boat one-fourth mile above Frisco bridge.

Daily gage height, in feet, of Black Warrior River near Cordova, Ala., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.7	4.2	3.5	1.3	5.3	1.1	2.4	+0.2	0.8	−0.4	0.6	0.5
2	1.5	3.6	3.1	1.2	4.0	.8	2.0	.0	1.8	— .45	.5	.4
3	1.3	3.1	2.7	1.1	3.2	.6	1.8	— .1	7.0	— .6	.4	1.2
4	.9	2.7	2.5	1.0	2.7	.4	1.5	— .2	8.2	— .55	.4	2.7
5	.3	2.9	2.2	1.2	2.3	.3	1.2	— .3	4.0	— .5	.4	2.7
6	.4	14.3	2.0	1.3	1.9	.1	1.0	— .4	2.3	— .15	.4	2.0
7	1.5	14.2	1.9	1.4	3.8	.1	.8	— .4	2.6	.0	.4	1.5
8	1.6	13.9	1.8	1.3	7.7	.0	.6	— .5	1.0	— .15	.3	1.4
9	1.3	28.9	2.2	1.1	5.3	.0	.4	— .5	.9	— .3	.3	2.7
10	1.6	30.0	16.4	1.0	3.9	.0	.2	— .4	.6	— .45	.4	2.8
11	3.5	20.0	10.0	.9	3.1	.0	1.3	— .2	.5	.6	1.5	2.4
12	14.9	12.0	6.8	.8	2.4	— .1	.7	2.5	.5	3.6	1.5	2.0
13	19.3	10.0	5.2	.8	2.9	— .2	.5	1.0	1.0	1.9	1.3	1.9
14	12.9	8.8	4.2	.8	2.6	— .3	.3	1.7	1.5	.0	1.0	1.6
15	6.4	7.0	3.4	.8	1.8	— .3	.1	1.1	1.0	.6	.9	2.4
16	6.0	6.8	2.9	.9	2.3	.0	— .3	1.8	.5	1.2	.7	7.0
17	4.4	5.0	2.5	1.0	2.5	.0	— .3	2.3	.3	2.3	.6	6.8
18	3.2	4.8	2.3	.9	1.8	.0	— .4	3.0	.0	1.5	.5	5.5
19	2.5	4.3	2.1	.7	1.3	.0	— .5	1.6	.0	1.1	.4	3.7
20	2.7	6.8	2.4	.6	1.0	.0	— .6	3.6	.0	.8	.5	3.2
21	3.3	26.5	4.6	.6	1.0	.0	— .7	2.6	.1	.6	.5	5.7
22	2.9	22.8	5.5	1.1	2.2	.0	— .8	1.6	.5	.4	.4	7.3
23	2.3	13.2	4.5	1.3	3.7	.0	— .8	1.1	.3	.4	.5	6.6
24	2.1	9.1	3.8	1.0	3.9	.1	— .8	1.0	.0	.4	.6	7.4
25	2.0	6.9	3.3	.8	3.9	.1	+ .4	2.5	— .1	.7	.6	6.8
26	1.6	5.5	2.9	1.5	3.0	.1	+ .9	7.5	— .3	1.0	.3	5.7
27	1.3	4.6	2.5	3.6	9.5	.2	+ .6	4.0	— .3	1.8	.3	4.2
28	1.2	4.0	2.2	3.5	4.1	.3	+ .2	2.0	— .35	.7	.3	3.7
29	1.2	.....	2.0	2.5	2.5	3.3	— .2	1.3	— .35	.7	.3	4.6
30	3.6	.....	1.8	4.3	1.9	3.3	.0	1.0	— .35	.7	.5	4.0
31	5.1	.....	1.5	.....	1.4	.....	.4	1.0	.....	.7	.....	4.4

NOTE.—These gage heights are somewhat uncertain.

Station rating table for Black Warrior River near Cordova, Ala., from January 1 to December 31, 1905.

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	.90	1,360	2.70	3,175	5.00	6,080
− .90	53	1.00	1,450	2.80	3,290	5.20	6,340
− .80	80	1.10	1,540	2.90	3,405	5.40	6,600
− .70	110	1.20	1,630	3.00	3,525	5.60	6,870
− .60	145	1.30	1,725	3.10	3,645	5.80	7,150
− .50	190	1.40	1,820	3.20	3,765	6.00	7,430
− .40	250	1.50	1,915	3.30	3,885	6.20	7,710
− .30	320	1.60	2,010	3.40	4,005	6.40	7,990
− .20	400	1.70	2,110	3.50	4,130	6.60	8,270
− .10	480	1.80	2,210	3.60	4,260	6.80	8,550
0.00	560	1.90	2,310	3.70	4,390	7.00	8,830
.10	645	2.00	2,410	3 80	4,520	7.20	9,110
.20	730	2.10	2,510	3 90	4,650	7.40	9,390
.30	820	2.20	2,615	4.00	4,780	7.60	9,670
.40	910	2.30	2,720	4.20	5,040	7.80	9,950
.50	1,000	2.40	2,830	4.40	5,300	8.00	10,230
.60	1,090	2.50	2,945	4.60	5,560	8.50	10,930
.70	1,180	2.60	3,060	4.80	5,820	9.00	11,650
.80	1,270						

The above table is based on discharge measurements made during 1900–1905. It is well defined to 14 feet. Above gage height 8.8 feet the rating curve is a tangent, the difference being 150 per tenth. Below gage height 2.6 feet the table is the same as for 1904.

