VIRGINIA DEPARTMENT OF AGRICULTURE AND IMMIGRATION

GEOLOGICAL SURVEY OF VIRGINIA

THOMAS L. WATSON, GEOLOGIST IN CHARGE

GEOLOGICAL SERIES, BULLETIN No. III

HYDROGRAPHY OF VIRGINIA

BY

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PUBLISHED BY

BOARD OF AGRICULTURE AND IMMIGRATION

1906

THE STONE PRINTING AND MFG. COMPANY
STAND ALONE
PRINTING
AND
COMMERCIAL
ROANOKE, VA., U.S.A.

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LETTER OF TRANSMITTAL.

To the Members of the Virginia Board of Agriculture and Immigration, and the Board of Visitors of the Virginia Polytechnic Institute:

Gentlemen:—I have the honor to submit herewith a report on the Hydrography of Virginia, prepared by N. C. Grover and R. H. Bolster, of the U. S. Geological Survey, in co-operation with the Virginia Geological Survey; and to request that it be published as Volume III of the Geological Series of the Virginia Survey.

Respectfully,

THOMAS L. WATSON,

Geologist in Charge.

Blacksburg, Va., March 15, 1906.

HYDROGRAPHY OF VIRGINIA.

ACKNOWLEDGMENTS.

The following compilation of hydrographic data for Virginia is the result of co-operation during 1905 between the United States Geological Survey and the Geological Survey of Virginia. It has been made possible at this time, however, by former work of the United States Geological Survey, which has for the past ten years maintained a number of gaging stations and collected much information concerning river stage and discharge. Other sources of information have been consulted and used freely, and it is believed, that the most valuable data in regard to river flow, rainfall, profiles, etc., have been included.

Acknowledgment should be made to the U. S. Weather Bureau for rainfall data and for certain records of river stages as indicated in the text; to the Chief of Engineers of the U. S. Army for profiles and elevations along certain portions of the Roanoke and Potomac Rivers; to the Tidewater Railroad Company for elevations along the Roanoke River; to the Hydrographers of the U. S. Geological Survey, under whose direction the greater part of the data in this report was collected; and to Professor D. C. Humphreys, of the Washington and Lee University, who represented the U. S. Geological Survey in Virginia prior to 1902.

TOPOGRAPHY OF THE AREA.

Virginia lies on the Atlantic seaboard, between latitudes 36° 40′ and 39° 30′, north, and longitudes 75° and 84° west, and comprises an area of 42,450 square miles, of which about 2,300 square miles is water surface included in landlocked bays, harbors and rivers. Its boundary is very irregular except on the south, where it nearly coincides with a parallel of latitude.

Within its borders lie the headwaters of a number of prominent rivers of the Middle, South Atlantic, and South Central States. The drainage map of Virginia, Plate II, brings out clearly the influential character of these drainage basins.

The importance of the region has long been appreciated, and much work has been done by various government bureaus and by private parties in studying phases of its hydrography and hydrology.

The State comprises part or all of the following drainage basins,—Potomac, Minor Chesapeake, Minor Southern Atlantic, James, Chowan, and Roanoke, which enter the Atlantic Ocean, and the Ohio River drainage, which enters the Eastern Mississippi River. The Minor Chesapeake Bay, Minor Southern Atlantic Ocean, and Chowan River drainages comprise most of the eastern part of the State, which is low and flat, and has but few power possibilities. Practically no hydrographic work has been done in these basins. The other basins comprise the mountainous area of the State, and are each of considerable importance as power streams, and on each a considerable amount of hydrographic information has been collected, as given in the following pages.

The principal watershed of the State is formed by the Blue Ridge of the Appalachian Mountains and extends from Harpers Ferry in a southwesterly direction across the State. West of and parallel to this range, and containing still higher summits, are the Shenandoah Mountains, while still farther west are the Alleghanies.

The Blue Ridge is pierced near the northern border of the State by Potomac River at Harpers Ferry, and within the State by James River at Balcony Falls near Glasgow, and by Roanoke River near Stewartsville. The Shenandoah Mountains are pierced at three points by tributaries of the James: by Jackson River at Iron Gate near Clifton Forge, by Cowpasture River a few miles north of Clifton Forge, and by North River near Panther. The Alleghany Mountains are pierced by New River near the western border of the State at the Narrows.

The highest altitudes are found near the southern boundary, where Rogers Mountain, the highest point in the State, has an elevation of 5,719 feet. Only one other summit in the State, White Top Ridge (5,530 feet), has an elevation over 5,000 feet. Five peaks, however, reach altitudes between 4,500 and 5,000 feet, and seventeen are between 4,000 and 4,500 feet high.

West of the Blue Ridge the country is broken by sharp mountain ridges, trending generally northeast and southwest, divided by valleys which in the northern part are drained by tributaries of the

Potomac River, flowing northeastward, and in the southern part by New River and its tributaries, whose waters flow through the Great Kanawha into Ohio River. The extreme southwestern part of the State is drained by tributaries of the Big Sandy, Holston, and Clinch Rivers. The topography of all of this section of the country is exceedingly rough, and the rivers flow through valleys having steep side slopes.

East of the Blue Ridge there is a gradual descent from the mountains through the hilly section of central Virginia to the Coastal Plain, the western boundary of which is formed by what is called the "fall line," the narrow zone where the granitic rocks pass below tide level. Over this "fall line" the streams pass in a succession of rapids formed by ledges of hard rock in the stream beds. It is crossed by the Potomac at Georgetown, by the Rappahannock at Fredericksburg, and by the James at Richmond.

The rivers within the Coastal Plain are generally tidal, with low velocities. In the southeastern corner of the State is the Great Dismal Swamp, the highest point of which is about 22 feet above sea level. Within the swamp is Drummond Lake, which has an area of about 5 square miles and forms the only fresh-water surface of considerable size in Virginia.

The following table, taken from Gannett's Gazetteer of Virginia, shows the distribution of altitudes within the State:

Areas in Virginia at different altitudes.

Feet.	Sq. mi.
0 to 100	9,700
100 to 500	10,500
500 to 1,000	5,950
1,000 to 1,500	4,700
1,500 to 2,000	4,200
2,000 to 3,000	6,800
3,000 to 4,000	600

Virginia was originally forested over nearly all its area, but the amount of available timber now remaining is comparatively small. No estimate of it has, however, been made.

Rainfall within the State is fairly well distributed throughout the year, and ranges from 40 to 60 inches annually. Most of the region east of the Blue Ridge has an annual rainfall between 45 and 50 inches. In the mountainous area much of the precipitation in the winter months is in the form of snow, which accumulates to considerable depths and the melting of which furnishes water for the spring freshets so prominent in the regimen of the rivers. An important characteristic of the rainfall, which must be considered in connection with the flow of the streams, is the large amount of pre-

cipitation during the summer months, when loss from evaporation is at a maximum.

The mean annual temperature ranges from 50 degrees in the mountainous parts of the State to 60 degrees in the Coastal Plain region.

The drainage basins of the State are here considered in order from north to south, and for each basin is given, as far as available, a detailed description, which includes data in regard to slope, and a profile, records of river stages, estimates of flow, rainfall data, and other information.

METHODS OF WORK.

FIELD METHODS.

The methods by which the records of stream discharge have been made are those in common use in the United States Geological Survey; they are described in detail in Water-Supply and Irrigation Papers Nos. 94 and 95, and briefly in the annual Progress Reports for 1904 and 1905. An outline of the method used in Virginia is given below, to assist in making clear the data which follow.

A gage for observing the stage of the river is established at a bridge or other place where the record of flow is to be made. This gage is a vertical staff, or some other device by which the height of water may be observed, and is read each day, by a person living near by. The average of the gage readings, if more than one, in any day is used as the mean gage height for that day.

At various stages of the river one of the hydrographers of the Survey visits the station and measures with a current meter the amount of water flowing. This meter is primarily an instrument for measuring the velocity of moving water, and consists essentially of a wheel with vanes, which may be shaped like those of a windmill or of a screw, or with cups like those of an anemometer, the necessary qualification being that moving water shall readily cause the wheel of the meter to turn. Each meter is rated before use. The rating is done by moving the meter through still water at various observed speeds to determine the relation between the velocity with which the meter moves through the water and the revolutions of the wheel. This relation having been determined, the meter is used in running water, the revolutions per unit of time noted, and the velocity of the water computed.

Observations of depth of water are also made, and from them the area in cross section of each portion of the stream is computed; each partial area multiplied by the mean velocity of that area gives a

partial discharge; the sum of the partial discharges is the total discharge of the stream.

OFFICE METHODS.

Measurements of flow as outlined above are made covering a considerable range of gage height. They are then plotted on coordinate paper, with gage heights for ordinates and discharges for abscissas, and a smooth curve, called the rating curve, is drawn through the points. From this curve a rating table is made which shows the discharge of the stream for any gage height.