Estimated monthly discharge of Black Warrior River near Cordova, Ala., for 1905.

[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	27,100	820	4,798	2.53	2.92
February	43,150	3,175	14,280	7.52	7.83
March	22,750	1,915	4,559	2.40	2.77
April	5,170	1,090	1,820	.958	1.07
May	12,400	1,450	3,889	2.05	2.36
June	3,885	320	880	.463	.517
July	2,830	80	957	.504	.581
August	9,530	190	1,908	1.00	1.15
September	10,510	285	1,753	.923	1.03
October	4,260	145	1,120	.589	.679
November	1,915	820	1,070	.563	.628
December	9,390	910	4,571	2.41	2.78
The year	43,150	80	3,468	1.83	24.32

NOTE.—See note to gage-height table, p. 143.

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 mile above the Mobile and Ohio Railroad bridge. There are three locks and dams within a distance of 3 miles above the station.

The channel is straight for a long distance 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.

Discharge measurements are made from the iron highway bridge. The initial point for soundings is the end of the iron bridge on the left bank, downstream side.

A vertical iron gage is attached to the downstream side of the second pier from the left bank of the bridge from which discharge measurements are made. Gage heights are furnished by the United States Engineers.

Information in regard to this station is contained in the following publications of the United States Geological Survey (Ann=Annual Report; WS=Water-Supply Paper):

Description: Ann 18, iv, pp 103–105; WS 15, p 57; 27, p 48; 36, p 156; 48, p 170; 65, p 284; 83, p 154; 98, pp 159–160; 127, p 167.

Discharge: Ann 18, iv, p 105; WS 15, p 57; 36, p 156; 65, p 284; 98, p 160; 127, p 168.

Discharge, monthly: Ann 18, iv, p 108; 19, iv, p 251; 20, iv, p 194; 21, iv, p 153; 22, iv, p 207; WS 75, p 96; 83, p 156.

Discharge, yearly: Ann 20, iv, p 51.

Gage heights: WS 11, pp 37–40; 15, p 57; 27, p 56; 36, p 157; 48, p 171; 65, p 285; 83, pp 154–155; 98 p 160; 127, p 168.

Hydrographs: Ann 18, iv, p 108; 19, iv, p 252; 20, iv, p 195; 21, iv, p 153.

Rating tables: Ann 18, iv, pp 106–107; 19, iv, p 251; WS 27, p 58; 39, p 445; 52, p 514; 65, p 323; 83, p 155

Discharge measurements of Black Warrior River at Tuscaloosa, Ala., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
February 20	J. M. Giles	454	9,872	1.37	25.45	13,500
February 21	do	507	19,320	3.15	44.75	60,930
February 24	do	495	16,660	1.52	39.55	25,340
February 25	do	484	13,440	1.26	33.00	16,880
June 27	W. E. Hall	250	1,807	1.06	6.85	1,909
July 11	do	251	1,860	1.35	7.15	2,516