The data necessary for the construction of a rating table for a gaging station as just stated 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.

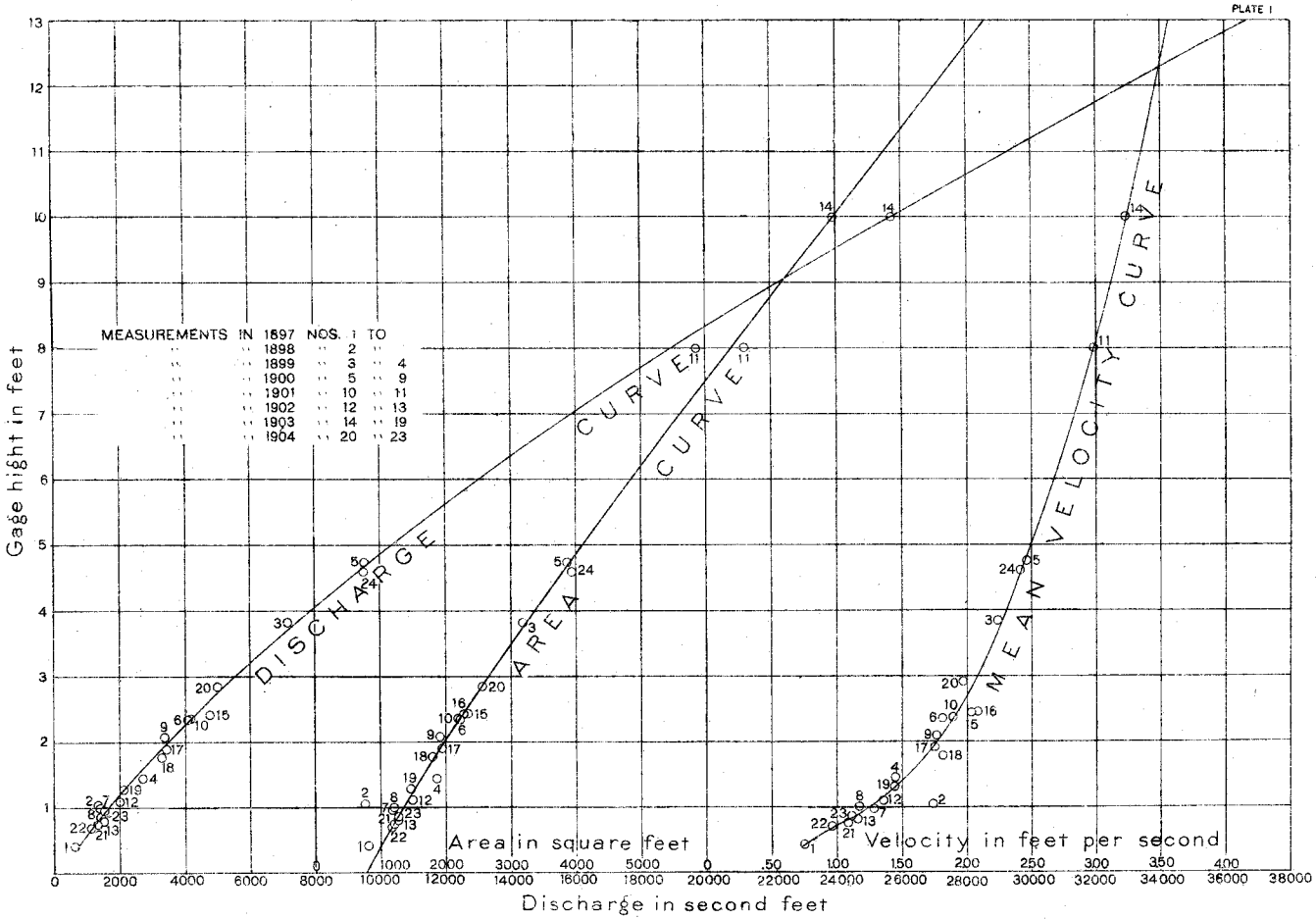
The construction of the rating table depends upon the following laws of flow for open permanent channels: (1) The discharge will remain constant so long as the conditions at and near the gaging station remain constant; (2) Neglecting the change of slope due to the rise and fall of the stream, the discharge 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. Plate I 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 alone 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



DISCHARGE, MEAN VELOCITY, AND AREA CURVES FOR JAMES RIVER AT CARTERSVILLE, VA.

with the relative change of these factors the curve may be either a straight line, a curve 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. It is used principally in connection with the area curve in locating errors in discharge measurements and in constructing the rating table.

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, be best located between and beyond the measurements by means of the curves of area and mean velocity. This curve, under normal conditions, is concave towards the horizontal axis, and is generally parabolic in form.

In the preparation of the rating table the discharge for each 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.

Prior to the fall of 1903 wire gages were used at many of the stations for observing the stage of the river. The correct length of gages of this type was difficult to maintain on account of the stretching of the wire. Small changes of length took place frequently, making necessary the application of corrections to the observed gage heights at the stations. In some instances the magnitude of the corrections and the time over which they should have been applied were not recorded, and the proper adjustments are therefore somewhat in doubt. In such instances, if the data warranted it, the gage heights were corrected by the amount that the measurements of the period in question were vertically above or below the curve. It is believed that by the use of corrected gage heights reasonably accurate estimates of discharge have been made for all the rivers described. Accompanying the rating tables are given as far as possible statements concerning the measurements on which it has been based and the probable degree of accuracy of the results.

The extent of frozen periods at all the stations is very uncertain. All ice notes are from observers gage height records but as the observers notes are very incomplete their absence does not always imply open channel conditions. Estimates for ice periods have been made as if open channel conditions existed, except as noted. This method involves errors over the relatively short ice periods of a few to forty per cent.

DEFINITIONS.

The volume of water flowing in a stream, the "run-off," is expressed in various terms, each of which is associated with a certain class of work. These terms may be divided into two classes: those which represent a rate of flow, as second-foot, gallons per minute, and run-off in second-feet per square mile; and those which represent actual quantities of water, as run-off in depth in inches. 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 the rate of one foot per second. It is generally used as a fundamental unit from which the others are computed.

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

"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 over the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

EXPLANATION OF TABLES.

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

1. Description of station.
2. List of discharge measurements.
3. Gage-height tables.
4. Rating tables.
5. Tables of estimated monthly and yearly discharges and run-off, based upon all the facts available 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. 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 affect the use of the data collected.

The discharge-measurement table gives the results of the discharge measurements made during each year, and includes the date, the name of the hydrographer, the gage height, the area, the mean velocity, and the discharge in second-feet.

The tables of daily gage heights give for each day the height of the surface of the river as found from the mean of the gage readings taken on that day. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage.

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

In the tables of estimated monthly discharges 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 are based.

POTOMAC RIVER DRAINAGE BASIN.

DESCRIPTION OF THE BASIN.

Potomac River is formed by the junction of the North and South branches about 15 miles below Cumberland, Md., from which point it flows in a southeasterly direction into Chesapeake Bay. For its entire length it makes the southern boundary of the State of Maryland and the northern boundary of the States of West Virginia and Virginia. It drains a total area of about 14,500 square miles.

The North Branch rises in the Alleghany Mountains near the western corner of Maryland; the South Branch in the Alleghany Mountains in Virginia and West Virginia. These branches, with their tributaries and the tributaries of the main stream as far down as the Shenandoah, drain a series of narrow and generally fertile valleys lying between the parallel ranges which make up the system of the Alleghanies in this region. Their slopes are not as a rule very great, and their beds are of gravel and sand. The slopes of their drainage basins are, however, usually very steep, and after a rain the water collects quickly in the rivers. There are few lowlands to be overflowed, and no lakes whatever in the region; consequently these streams, and with them the Potomac River, are subject to very sudden and heavy freshets in wet seasons, while in dry seasons their discharge becomes small. The record of gage heights at Point of Rocks, Md., covering a period of over ten years, shows a maximum range of about 24 feet; and for several years the range has been more

RAINFALL STATIONS.