Daily gage height, in feet, of Black Warrior River at Tuscaloosa, Ala., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.1	19.2	21.4	9.41	15.75	9.15	15.35	6.25	7.6	5.0	6.15	5.72
2	10.11	17.1	18.59	8.95	16.5	8.95	12.8	6.35	6.7	4.9	5.92	5.9
3	9.55	15.1	15.8	8.68	15.02	8.2	12.25	6.55	8.75	4.9	5.8	6.55
4	8.4	13.75	13.5	8.4	13.3	7.05	10.75	6.2	15.3	5.0	5.7	7.65
5	7.9	13.15	12.0	8.5	11.85	6.58	8.75	5.85	18.05	4.95	5.5	9.7
6	7.75	31.8	11.3	8.75	10.68	6.25	7.53	5.62	14.0	4.92	5.45	10.45
7	7.65	40.4	10.65	8.9	10.4	5.95	7.25	5.45	10.7	5.2	5.35	9.55
8	8.6	40.0	10.35	8.95	12.35	5.8	7.15	5.55	8.75	5.5	5.3	8.8
9	9.25	55.35	10.4	15.5	18.0	5.65	7.35	5.25	7.65	5.5	5.2	8.35
10	9.1	56.9	15.1	13.2	16.8	5.1	7.0	5.2	6.95	5.4	5.3	9.1
11	10.05	54.45	27.12	11.1	14.35	5.08	7.02	6.35	6.45	5.42	5.3	10.15
12	20.8	48.98	23.6	9.85	12.35	5.06	9.5	6.9	6.2	5.65	5.75	10.0
13	45.6	44.75	19.3	9.3	10.81	5.04	12.25	9.45	6.2	8.4	6.78	9.35
14	46.07	42.98	16.21	9.0	10.11	5.0	11.75	10.65	6.45	8.25	7.0	8.9
15	40.2	39.35	13.85	8.5	9.8	5.4	9.6	9.8	6.65	7.35	6.72	9.1
16	33.51	35.25	12.45	8.6	9.7	5.35	8.0	9.65	6.6	6.75	6.4	10.8
17	27.6	31.59	11.42	8.6	9.91	5.4	6.9	9.25	6.2	6.65	6.22	16.1
18	23.31	28.68	10.82	8.4	10.02	6.35	6.25	11.25	5.8	7.7	6.03	16.2
19	19.5	26.45	10.15	8.21	11.75	7.4	5.9	11.0	5.55	7.72	5.9	14.5
20	16.4	25.0	10.2	7.85	9.8	6.4	5.6	10.15	5.4	7.2	5.82	13.12
21	15.1	39.98	14.5	7.65	9.2	6.11	5.41	13.3	5.3	6.65	5.75	13.02
22	14.02	47.65	21.05	7.72	9.95	5.75	5.25	16.85	5.25	6.23	5.6	17.8
23	12.7	45.2	21.62	8.05	13.15	5.85	5.1	9.7	5.8	5.9	6.0	21.15
24	11.65	39.9	18.8	8.32	15.82	7.25	5.25	8.75	5.6	5.72	5.9	20.9
25	11.2	34.9	16.2	8.15	14.81	6.9	6.42	8.5	5.4	5.6	5.8	22.6
26	10.1	30.5	14.35	9.13	14.6	7.28	9.35	15.55	5.3	5.6	5.72	20.6
27	9.7	27.05	13.35	10.88	14.51	6.98	8.75	23.0	5.15	5.9	5.6	17.6
28	9.1	24.2	12.03	13.4	20.2	6.7	7.4	17.4	5.3	6.25	5.61	15.35
29	8.5	.....	11.2	13.81	16.0	7.8	6.58	12.5	4.95	7.0	5.7	15.15
30	12.15	.....	10.53	13.25	12.51	14.45	6.22	9.65	4.9	6.75	5.8	15.15
31	19.1	.....	9.95	.....	10.5	.....	6.17	8.1	.....	6.45	.....	16.7

CLEAR CREEK NEAR ELK, ALA.

This station was established June 22, 1904, by M. R. Hall. It is located at the wagon bridge 1 mile south of Elk and 15 miles north of Jasper, on the road to Houston. The bridge is about one-fourth mile above Clear Creek Falls and 2 miles above the junction of Clear Creek with Sipsey Fork of Black Warrior River. This station is maintained in cooperation with the Alabama Geological Survey, by which the gage reader is paid.

The channel is straight for about 400 feet above and 500 feet below the station. The current above the station is rather sluggish at low stages; below, it is swift and broken. The right bank is low, wooded, and is liable to overflow, but all the water passes under the bridge and trestle. The left bank is high, rocky, clean, and is not subject to overflow. The bed of the stream is composed of rock and clean sand and is permanent. There is one channel at all stages.

Discharge measurements are made from the upstream side of the bridge. This is an iron bridge, having a single span of 100 feet and a 49-foot trestle approach on the right bank. The initial point for soundings is the end of the bridge at the left bank, on the upstream side. At very low water the current is too sluggish for measurement at the bridge, but measurements are made by wading at the falls below.

The gage is a vertical timber fastened to the right side of the right-bank stone pier under the upstream side of the bridge. It is read once each day by J. S. Gossett. Bench marks were established as follows: (1) The top of the outer, upstream eyebar, at a point

35 feet from the initial point for soundings; elevation, 17.10 feet. (2) A copper plug set in rock on the left bank about 15 feet upstream from the end of the bridge; elevation, 17.04 feet. Elevations refer to the datum of the gage.

A description of this station and gage-height and discharge data are contained in Water-Supply Paper of the United States Geological Survey No. 127, pp. 169–170.

Discharge measurements of Clear Creek near Elk, Ala., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
January 28	J. M. Giles	96	109	0.98	0.97	106
January 28	do	96	109	.95	.95	104