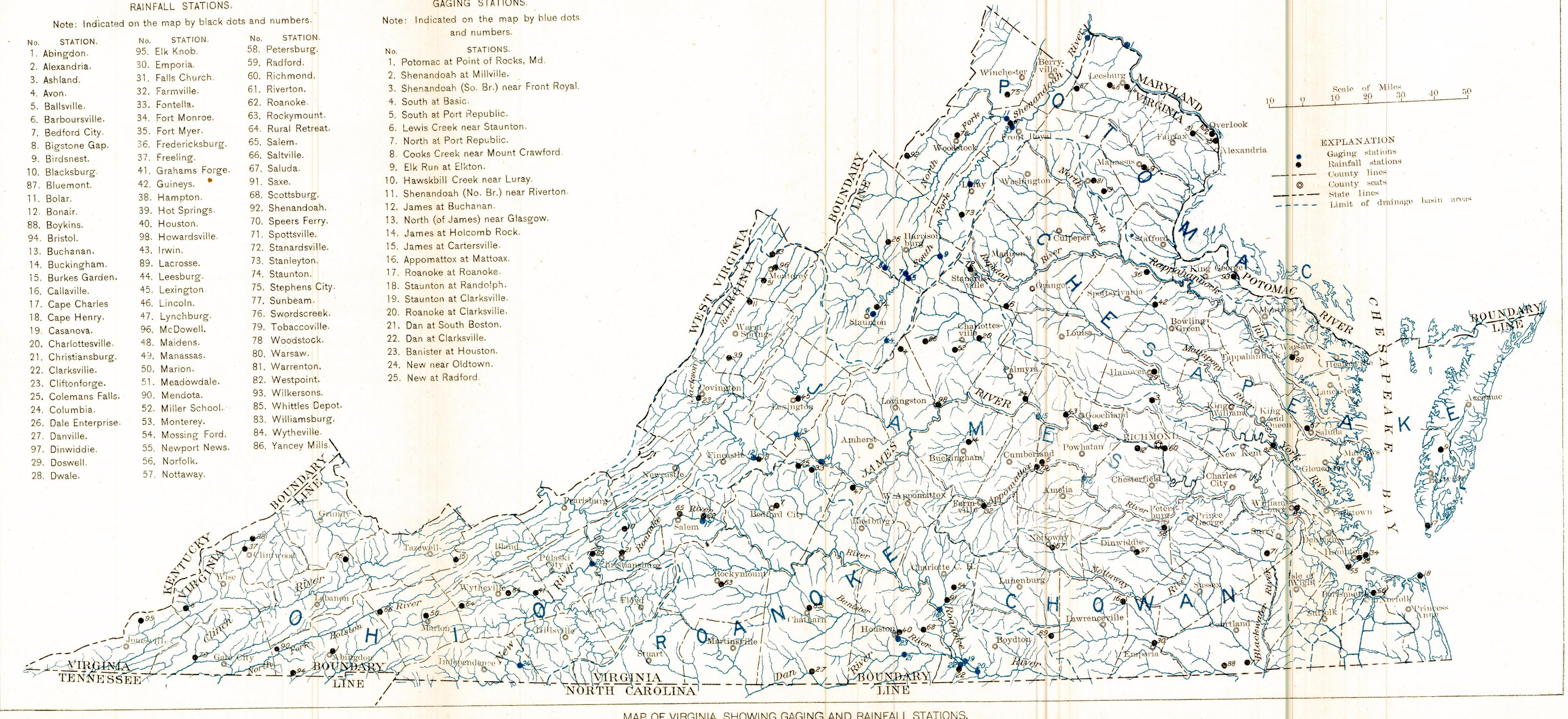
Note: Indicated on the map by black dots and numbers.

No.	STATION.	No.	STATION.	No.	STATION.
1.	Abingdon.	95.	Elk Knob.	58.	Petersburg.
2.	Alexandria.	30.	Emporia.	59.	Radford.
3.	Ashland.	31.	Falls Church.	60.	Richmond.
4.	Avon.	32.	Farmville.	61.	Riverton.
5.	Ballsville.	33.	Fontella.	62.	Roanoke.
6.	Barboursville.	34.	Fort Monroe.	63.	Rockymount.
7.	Bedford City.	35.	Fort Myer.	64.	Rural Retreat.
8.	Bigstone Gap.	36.	Fredericksburg.	65.	Salem.
9.	Birdsnest.	37.	Freeling.	66.	Saltville.
10.	Blacksburg.	41.	Grahams Forge.	67.	Saluda.
87.	Bluemont.	42.	Guineys.	91.	Saxe.
11.	Bolar.	38.	Hampton.	68.	Scottsburg.
12.	Bonair.	39.	Hot Springs.	92.	Shenandoah.
88.	Boykins.	40.	Houston.	70.	Speers Ferry.
94.	Bristol.	98.	Howardsville.	71.	Spottsville.
13.	Buchanan.	43.	Irwin.	72.	Stanardsville.
14.	Buckingham.	89.	Lacrosse.	73.	Stanleyton.
15.	Burkes Garden.	44.	Leesburg.	74.	Staunton.
16.	Callaville.	45.	Lexington.	75.	Stephens City.
17.	Cape Charles	46.	Lincoln.	77.	Sunbeam.
18.	Cape Henry.	47.	Lynchburg.	76.	Swordscreek.
19.	Casanova.	96.	McDowell.	79.	Tobaccoville.
20.	Charlottesville.	48.	Maidens.	78	Woodstock.
21.	Christiansburg.	49.	Manassas.	80.	Warsaw.
22.	Clarksville.	50.	Marion.	81.	Warrenton.
23.	Cliftonforge.	51.	Meadowdale.	82.	Westpoint.
25.	Colemans Falls.	90.	Mendota.	93.	Wilkersons.
24.	Columbia.	52.	Miller School.	85.	Whittles Depot.
26.	Dale Enterprise.	53.	Monterey.	83.	Williamsburg.
27.	Danville.	54.	Mossing Ford.	84.	Wytheville.
97.	Dinwiddie.	55.	Newport News.	86.	Yancey Mills
29.	Doswell.	56.	Norfolk.		
28.	Dwale.	57.	Nottaway.		

GAGING STATIONS.

Note: Indicated on the map by blue dots and numbers.

No.	STATIONS.
1.	Potomac at Point of Rocks, Md.
2.	Shenandoah at Millville.
3.	Shenandoah (So. Br.) near Front Royal.
4.	South at Basic.
5.	South at Port Republic.
6.	Lewis Creek near Staunton.
7.	North at Port Republic.
8.	Cooks Creek near Mount Crawford.
9.	Elk Run at Elkton.
10.	Hawksbill Creek near Luray.
11.	Shenandoah (No. Br.) near Riverton.
12.	James at Buchanan.
13.	North (of James) near Glasgow.
14.	James at Holcomb Rock.
15.	James at Cartersville.
16.	Appomattox at Mattoax.
17.	Roanoke at Roanoke.
18.	Staunton at Randolph.
19.	Staunton at Clarksville.
20.	Roanoke at Clarksville.
21.	Dan at South Boston.
22.	Dan at Clarksville.
23.	Banister at Houston.
24.	New near Oldtown.
25.	New at Radford.



MAP OF VIRGINIA, SHOWING GAGING AND RAINFALL STATIONS.

than 20 feet in each year. The corresponding maximum and minimum discharges have been estimated at 218,700 second-feet and 900 second-feet, respectively.

The slopes of the tributary basin of the Shenandoah River are in many instances steep, but the valley through which the Shenandoah flows is generally broader and more lands are subject to overflow. The slope of the river itself is usually greater than the slopes of the tributaries above mentioned. As a result the fluctuations in this stream are not so great, having a maximum range of about 19 feet at Millville in ten years, while the average annual fluctuation is 10 feet or less. The discharge in this period has ranged between approximately 140,000 second-feet and 480 second-feet.

From the junction of the North and South branches below Cumberland, Md., the Potomac cuts through the mountains at nearly a right angle. Its valley is narrow, its slope in many places great; the bed is generally gravel and bowlders, with ledge rock at small depth which often appears at the surface. The banks are usually high and not subject to overflow. It crosses the fall-line a few miles above Washington, and reaches tidewater at Georgetown.

The Baltimore and Ohio Railroad follows the river for its entire length, while the Norfolk and Western Railroad and the Cumberland Valley Railroad cross the stream. The Chesapeake and Ohio Canal follows it from Cumberland to Georgetown.

The following tables show the elevations above tide of a number of points on the Shenandoah, South Branch of the Potomac, and Potomac Rivers.

Slope of the Shenandoah River.

Locality.	Distance from mouth.	Elevation above tide.	Distance between points.	Fall between points.	Fall per mile between points.
	Miles.	*Feet.*	*Miles.*	*Feet.*	*Feet.*
Harpers Ferry, junction with Potomac	0.0	242	2.5	44	17.6
Bull's Falls	2.5	286	5.5	40	7.3
Near mouth of Evitts Creek	8.0	326	10.0	34	3.4
Castleman's Ferry	18.0	360	13.0	40	3.1
Berry's Ferry	31.0	400	23.0	53	2.3
Confluence of North and South Forks*	54.0	453	96.0	586	6.1
South Fork, near Port Republic	150.	1,039			

*Profiles of the Norfolk & Western Railroad give this elevation as 445 feet.

Slope of the South Branch of the Potomac River.

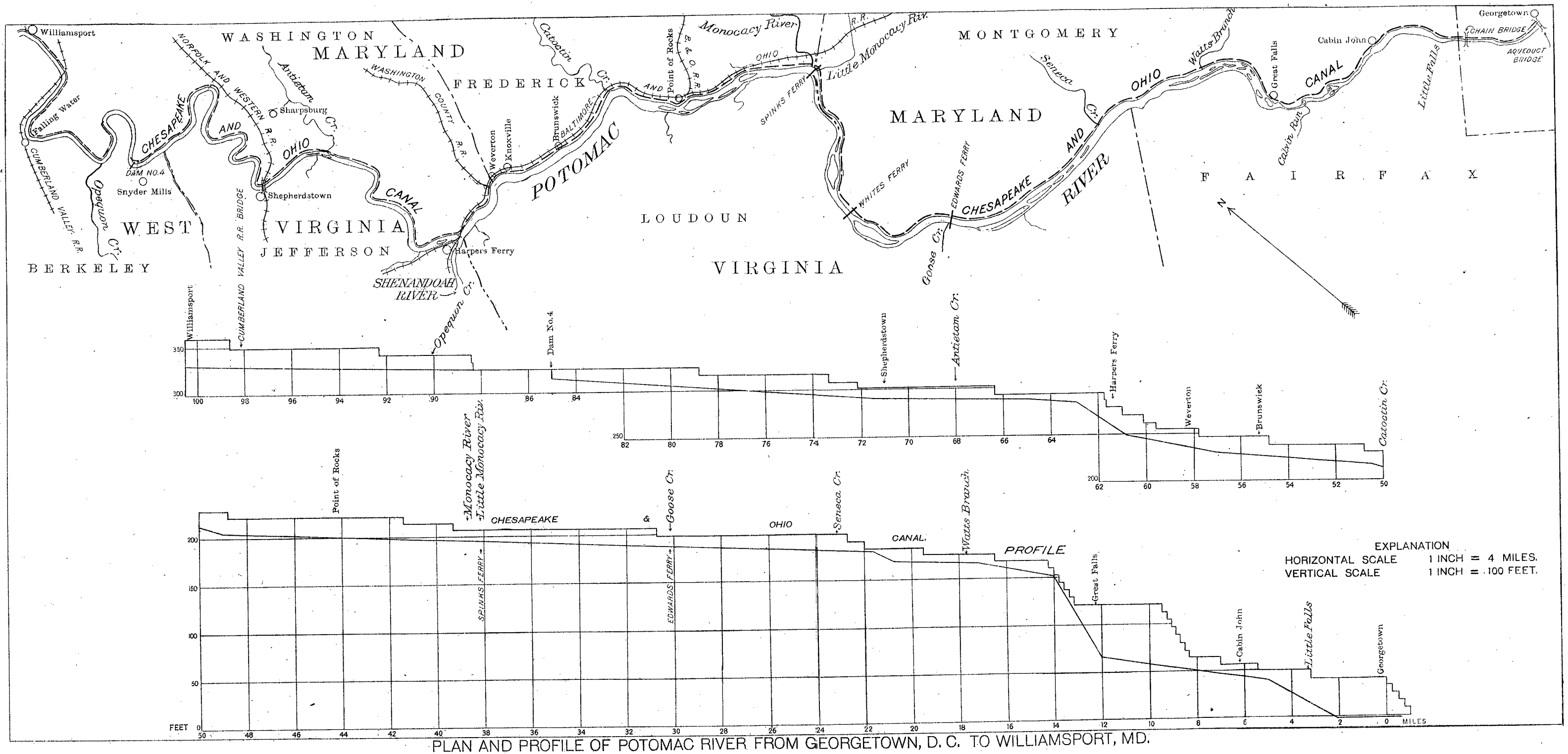
Locality.	Distance from mouth.	Elevation above tide.	Distance between points.	Fall between points.	Fall per mile between points.
	Miles.	*Feet.*	*Miles.*	*Feet.*	*Feet.*
Mouth	0.0	0	29.6	127	4.3
Opposite Romney	29.6	127	24.0	151	6.3
Moorefield	53.6	278	12.0	97	8.1
Petersburg	65.6	375			

Slope of the Potomac River.

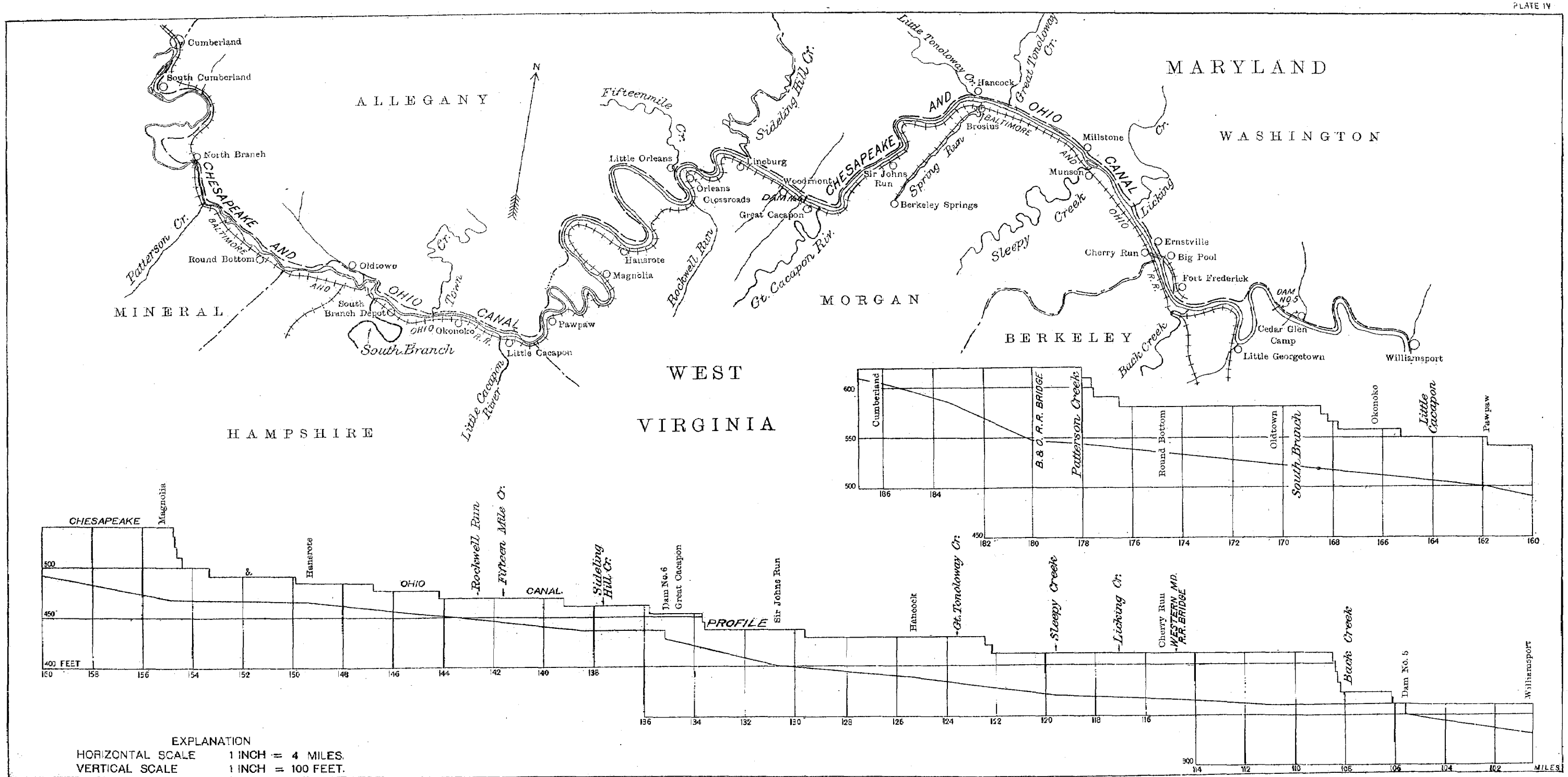
Locality.	Distance from mouth.	Elevation above tide.	Distance between points.	Fall between points.	Fall per mile between points.
	Miles.	*Feet.*	*Miles.*	*Feet.*	*Feet.*
Georgetown	0.0	0	61.5	245	4.0
Harpers Ferry	61.5	245	9.5	35	3.7
Shepherdstown	71.0	280	14.0	39	2.8
Dam No. 4	85.0	319	22.0	38	1.7
Dam No. 5	107.0	357	78.0	253	3.2
Cumberland	185.0	610			

It will be noticed that the elevation of the Potomac where it passes through the Blue Ridge is about 245 feet, while that of the James at its passage through the same range of mountains at Blue Ridge dam is 706 feet. The fall of the Potomac is therefore much smaller than that of the James, though still quite large. Of the 245 feet below Harpers Ferry about 90 occur in a short distance at the Great Falls; and if this be subtracted, the fall in the remaining distance is found to average about 2.5 feet per mile.

As a water-power stream the principal disadvantage of the Potomac is the great variability of its flow. Good rock foundations for dams can generally be found at small depth, the banks are as a rule favorable, and there are several sites where large falls could be rendered available, as will be seen hereafter. Building materials are generally obtainable, and facilities for transportation are excellent. A very insignificant amount of power has been developed.