Daily gage height, in feet, of Clear Creek near Elk, Ala., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.0	1.3	1.3	1.1	1.6	1.0	1.1	0.9	0.8	0.8	1.0	1.0
2	1.0	1.3	1.2	1.1	1.4	.9	.9	.9	1.9	.8	1.0	1.0
3	.9	1.2	1.2	1.1	1.3	.9	.9	.9	1.4	.9	1.0	1.1
4	.9	1.2	1.2	1.1	1.2	.9	1.0	.8	1.3	.9	1.0	1.1
5	.9	1.5	1.2	1.1	1.2	.9	1.2	.8	1.1	.9	1.0	1.0
6	.9	2.7	1.2	1.1	1.2	.9	1.0	.8	1.0	.9	.9	1.0
7	.9	2.2	1.1	1.1	1.5	.9	.9	.8	1.0	.8	.9	1.0
8	1.1	3.8	1.0	1.1	1.4	.8	1.0	.8	.9	.8	.9	1.1
9	1.0	4.6	3.3	1.1	1.3	.8	.9	.8	.9	.8	.9	1.1
10	1.1	2.5	3.0	1.1	1.2	.8	.9	.8	.9	1.1	1.4	1.1
11	1.6	2.1	2.4	1.0	1.2	.8	1.3	.8	.9	1.8	1.3	1.1
12	3.1	1.9	1.8	1.0	1.1	.8	1.2	.8	1.0	1.6	1.2	1.0
13	2.3	1.9	1.5	1.0	1.3	.8	1.1	1.1	1.0	1.3	1.1	1.0
14	1.8	1.8	1.4	1.0	1.1	.8	1.0	1.1	.9	1.1	1.1	1.1
15	1.5	1.7	1.4	1.0	1.1	.9	.9	1.1	.9	1.1	1.1	1.6
16	1.3	1.6	1.3	1.2	1.1	1.1	.9	1.1	.9	1.4	1.1	1.8
17	1.3	1.5	1.3	1.1	1.1	1.0	.9	1.3	.8	1.3	1.0	1.7
18	1.2	1.4	1.2	1.0	1.1	1.1	.9	1.0	.8	1.1	1.0	1.5
19	1.2	1.4	1.3	1.0	1.0	1.0	.8	1.0	1.4	1.1	1.0	1.4
20	1.3	5.2	1.3	1.0	1.0	.9	.8	1.0	1.1	1.1	1.0	1.4
21	1.2	3.3	1.8	1.0	1.0	.9	.8	1.0	1.1	1.0	1.0	1.8
22	1.2	2.3	1.6	1.2	1.2	.9	.8	1.0	1.0	1.0	1.0	1.6
23	1.1	2.0	1.4	1.1	1.1	1.0	.7	1.0	1.0	1.0	1.0	1.9
24	1.1	1.8	1.4	1.1	1.2	.9	.9	.9	.9	1.0	.9	1.9
25	1.1	1.7	1.3	1.1	1.2	.9	1.7	1.0	.9	1.0	1.0	1.6
26	1.0	1.6	1.3	1.3	1.1	.9	1.2	1.0	.8	1.3	1.0	1.5
27	1.0	1.5	1.3	1.3	1.1	.9	1.0	1.0	.8	1.2	1.0	1.5
28	.9	1.4	1.2	1.2	1.0	.9	.9	.9	.8	1.1	1.0	1.4
29	1.0	.....	1.2	1.1	1.0	.9	.9	.9	.8	1.1	1.0	1.4
30	1.5	.....	1.2	1.8	1.0	.9	.9	.9	.8	1.1	1.0	1.3
31	1.4	.....	1.1	.....	1.0	.....	.9	.9	.....	1.0	.....	1.3

Station rating table for Clear Creek, near Elk, Ala., from June 23, 1904, to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.60	12	0.80	44	1.00	128	1.10	188
.70	24	.90	76				

The above table is based on seven discharge measurements made during 1904-5. It is fairly well defined. The above table covers the low-water period. As no high-water measurements have been made, the monthly estimates have not been made.

LOCUST FORK OF BLACK WARRIOR RIVER 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. The Palos station was established November 26, 1901, by the United States Engineer Corps, who furnish the daily gage heights to the United States Geological Survey.

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.

Discharge measurements are made from the mining railroad bridge of the Drennan Coal Mining Company, about one-fourth mile below the Kansas City, Memphis and Birmingham Railroad bridge. 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 gage is situated on the right bank of the river, just below the Kansas City, Memphis and Birmingham Railroad bridge. It is in two sections, the lower or inclined section reading from 0 to 17 feet vertically, and the upper or vertical section reading from 17 to 32 feet. The datum of the gage (251.71 feet above Mobile datum) is supposed to be extreme low water. High water, April, 1900, was about 37 feet. Bench marks were established as follows: (1) The top of the crossbeam at a point 80 feet from the left end of the bridge on the downstream side; elevation, 46.70 feet. (2) A copper plug in a water-oak tree on the right bank, 20 feet downstream from the gage; elevation, 21.68 feet. Elevations refer to the datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey:

Description: 83, p 159; 98, p 164; 127, pp 171–172.
Discharge: 83, p 159; 98, p 165; 127, p 172.
Discharge, monthly: 83, p 161; 98, p 166; 127, p 174.
Gage heights: 83, p 160; 98, p 165; 127, p 173.
Rating table: 83, p 160; 98, p 166; 127, p 173.

Discharge measurements of Locust Fork of Black Warrior River at Palos, Ala., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
February 27[a]	J. M. Giles	175	570	3.87	2.02	2,205
February 27	do	157	1,507	1.64	1.98	2,465
June 15	F. A. Murray	151	943	.51	.72	484
August 10	B. S. Drane	155	351	.83	.50	291
August 10[a]	do	155	363	.84	.50	304
September 26[a]	F. A. Murray	127	280	.46	.30	129

[a] Measured at Frisco Railroad bridge.