PLAN AND PROFILE OF POTOMAC RIVER FROM GEORGETOWN, D. C. TO WILLIAMSPORT, MD.



PLAN AND PROFILE OF POTOMAC RIVER FROM WILLIAMSPORT, MD. TO CUMBERLAND, MD.

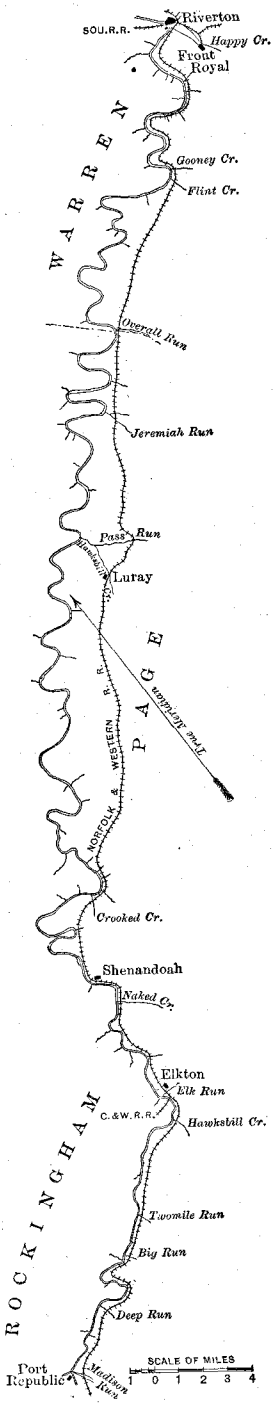


FIG I. PLAN OF SOUTH BRANCH OF SHENANDOAH RIVER.

In August, 1899, a reconnaissance survey of the South Branch of Shenandoah River between Port Republic, Va., and Riverton, Va., was made by Mr. F. H. Anschutz, under the direction of D. C. Humphreys, for the purpose of obtaining a profile of the river and a map showing the location of the mills, the unused falls, and the localities where water power might possibly be developed.

The results of the work are shown by the map (fig. 1) and the profile (plate v). The distances along the profile and map are measured along the center line of the stream, the initial point being the forks of the river at Port Republic.

The developed and undeveloped power of the river at the time of the survey was briefly stated, as follows:

At Port Republic a combined sawmill and gristmill utilizes a fall of 10 feet in South River, which is obtained by a dam about a quarter of a mile above the mouth.

On North River, in the first 1,500 feet above the forks, there is a fall of 6 feet which was once used for power and which could easily be developed again.

At Shendun, 4 miles above Port Republic, on South River, an excellent power was partially developed during what is known as "boom times" in 1890. The fall is said to be about 20 feet.

Two miles down stream from the forks there is a gristmill utilizing about 6 feet fall, obtained by a brush dam and a long race.

At 6 miles there is a fall of 4.5 feet, but the banks are low.

At 7½ miles there is a small gristmill with a 3-foot timber dam

Between the 7½-mile point and the next mill, at 11 miles, there is a total fall of 25 feet, but the river banks are much broken and generally are low.

At 11 miles there is a small gristmill using about 6 feet fall.

At 12½ miles there is a gristmill using 5½ feet fall.

At 17 miles, opposite Elkton, there is a combined gristmill and sawmill, with a 4-foot dam, using 6 feet fall.

In the neighborhood of Shenandoah the fall is rapid but the banks are low.

At 31½ miles there is an old mill and a timber dam 4 feet high the first course of timbers of which is missing.

At 32½ miles, Grove Hill, there is a gristmill and a good dam of timber and loose rocks, 4 feet high.

At 37½ miles, Kemple Falls, there is a fall of 15 feet in three-fourths of a mile. The bank on the left side is fairly good, but on the right side of the main group of channels the river spreads out over and runs through a large area of bowlders, and the bank for a considerable distance back is but little above the surface of the stream.

At 38 miles, Newport, there is a combined sawmill and gristmill that uses about 6 feet fall. The dam is about 4 feet high, loosely made of timber and stonework.

At 41 miles is Mank's mill, a gristmill with a dam 3½ feet high, rudely constructed of brush and loose stone. The fall below the mill is good and about 7 feet are utilized.

At 50 miles there is an old mill site, nothing being left except the foundation of the dam.

At 55 miles, Schuler, there is a gristmill, with a dam 3½ feet high.

At 66½ miles is Goode's mill, the dam for which is 3 feet high, of timber and planking backed by loose rock. The mill uses a fall of about 6 feet.

At 79½ miles is Hazard's mill, on the left bank of the stream, at a point where the river splits and runs around a large island. The dam is in the left branch and is substantially constructed of timber; it is 4½ feet high.

At 97½ miles is Blackmore's dam. It was a stoutly built dam of timber and dry masonry, but it is broken at each end and part of the upper course is missing at the middle. The mill is no longer standing.

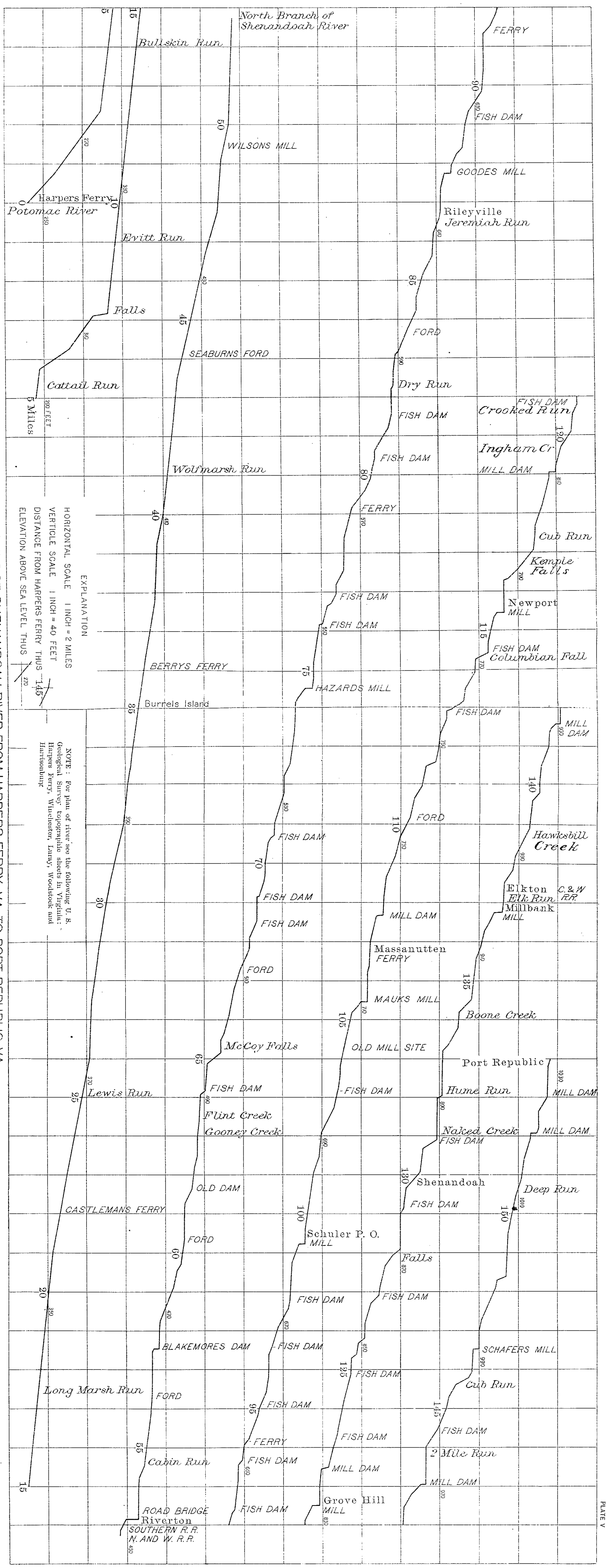
At 101 miles, Riverton, are the Riverton mills. The dam is 6 feet high, of timber, and is well constructed.

POTOMAC RIVER AT POINT OF ROCKS, MD.

This station was established by C. C. Babb, February 17, 1895, at the steel highway bridge at Point of Rocks, Md. As originally placed, the gage was located in the third span of the bridge from the north shore. The length of the wire from the end of the weight to the marker was 48.0 feet and the zero of the gage was 6.0 feet from the center of the pulley. The zero of the gage was 40.9 feet below B. M. No. 1 described below. June 18, 1896, a new wire gage was placed on the lower side of the first span of the bridge, the wire length being 44.19 feet. The zero of the gage was changed to 41.3 below B. M. No. 1. During 1896 and 1897 the wire became rusted and broke frequently; the changes in wire length not being recorded. January 25, 1898, a new wire was put in, the length being 44.22 feet, which length has been used since that date. The datum elevation 41.3 was not changed.

During the period between the measurements of April 16 and July 29, 1901, a large quantity of earth excavated from the canal was thrown into the river along its left bank, changing the section and probably affecting the flow of the river. This necessitated moving the gage farther from the shore which was done by the observer, who installed a temporary gage. The indications are, that the gage was not set to read exactly the same as the one which it replaced, and the gage heights between April 16, 1901, and September 2, 1902, are somewhat in error.

A standard box chain gage was installed at this station, September 2, 1902. It is bolted to the handrail on the lower side of the bridge in the first span from the left bank. The length of the chain is 44.22 feet which was the same length as had been previously used. In placing the new gage, however, the datum was lowered .45 of a



PROFILE OF SHENANDOAH RIVER FROM HARPERS FERRY, VA. TO PORT REPUBLIC, VA.

PLATE V

foot and the elevation of the bench mark was changed from 41.3 feet to 41.75 feet to agree therewith.

Bench mark No. 1, established November 16, 1896, is a copper bolt in a large capstone on the lower wing wall of the north abutment, about 10 feet from the north end of the first iron truss and 41.75 feet above the datum of the gage. B. M. No. 2, established July, 1904, is a cross chiseled on the lower step of the upstream wing wall on the left bank of the river, being just across the tow-path, 15 feet from the canal. Its elevation is 24.00 feet above gage datum.

Discharge measurements are made from the eight-span steel toll bridge to which the gage is attached. The initial point for soundings is the left end of the lower guard rail, 0.4 foot beyond the center of the end pin, on the downstream side of the bridge. The channel is straight for 500 feet above and 200 feet below the station. It is 1,300 feet wide, broken by seven bridge piers. Both banks overflow only at extremely high water and are not wooded. In the two right spans the bed is composed of mud and is subject to some change; in the other spans the bed is composed of gravel and cobblestones and is permanent. The current does not flow at right angles with the bridge in all of the spans. The gage is read once each day by George H. Hickman.

Discharge Measurements of Potomac River at Point of Rocks, Md.

Date.	Hydrographer.	Area of section.	Mean velocity.	aGage height.	Discharge.
1895.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
March 25	C. C. Babb	6,257	1.68	3.05	10,520
April 5	do	6,338	2.21	3.42	14,030
April 13	do	7,851	2.23	4.27	17,520
April 23	do	4,765	1.55	2.10	7,371
May 1	do	7,718	2.73	4.35	21,070
May 7	do	5,969	2.09	3.10	12,480
May 17	do	5,118	1.74	2.35	8,918
May 28	do	5,221	1.76	2.45	9,189
June 3	do	3,998	1.13	1.53	4,536
June 17	do	3,793	1.12	1.30	4,233
July 10	do	4,008	1.17	1.50	4,695
November 6	do	2,660	0.45	0.40	1,202
1896.					
June 23	D. C. Humphreys	5,386	1.20	1.82	6,462
August 4	do	4,526	1.55	1.86	7,057
November 16	A. P. Davis	4,121	1.48	1.60	6,109
1897.					
February 9	C. C. Babb	11,670	3.49	c7.95	40,650
bFebruary 23	do	28,400	5.45	c21.70	154,800
March 8	E. G. Paul	8,759	3.13	5.70	27,380
March 27	do	.....	.....	4.05	17,120
July 23	G. H. Matthes	4,800	1.69	c2.85	8,130
October 29	E. G. Paul	2,851	0.75	c0.20	2,141
April 12	do	7,602	2.71	c5.00	20,620
1898.					
January 25	E. G. Paul	10,320	3.23	6.50	33,340
August 19	do	6,000	2.38	3.30	14,310
October 3	do	2,547	0.76	0.65	1,939
1899.					
January 28	E. G. Paul	6,743	2.57	3.80	17,330
May 20	do	11,450	4.01	8.15	45,990
September 5	do	2,505	0.94	0.80	2,360
October 29	do	2,319	0.70	0.50	1,628

aAll gage heights refer to datum 41.30 feet below bench mark No. 1, 1895 to 1901, inclusive, and 41.75 feet below the same bench mark 1902 to 1905.
bMeasurement recomputed.
cGage heights inaccurate.

Discharge measurements of Potomac River at Point of Rocks, Md.

Date.	Hydrographer.	Area of section.	Mean velocity.	*a*Gage height.	Discharge.
1900.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
June 28	E. G. Paul	3,814	1.37	1.50	5,212
*d*October 2	do	852	1.48	0.30	1,259
September 19	C. R. Olberg	2,767	0.82	*c*0.30	2,277
1901.					
April 16	E. G. Paul	19,410	5.19	14.30	100,800
July 29	do	3,772	1.73	1.85	6,530
December 27	do	4,848	2.35	2.89	11,410
1902.					
June 22	Newell and Paul	2,897	1.01	1.25	2,921
September 2	E. G. Paul	2,356	0.73	0.87	1,717
1903.					
March 12	E. C. Murphy	6,600	2.86	4.84	18,880
April 17	Hoyt and Paul	17,250	5.01	13.70	86,420
April 17	Hoyt and Stokes	16,500	4.88	13.10	80,520
April 18	do	12,180	4.44	9.60	54,080
September 14	Paul and Sawyer	2,950	1.28	1.50	3,770
November 9	W. C. Sawyer	2,590	0.83	1.12	2,140
1904.					
July 11	Hoyt and Grover	5,500	2.50	3.87	13,750
1905.					
March 13	Tillinghast and Comstock	8,600	3.33	6.56	28,640
June 20	Grover and Lyman	2,727	1.10	1.29	2,997
October 30	G. F. Harley	3,532	1.38	2.05	4,889
November 9	do	2,703	.94	1.20	2,531
November 9	Harley and Stewart	2,703	.91	1.20	2,467

*a*All gage heights refer to datum 41.30 feet below bench mark No. 1, 1895 to 1901, inclusive, and 41.75 feet below the same bench mark 1902 to 1905.

*c*Gage heights inaccurate.

*d*Made by wading.

Daily gage height, in feet, of Potomac River at Point of Rocks, Md.

See description of station page 16 in regard to datum of gage.

Day.	Jan.	Feb	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1895.												
1	.....	.....	6.1	3.1	3.3	1.8	2.0	1.0	0.6	0.3	0.4	0.4
2	.....	.....	9.7	3.0	5.9	1.7	2.7	.9	.7	.3	.4	.5
3	.....	.....	10.6	2.9	5.8	1.5	2.3	.8	.9	.3	.3	.5
4	.....	.....	9.6	3.6	5.4	1.4	2.1	.8	.7	.3	.3	.5
5	.....	.....	7.1	3.5	4.4	1.4	1.9	.9	.6	.3	.3	.5
6	.....	.....	5.6	3.0	3.7	1.4	1.7	.8	.6	.3	.4	.6
7	.....	.....	4.8	2.7	3.1	1.2	1.5	.8	.6	.3	.3	.8
8	.....	.....	4.3	2.6	2.7	.8	1.5	.8	.5	.3	.3	.8
9	.....	.....	4.1	3.0	2.7	1.3	1.7	1.1	.5	.3	.4	.6
10	.....	.....	4.1	10.8	2.8	1.2	1.6	1.0	.6	.3	.4	.5
11	.....	.....	4.0	7.9	2.8	1.1	1.5	.9	.5	.3	.4	.5
12	.....	.....	3.6	5.8	2.7	1.1	1.5	.8	.5	.4	.5	.5
13	.....	.....	3.6	4.5	2.7	1.2	1.3	.8	.5	.2	.4	.6
14	.....	.....	3.6	3.8	2.8	1.2	1.2	.7	.5	.2	.4	1.6
15	.....	.....	4.7	3.5	3.0	1.5	1.1	.7	.5	.3	.4	.6
16	.....	.....	5.9	3.4	2.6	1.3	1.0	.6	.5	.3	.4	.5
17	.....	1.6	8.1	3.3	2.4	1.2	1.0	.6	.4	.3	.4	.4
18	.....	1.6	6.9	3.0	2.3	1.1	1.0	.6	.4	.3	.4	.4
19	.....	1.6	5.4	2.7	2.2	1.1	1.1	.6	.5	.3	.4	.3
20	.....	1.6	4.9	2.6	2.4	1.0	1.0	.6	.5	.3	.4	.3
21	.....	1.7	4.1	2.4	2.3	.9	1.0	.6	.4	.2	.4	.3
22	.....	1.8	3.8	2.2	2.4	1.0	1.0	.5	.4	.2	.4	.6
23	.....	2.0	3.4	2.1	2.8	1.0	1.1	.5	.4	.2	.4	.6
24	.....	2.0	3.2	2.0	3.8	.9	.9	.5	.5	.3	.4	1.3
25	.....	2.0	3.0	2.0	3.3	.8	.9	.4	.5	.3	.4	1.3
26	.....	2.1	2.9	1.9	2.6	.8	1.0	.4	.4	.3	.4	1.2
27	.....	2.9	3.0	1.8	2.5	1.2	1.2	.4	.4	.3	.4	1.3
28	.....	3.6	3.8	1.8	2.4	2.1	1.3	.4	.4	.3	.5	1.4
29	.....	.....	3.2	1.8	2.4	1.6	1.2	.4	.3	.3	.5	.9
30	.....	.....	4.3	2.2	2.2	1.5	1.1	.5	.3	.3	.4	.9
31	.....	.....	3.5	.....	2.0	.....	1.1	.5	.....	.3	.....	1.3
1896.												
1	a1.3	1.3	.....	.....	.....	1.1	1.6	2.0	0.5	21.85	0.8	2.0
2	1.2	1.2	.....	.....	.....	.8	1.4	2.2	.5	12.05	.8	3.0
3	1.3	1.3	.....	.....	.....	.6	1.2	2.5	.4	6.3	.7	2.8
4	1.4	1.8	.....	.....	.....	.5	1.1	2.0	.4	4.0	.7	2.3
5	1.4	2.8	.....	.....	.....	.4	1.0	1.8	.4	3.0	.8	2.0
6	1.4	3.5	.....	.....	.....	.3	1.3	1.6	.5	2.4	6.0	1.8
7	1.3	7.0	.....	.....	.....	.6	1.2	1.4	.3	2.1	6.0	1.7
8	1.3	7.0	.....	.....	.....	.6	1.6	1.2	.3	1.8	5.1	1.7
9	1.3	5.0	.....	.....	.....	1.6	1.9	1.1	.3	1.5	3.8	1.6
10	1.3	3.8	.....	.....	.....	2.0	2.5	1.2	.3	1.3	3.0	1.5
11	1.0	2.9	.....	.....	a0.8	2.2	4.0	1.1	.4	1.2	2.5	1.7
12	.8	2.8	.....	.....	.7	1.7	3.8	1.0	.3	1.1	2.2	1.7
13	.7	2.4	.....	.....	.6	1.4	2.7	1.0	.3	1.1	1.9	1.6
14	.6	2.3	.....	.....	.6	1.1	2.3	1.1	.3	1.0	1.7	1.5
15	.5	2.7	.....	.....	.5	1.0	2.3	1.1	.3	1.0	1.5	1.4
16	.5	3.9	.....	.....	1.6	1.1	1.6	1.1	.8	1.0	1.5	1.3
17	.5	3.5	.....	.....	1.1	a1.2	1.5	1.2	.5	1.0	1.4	1.2
18	.4	2.9	.....	.....	1.0	3.4	1.4	1.0	.4	1.0	1.3	1.1
19	.3	2.3	.....	.....	.8	3.2	1.4	.8	.4	.9	1.2	1.0