Daily gage height, in feet, of Locust Fork of Black Warrior River at Palos, Ala., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.1	1.7	1.9	1.0	1.4	1.1	2.0	0.7	0.7	0.2	0.5	0.8
2	1.0	1.6	1.9	.9	1.4	1.0	1.8	.7	.9	.2	.4	.8
3	1.0	1.4	1.8	.9	1.2	.9	2.0	.7	1.4	.2	.4	1.2
4	.9	1.3	1.6	.8	1.1	.8	1.4	.6	1.8	.4	.4	1.6
5	.9	1.4	1.4	.9	1.1	.7	1.1	.5	1.4	.9	.4	2.0
6	.8	6.9	1.3	1.0	1.0	.7	1.0	.4	1.0	.9	.4	1.9
7	1.0	5.0	1.2	1.0	1.2	.6	1.0	.3	.9	.8	.4	1.8
8	1.2	5.8	1.1	1.1	1.7	.6	1.2	.3	.5	.8	.4	1.8
9	1.1	20.9	1.2	1.0	1.8	.5	1.0	.2	.6	.9	.4	2.1
10	1.1	19.0	1.3	.9	1.5	.5	.9	.5	.6	.9	.5	1.7
11	1.6	10.1	1.4	.9	1.2	.4	1.7	.5	.5	.9	.7	1.7
12	5.2	5.0	1.3	.9	1.1	.4	3.3	.6	.7	.8	.8	1.6
13	12.1	5.0	1.2	.8	1.1	.4	2.5	1.0	.7	.7	.9	1.3
14	7.2	4.9	1.1	.8	1.1	.5	1.7	1.5	.7	.6	.7	1.1
15	4.1	4.2	1.1	.8	1.0	.7	1.3	1.0	.6	.7	.7	1.3
16	2.6	3.5	1.0	.9	1.6	1.5	1.0	1.7	.6	.8	.7	1.7
17	2.0	2.9	1.0	.9	2.5	1.1	.9	1.5	.5	.9	.6	1.9
18	1.7	2.6	.9	.8	2.0	.9	.8	1.1	.5	.9	.6	1.6
19	1.6	2.0	.9	.8	1.6	.8	.7	1.0	.4	.8	.6	1.3
20	1.7	3.5	1.0	.7	1.3	.7	.8	1.0	.4	.8	.5	1.4
21	1.6	8.3	2.4	.7	1.4	.6	.7	2.0	.4	.7	.6	2.5
22	1.3	7.4	2.8	.9	1.8	1.5	.5	1.0	.4	.7	.6	3.7
23	1.3	4.9	2.1	1.0	2.4	1.4	.5	.9	.4	.6	.6	3.3
24	1.2	3.5	1.8	.9	2.0	1.3	.4	1.0	.3	.6	.6	3.0
25	1.2	2.8	1.6	.8	2.2	1.5	.8	3.2	.3	.6	.6	2.5
26	1.1	2.4	1.4	.9	2.1	1.0	.6	4.4	.3	.6	.6	2.2
27	1.0	2.2	1.3	1.0	2.7	1.3	.6	2.1	.3	.5	.6	1.9
28	1.9	2.0	1.2	1.1	2.1	1.4	.6	1.3	.2	.5	.7	1.7
29	.9	.....	1.2	1.0	1.7	4.3	.5	1.2	.2	.6	.8	2.0
30	1.8	.....	1.1	1.2	1.4	3.1	.5	1.1	.2	.5	.8	2.1
31	1.9	.....	1.1	.....	1.2	.....	1.0	.9	.....	.5	.....	1.7

Station rating table for Locust Fork of Black Warrior River at Palos, Ala., from January 1, 1904, to December 31, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.00	34	1.10	935	2.10	2,530	3.20	4,560
.10	67	1.20	1,070	2.20	2,710	3.40	4,940
.20	110	1.30	1,210	2.30	2,890	3.60	5,320
.30	165	1.40	1,360	2.40	3,070	3.80	5,700
.40	230	1.50	1,515	2.50	3,250	4.00	6,100
.50	305	1.60	1,680	2.60	3,430	4.20	6,500
.60	390	1.70	1,850	2.70	3,610	4.40	6,900
.70	480	1.80	2,020	2.80	3,800	4.60	7,300
.80	580	1.90	2,190	2.90	3,990	4.80	7,700
.90	690	2.00	2,360	3.00	4,180	5.00	8,100
1.00	810						

The above table is based on 21 discharge measurements made during 1902–1905. It is well defined between gage heights —0.1 foot and 5 feet. Above gage height 5 feet the rating curve is a tangent, the difference being 200 per tenth.

Estimated monthly discharge of Locust Fork of Black Warrior River at Palos, Ala., for 1905.