aGage heights January 1 to June 17, 1896, approximate.

Daily gage height, in feet, of Potomac River at Point of Rocks, Md.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1896.												
20	a.3	1.3	.....	.....	a.6	2.7	1.3	.7	.7	.9	1.1	1.0
21	.3	.9	.....	.....	.6	2.2	1.2	.6	.4	.8	1.0	1.0
22	.5	1.1	.....	.....	.7	1.8	1.1	.6	.5	.8	1.0	1.0
23	.6	1.5	.....	.....	1.0	1.8	1.2	.6	.4	.8	1.0	1.0
24	2.3	1.5	.....	.....	1.0	1.8	1.6	.6	.4	.7	1.0	1.0
25	5.1	1.6	.....	.....	.9	1.6	3.3	.6	.3	.7	.9	.9
26	4.8	1.4	.....	.....	.8	1.7	8.7	.5	.4	.9	.9	1.1
27	3.7	1.3	.....	.....	.7	1.9	6.0	.5	.4	1.0	.9	1.0
28	2.9	1.2	.....	.....	.6	2.3	3.3	.5	.3	.9	1.0	.7
29	2.1	1.8	.....	.....	.8	2.0	2.7	.6	.4	.9	1.0	.7
30	1.6	.....	.....	.....	1.0	1.8	2.8	.6	5.3	.8	1.2	.8
31	1.4	.....	.....	.....	1.6	.....	2.4	.5	.....	.8	.....	.9
b1897.												
1	.8	2.0	5.3	2.3	1.7	2.0	1.3	1.5	1.0	.7	.7	.9
2	.8	1.9	4.4	2.2	1.9	1.9	1.2	1.4	.9	.7	.8	.9
3	.8	2.5	4.2	2.1	6.5	1.8	1.3	1.3	.9	.7	1.0	.9
4	.9	2.0	4.1	2.1	14.0	1.9	1.3	1.3	.9	.7	1.4	1.0
5	.9	2.1	4.6	2.2	8.5	2.0	1.2	1.3	.9	.7	1.0	1.1
6	1.0	5.1	5.4	2.5	6.0	2.0	1.2	1.8	.9	.6	.8	3.2
7	1.4	8.0	6.0	2.8	5.4	1.9	1.2	1.3	.9	.6	.7	3.6
8	1.7	10.5	5.8	3.0	4.6	2.0	1.2	1.2	.8	.6	.5	3.2
9	1.5	7.9	5.0	2.9	4.0	2.0	1.1	1.3	.8	.6	.5	2.4
10	1.3	5.8	4.5	3.7	3.5	1.8	1.0	1.3	.8	.6	.5	1.5
11	1.1	4.6	4.2	5.7	3.2	1.7	1.4	1.4	.7	.7	.7	1.3
12	1.1	4.0	4.0	4.6	3.0	1.7	1.3	1.3	.7	.8	1.2	1.1
13	1.1	3.9	3.9	3.9	3.3	1.6	1.3	1.3	.7	.6	.8	1.0
14	.9	4.6	3.7	3.5	8.9	1.6	1.4	1.2	.8	.7	.5	.9
15	.9	5.7	3.7	3.3	12.6	1.7	1.4	1.2	.8	.7	.5	1.5
16	1.0	7.0	3.8	3.1	8.0	1.7	1.5	1.3	.7	.6	.6	4.1
17	.9	7.4	4.2	3.0	5.0	1.6	1.3	1.2	.7	.6	1.1	4.3
18	.9	7.7	4.4	2.9	4.4	1.6	1.1	1.2	.7	.6	.9	3.3
19	.9	7.6	4.7	2.8	4.1	1.7	1.4	1.1	.7	.6	.7	2.6
20	1.5	7.2	5.3	2.6	3.9	1.7	1.4	1.1	.7	.6	.7	2.2
21	1.5	6.4	6.2	2.5	3.5	2.1	2.1	1.1	.7	.6	.6	2.1
22	1.4	6.7	6.0	2.3	3.2	2.0	2.6	1.1	.7	.7	6	1.6
23	1.4	21.2	5.5	2.2	2.9	1.8	2.7	1.1	.8	.6	.6	1.5
24	1.4	24.6	4.8	2.1	2.8	1.7	2.1	1.2	1.0	.6	.4	1.4
25	1.5	16.8	4.7	2.1	2.9	1.6	1.9	1.7	.8	.7	.4	1.3
26	1.8	9.3	4.6	2.0	3.0	1.6	1.9	1.6	.8	.7	.4	1.3
27	2.0	7.3	4.1	1.9	2.8	1.6	2.1	1.3	.9	.7	.8	1.2
28	2.3	6.0	3.8	1.9	2.5	1.5	2.2	1.3	.9	.8	.6	1.2
29	2.2	.....	3.6	1.8	2.2	1.4	2.1	1.3	.9	.9	.5	1.1
30	2.1	.....	3.3	1.7	2.1	1.3	1.9	1.3	.9	.9	.6	1.1
31	2.0	.....	2.9	.....	2.0	.....	1.8	1.3	.....	.9	.....	1.1
1898.												
1	1.1	2.8	1.9	6.1	2.6	2.2	0.9	1.5	1.2	0.7	2.7	2.1
2	1.1	1.7	1.8	5.2	2.4	2.0	.8	1.7	1.1	.7	2.5	2.1
3	1.2	2.0	1.7	4.6	2.2	1.8	.8	1.4	1.1	.6	2.3	2.0
4	1.4	1.9	1.7	4.1	2.0	1.7	.7	1.2	1.0	.7	2.2	2.5

a Gage heights January 1 to June 17, 1896, approximate.
b 1897 gage heights subject to errors of several tenths.