[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	22,300	580	2,767	2.71	3.12
February	39,900	1,210	8,381	8.22	8.56
March	3,800	690	1,417	1.39	1.60
April	1,070	480	707	.693	.773
May	3,610	810	1,686	1.65	1.90
June	6,700	230	1,049	1.03	1.15
July	4,750	230	1,089	1.07	1.23
August	6,900	110	1,143	1.12	1.29
September	2,020	110	459	.450	.502
October	690	110	463	.454	.523
November	690	230	383	.375	.418
December	5,510	580	2,145	2.10	2.42
The year	39,900	110	1,807	1.77	23.49

MISCELLANEOUS MEASUREMENTS IN MOBILE RIVER DRAINAGE BASIN.

The following is a list of miscellaneous discharge measurements made in Mobile River drainage basin during 1905:

Big Sandy Creek near Dadeville, Ala.—A measurement was made June 7, 1905, from the upstream side of Hall's wagon bridge, near Dadeville, Ala. The bench mark is the top of the outside wooden stringer on the upstream side of the bridge at the first vertical post from the left-bank pier; elevation, 26.00 feet above the datum of the assumed gage.

Width, 73 feet; area, 127 square feet; mean velocity, 0.34 foot per second; gage height, 1.65 feet; discharge, 44 second-feet.

Big Wills Creek near Attalla, Ala.—A measurement was made July 28, 1905, from the downstream side of Ray's bridge, about 2½ miles from Attalla, Ala. The bench mark is the top of the downstream end of the second-floor beam from the right end of the second

span from the right-bank end of the bridge; elevation, 25.00 feet above the datum of the assumed gage.

Width, 30 feet; area, 73 square feet; mean velocity, 1.49 feet per second; gage height, 3.77 feet; discharge, 109 second-feet.

Black Water Creek near Jasper, Ala.—A discharge measurement was made January 28, 1905, from the upstream side of a single-span iron highway bridge, 100 yards below the dam at Camack's mill, 6 miles north of Jasper" Ala. The initial point for soundings is the end of the bridge at the right-bank upstream side. The bench mark is the top of the upstream eyebar, 49 feet from the right-bank end of the bridge; elevation, 20.00 feet above the datum of the assumed gage.

Width, 68 feet; area, 83 square feet; mean velocity, 1.18 feet per second; gage height, 1.8 feet; discharge, 98 second-feet.

Buck Creek near Helena, Ala.—A measurement was made April 3, 1905, from the footbridge and log across Buck Creek at point opposite Helena, Ala. The bench mark is the top of tie or base of rail at second crossbeam from the left bank at the Louisville and Nashville Railroad bridge; elevation, 22.00 feet above the datum of the assumed gage.

Width, 73 feet; area, 70 square feet; mean velocity, 1.00 foot per second; gage height, 1.75 feet; discharge, 69 second-feet.

Cahaba River near Tacoa, Ala.—Two measurements were made April 3, 1905, near Tacoa, Ala. The bench mark is the base of rail on the Louisville and Nashville Railroad bridge over the third crossbeam from the center pier; elevation, 49.00 feet above the datum of the assumed gage.

At section 500 feet above Louisville and Nashville Railroad bridge: Width, 64 feet; area, 268 square feet; mean velocity, 0.62 foot per second; gage height, 4.65 feet; discharge, 167 second feet.

At section 1,000 feet below mouth of Buck Creek: Width, 116 feet; area, 146 square feet; mean velocity, 1.55 feet per second; gage height, 4.65 feet; discharge, 227 second-feet.

Cedar Creek near Cavespring, Ga.—This stream enters Coosa River about 6 miles northwest of Cavespring, Ga. A measurement was made July 25, 1905, from the upstream side of a single-span steel bridge 2½ miles northwest of Cavespring and one-fourth mile above the Southern Railway bridge. The bench mark is the top of the upstream end of the second iron floor beam from the right end of the bridge; elevation, 17.00 feet above the datum of the assumed gage.

Width, 68 feet; area, 186 square feet; mean velocity, 0.42 foot per second; gage height, 3.13 feet; discharge, 77 second-feet.

Hillabee Creek near Alexander City, Ala.—A regular station was formerly maintained at a wooden wagon bridge 6½ miles northeast of Alexander City, Ala., on the road leading to Newsite. The old gage is still in place. A measurement was made June 9, 1905.

Width, 135 feet; area, 194 square feet; mean velocity, 0.62 foot per seeond; gage height, 1.15 feet, discharge, 120 second-feet.

Luxapelila Creek at Columbus, Miss.—This stream enters Tombigbee River at Columbus, Miss. A measurement was made November 24, 1905, from the downstream side of the Mobile and Ohio Railroad bridge. The bench mark is the top of the downstream end of the first floor beam from the right end of the steel truss; elevation, 35.00 feet above the datum of the assumed gage.

Width, 110 feet; area, 710 square feet; mean velocity, 0.33 foot per second; gage height, 3.92 feet; discharge, 234 second-feet.

PEARL RIVER DRAINAGE BASIN.

DESCRIPTION OF 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 following pages give the results of the data collected in this drainage during 1905:

PEARL RIVER AT JACKSON, MISS.

This station was established June 24, 1901, by K. T. Thomas. It is located at a highway bridge, 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 channel makes a 90° curve about 200 feet above the bridge. It is nearly straight for about one-fourth mile below the bridge. The right bank is high and rocky and does not overflow. The left bank is of cleared ground and overflows at about 20 feet gage height. The width of the stream at low stages is about 130 feet and at flood stages about 900 feet. The bed is of sand and gravel and is shifting. The current velocity is moderate, but is not well distributed, and is broken by an old pier and some short piles under the bridge.

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 bridge on the right bank. At low stages the discharge can be measured by wading about one-fourth mile above the bridge

The original chain gage was fastened to the downstream side of the bridge at a point 130 feet from the initial point for soundings. On July 14, 1905, this was superseded by a standard chain gage, fastened to the downstream lower chord of the bridge, in the fifth panel from the right-bank end of the main span; length of chain, 42.08 feet. The datum of this gage is the same as that of the original gage; the bottom of the gage box at the pulley is 40.08 feet above the datum of the gage. Bench marks were established as follows: (1) The downstream end of the top of the iron floor beam, 120 feet from the right-bank end of the bridge; elevation, 39.00 feet. The elevation of the bridge floor at this point is 40.15 feet. (2) A cross marked on the top of the downstream tubular pier at the right bank; elevation, 38.88 feet. (3) The top of the upstream latticed iron post supporting the right end of the bridge; elevation, 39.11 feet. (4) The head of a small bolt driven vertically into the base of an ash tree on the sidewalk on South Jefferson street, about 130 feet from north corner of Silas Brown street; elevation, 52.74 feet. Elevations refer to datum of the gage.

Information in regard to this station is contained in the following Water-Supply Papers of the United States Geological Survey as follows:

Description: 65, p 286; 83, p 164; 98, p 170; 127, pp 177–178.
Discharge: 65, p 286; 83, p 165; 98, p 171; 127, p 178.
Discharge, monthly: 98, p 172; 127, p 180.
Gage heights: 65, p 287; 83, p 165; 98, p 171; 127, p 179.
Rating table: 98, p 172; 127, p 179.

Discharge measurements of Pearl River at Jackson, Miss., in 1905.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Feet.	*Square feet.*	*Feet per second.*	*Feet.*	*Second-feet.*
February 16	J. M. Giles	1,272	14,600	1.69	29.05	24,710
February 17	do	1,272	14,750	1.68	29.15	24,690
June 24	W. E. Hall	113	473	1.21	2.50	574
July 14	do	117	503	1.25	2.50	630

Daily gage height, in feet, of Pearl River at Jackson, Miss., for 1905.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.1	7.0	21.3	13.0	18.6	5.7	5.1	1.8	5.7	3.7	2.5	1.8
2	3.5	6.4	20.1	11.4	18.5	5.2	4.9	1.9	5.2	3.5	2.4	1.8
3	3.6	6.0	18.8	10.6	18.0	5.0	4.8	1.7	4.2	2.7	2.3	1.9
4	3.5	6.2	17.9	11.8	17.5	4.4	4.7	2.4	3.9	3.7	2.4	1.8
5	3.4	9.2	15.4	12.7	16.8	4.2	4.4	3.0	3.3	4.0	3.5	1.8
6	3.3	14.7	13.5	13.0	15.6	3.7	4.0	3.4	3.0	4.5	3.4	1.7
7	3.1	15.8	12.1	12.1	13.8	3.4	3.6	3.0	2.8	3.2	3.5	1.8
8	2.9	19.1	10.5	12.2	12.7	3.1	3.3	2.6	2.5	3.2	2.9	1.8
9	2.9	22.3	9.7	11.4	11.6	2.9	3.0	2.4	2.3	2.0	2.8	1.9
10	2.9	24.1	8.8	11.0	10.8	2.8	2.9	2.3	2.0	2.2	3.8	2.0
11	2.9	25.0	9.0	11.7	10.0	2.7	2.8	2.2	2.0	3.0	4.5	2.1
12	5.5	25.8	8.7	13.8	9.5	2.4	2.7	2.3	3.0	4.4	4.2	2.1
13	6.1	26.9	8.5	14.7	9.3	2.4	2.4	2.5	1.9	5.0	3.9	2.2
14	6.6	27.7	8.2	15.7	9.6	2.3	2.4	3.6	1.9	4.8	3.3	4.4
15	7.3	28.6	8.1	15.8	11.7	2.2	2.5	3.3	1.7	4.2	3.3	7.3
16	7.0	29.0	8.0	14.8	12.6	2.2	2.5	3.4	1.6	5.2	3.1	6.6
17	7.0	29.2	7.9	14.8	11.7	2.1	2.4	3.3	1.6	5.4	2.9	6.0
18	7.3	28.9	7.6	14.7	11.6	2.1	2.3	3.3	1.5	5.5	2.8	5.7
19	7.4	28.6	10.2	14.4	10.5	2.1	2.2	3.8	1.5	5.3	2.8	5.9
20	7.5	28.8	10.5	14.1	9.2	2.0	2.0	4.1	1.6	5.2	2.7	6.1
21	7.1	28.7	13.5	13.8	8.2	2.1	2.0	5.2	1.5	4.7	2.6	6.6
22	6.6	28.2	14.8	13.1	7.7	2.2	1.9	5.0	1.5	4.1	2.5	7.5
23	6.1	27.5	16.8	12.4	11.1	2.3	1.9	4.9	1.4	3.7	2.4	8.2
24	5.9	26.6	17.4	11.7	12.2	2.7	1.8	4.9	1.4	3.5	2.3	7.9
25	5.9	25.7	17.9	13.9	12.5	2.7	2.6	4.9	1.4	3.4	2.2	7.4
26	5.8	24.6	17.9	16.5	12.8	3.0	2.7	4.9	1.3	3.5	2.1	7.1
27	5.1	23.6	17.3	17.2	12.0	3.2	2.0	4.8	1.3	3.1	2.0	6.8
28	5.2	22.7	16.5	17.6	10.1	3.5	2.5	4.8	1.3	3.0	1.9	6.6
29	5.2	.....	15.9	17.7	8.2	4.5	2.4	5.3	1.2	2.8	1.9	6.3
30	7.5	.....	15.5	17.9	7.3	5.1	2.1	5.7	1.1	2.6	1.8	6.0
31	6.8	.....	14.3	.....	6.5	.....	1.8	5.8	.....	2.6	.....	6.4

Station rating table for Pearl River at Jackson, Miss., from January 1 to December 31, 1905.

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	80	2.80	710	5.60	2,090	12.50	6,260
.40	88	2.90	753	5.80	2,200	13.00	6,600
.50	97	3.00	797	6.00	2,310	13.50	6,950
.60	108	3.10	842	6.20	2,420	14.00	7,300
.70	120	3.20	888	6.40	2,530	14.50	7,650
.80	133	3.30	935	6.60	2,640	15.00	8,000
.90	147	3.40	982	6.80	2,750	15.50	8,350
1.00	162	3.50	1,030	7.00	2,860	16.00	8,700
1.10	178	3.60	1,078	7.20	2,970	16.50	9,100
1.20	196	3.70	1,126	7.40	3,080	17.00	9,500
1.30	216	3.80	1,174	7.60	3,195	17.50	9,900
1.40	238	3.90	1,223	7.80	3,315	18.00	10,300
1.50	262	4.00	1,272	8.00	3,435	19.00	11,100
1.60	288	4.10	1,321	8.20	3,555	20.00	12,000
1.70	316	4.20	1,370	8.40	3,675	21.00	12,900
1.80	345	4.30	1,420	8.60	3,795	22.00	13,900
1.90	375	4.40	1,470	8.80	3,915	23.00	15,000
2.00	407	4.50	1,520	9.00	4,035	24.00	16,200
2.10	440	4.60	1,570	9.50	4,335	25.00	17,500
2.20	475	4.70	1,620	10.00	4,635	26.00	19,000
2.30	511	4.80	1,670	10.50	4,960	27.00	20,700
2.40	548	4.90	1,720	11.00	5,285	28.00	22,600
2.50	587	5.00	1,770	11.50	5,610	29.00	24,500
2.60	627	5.20	1,870	12.00	5,935	30.00	26,400
2.70	668	5.40	1,980				

The above table is based on 18 discharge measurements made during 1901–1905. It is well defined between gage heights 0.3 foot and 8.3 feet. The table has been extended beyond these limits, being based on one measurement at 24 feet and two at 29 feet. Below 10 feet the table is the same as for 1904.

Estimated monthly discharge of Pearl River at Jackson, Miss., for 1905.

[Drainage area, 3,120 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
January	3,135	753	1,963	0.629	.725
February	24,880	2,310	16,100	5.16	5.37
March	13,200	3,195	7,005	2.25	2.59
April	10,220	5,025	7,236	2.32	2.59
May	10,780	2,585	5,959	1.91	2.20
June	2,145	407	894	.287	.320
July	1,820	345	769	.246	.284
August	2,200	316	1,126	.361	.416
September	2,145	178	549	.176	.196
October	2,035	407	1,189	.381	.439
November	1,520	345	741	.238	.266
December	3,555	316	1,694	.543	.626
The year	24,880	178	3,769	1.21	16.02

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CLASSIFICATION OF THE PUBLICATIONS OF THE UNITED STATES GEOLOGICAL SURVEY.

[Water-Supply Paper No. 168.]

The publications of the United States Geological Survey consist of (1) Annual 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.

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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.

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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.
1905. East of Mississippi River, Nos. 165, 166, 167, 168, 169, 170, and 171.
West of Mississippi River, Nos. 171, 172, 173, 174, 175, 176, 177, and 178.

The Geological Survey and the Reclamation Service have suboffices in different parts of the United States, from which hydrographic and reclamation work in the respective localities is carried on and where data may be obtained on application. These offices are located as follows:

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APRIL, 1906.

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