Daily gage height, in feet, of Potomac River at Point of Rocks, Md.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1898.												
5	1.4	1.9	1.6	3.8	1.9	1.6	.7	2.2	1.0	.8	2.0	5.1
6	1.5	2.0	1.6	3.6	1.8	1.4	.7	7.2	1.0	.8	1.8	9.2
7	1.4	2.0	1.6	3.2	2.2	1.3	.7	6.1	1.1	1.0	1.8	6.1
8	1.1	1.9	1.5	2.9	5.4	1.3	.8	3.7	1.0	1.1	1.7	4.5
9	1.2	1.9	1.5	2.4	11.05	1.2	.7	3.9	1.0	1.0	1.6	3.6
10	1.4	1.8	1.4	2.5	9.6	1.2	.7	5.6	.9	1.0	1.6	3.0
11	2.1	1.8	1.4	2.5	6.5	1.1	.7	14.0	.9	.9	2.0	2.6
12	4.0	1.9	1.5	2.4	5.2	1.1	.6	16.05	.9	.9	1.8	2.4
13	3.9	2.0	1.5	2.4	4.2	1.1	.5	9.5	.8	1.4	1.8	2.2
14	3.5	1.9	1.6	2.5	3.7	1.3	.5	8.0	.8	1.2	2.0	2.2
15	3.7	1.9	1.6	2.5	3.1	1.3	.5	7.2	.8	1.0	2.0	2.0
16	4.9	2.0	1.7	4.0	3.0	1.3	.5	6.1	.8	.8	1.8	1.8
17	6.2	2.0	1.7	9.0	3.2	1.3	.5	5.2	.8	.8	1.8	1.8
18	4.9	1.8	2.0	6.7	4.6	1.2	.5	4.3	.8	.8	1.8	2.0
19	3.8	1.7	5.8	5.1	4.4	1.5	.7	3.3	.8	1.4	2.2	2.1
20	3.1	1.7	4.6	4.2	3.5	1.4	.7	3.1	.7	9.0	3.0	2.2
21	2.9	2.8	3.5	3.5	2.3	1.3	.9	3.0	.7	5.4	3.6	2.6
22	2.8	3.8	3.5	3.2	2.9	1.3	.9	3.8	.7	5.35	3.3	3.3
23	3.2	4.1	6.6	2.9	3.1	1.3	1.1	2.8	.7	13.1	3.2	4.7
24	7.6	3.4	6.2	2.6	3.9	1.2	.9	2.3	.7	10.1	3.1	6.2
25	6.5	2.9	6.4	2.6	5.1	1.1	.8	2.0	.7	5.9	3.0	6.9
26	5.1	2.6	10.5	2.6	5.6	1.1	.9	1.8	.7	4.5	2.7	5.3
27	5.0	2.3	7.2	2.5	4.1	1.0	1.2	1.5	.9	3.8	2.6	4.3
28	5.1	2.1	5.3	3.3	3.4	1.0	1.0	1.5	.8	3.6	2.4	3.7
29	5.1	.....	4.4	3.0	3.0	.9	1.2	1.4	.7	3.4	2.2	3.2
30	3.6	.....	4.3	2.8	2.8	.9	1.4	1.3	.7	3.0	2.1	3.0
31	3.4	.....	6.2	.....	2.4	.....	1.7	1.3	.....	2.8	.....	2.7
1899.												
1	3.0	2.4	11.9	5.3	1.6	2.0	1.0	0.7	0.9	0.7	0.8	0.8
2	3.4	2.0	9.2	4.5	1.6	2.4	1.0	.7	.9	.6	1.5	.8
3	2.9	2.1	8.2	4.0	2.1	3.8	1.1	.7	.8	.6	2.5	.8
4	2.7	2.1	7.6	3.6	1.7	2.6	1.0	.9	.8	.6	2.0	.8
5	2.3	2.0	8.5	3.3	1.7	2.1	.9	1.0	.8	.6	1.8	.8
6	4.1	2.0	16.55	3.0	2.1	1.8	1.0	1.1	.7	.6	1.4	.7
7	6.9	2.0	12.9	2.8	2.0	1.6	2.0	1.1	.7	.6	1.4	.7
8	8.1	2.3	10.0	3.0	1.9	1.5	1.0	1.1	.6	.7	1.3	.7
9	6.8	2.3	8.1	3.5	2.0	1.4	1.0	1.0	.6	.7	1.2	.7
10	5.4	3.6	6.0	3.4	2.4	1.7	.9	1.0	.6	.6	1.0	.7
11	4.6	4.2	5.8	4.2	4.5	1.8	.9	.9	.6	.6	.9	.7
12	3.9	4.2	5.6	4.5	3.8	1.7	.8	.8	.8	.6	.9	.8
13	3.6	4.0	5.0	3.4	3.4	1.7	.8	.6	1.2	.6	.8	.8
14	3.4	3.9	4.8	3.2	3.2	1.6	.8	.6	1.1	.5	.8	1.2
15	3.4	3.8	4.5	3.0	2.8	1.5	.9	.6	1.0	.5	.8	3.0
16	4.0	4.0	4.6	2.8	2.5	1.5	1.1	.7	.9	.5	.8	2.1
17	5.7	4.5	4.7	2.7	2.3	1.4	.9	.7	.8	.5	.8	1.7
18	5.2	5.0	4.4	2.6	2.4	1.4	.7	.6	.7	.5	.7	1.5
19	4.7	5.2	5.2	2.5	8.55	1.3	.7	.6	.7	.5	.7	1.6
20	4.4	5.4	5.4	2.4	6.3	1.3	.7	.6	.9	.5	.7	1.5
21	4.0	6.0	5.3	2.2	5.0	1.2	.7	.6	.7	.5	.7	1.3
22	3.5	8.5	4.7	2.1	3.6	1.2	.7	.5	.8	.5	.7	1.1
23	3.3	14.8	4.2	2.0	3.0	1.1	.7	.5	.9	.5	.8	1.0

Daily gage height, in feet, of Potomac River at Point of Rocks, Md.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1899.												
24	3.2	13.7	4.0	2.0	2.7	1.1	.6	.5	.9	.5	.8	1.2
25	3.3	9.0	3.9	2.0	2.4	1.0	.6	.5	.9	.5	.9	1.8
26	4.8	6.0	3.7	1.9	2.1	1.0	.6	.5	1.0	.5	.9	2.1
27	4.7	9.25	3.5	1.9	2.0	1.0	.6	1.2	.8	.5	.8	1.5
28	3.9	13.9	3.4	1.8	1.8	1.2	.6	1.1	.7	.5	.8	1.6
29	3.2	.....	4.6	1.7	1.7	1.1	.5	1.1	.7	.5	.8	1.6
30	2.8	.....	8.6	1.7	1.7	1.0	.8	1.0	.8	.5	.8	1.6
31	2.6	.....	7.0	.....	1.8	.....	.8	1.0	.....	.6	.....	1.6
1900.												
1	1.5	1.0	3.5	4.8	1.9	1.3	1.2	1.2	0.7	0.3	0.5	2.4
2	1.5	1.6	4.5	3.8	1.7	1.3	1.1	1.1	.7	.3	.5	1.9
3	1.4	2.0	6.6	3.4	1.6	1.3	1.0	1.0	.6	.3	.5	1.6
4	1.5	2.1	5.9	3.1	1.5	1.4	1.0	.9	.6	.3	.5	1.6
5	1.5	2.2	4.4	2.8	1.5	1.6	.9	.9	.5	.3	.5	2.0
6	1.4	1.9	4.0	2.7	1.4	1.6	1.3	.8	.6	.3	.4	4.1
7	1.4	1.8	3.6	2.6	1.4	1.5	1.0	.8	.5	.3	.4	5.9
8	1.3	1.5	3.9	2.5	1.3	1.4	.9	.7	.4	.3	.4	3.7
9	1.3	1.8	4.5	2.4	1.3	1.4	.8	.6	.4	.3	.5	3.0
10	1.2	2.3	4.0	2.3	1.3	1.3	.7	.6	.3	.3	.6	2.5
11	1.3	3.0	3.6	2.1	1.2	1.2	.6	.5	.4	.3	.5	2.1
12	1.4	2.5	3.2	2.1	1.2	1.1	.6	.5	.3	.3	.4	1.8
13	1.4	3.0	2.9	2.0	1.1	1.0	.5	.4	.3	.3	.4	1.6
14	1.5	4.5	2.8	1.9	1.1	.9	.5	.4	.4	.3	.4	1.5
15	1.8	5.3	2.7	1.9	1.1	1.3	.5	.4	.4	.9	.4	1.4
16	2.1	4.5	2.6	1.8	1.1	1.0	.4	.4	.4	.5	.4	1.4
17	1.9	3.8	2.4	1.8	1.0	1.8	.4	.4	.3	.4	.4	1.5
18	1.7	3.1	2.3	1.7	1.0	2.8	.4	.4	.3	.3	.3	1.2
19	1.6	2.6	2.4	1.7	1.2	8.5	.5	.4	.3	.3	.2	1.1
20	2.2	2.3	2.6	1.6	1.3	6.2	1.4	.4	.3	.3	.2	1.1
21	3.6	1.9	5.8	1.7	1.8	4.6	1.0	.4	.3	.3	.3	1.0
22	6.8	3.0	8.7	2.2	1.9	3.6	.9	.4	.3	.5	.4	.9
23	5.5	6.9	6.6	2.5	2.0	2.7	.8	.4	.3	.4	.4	.9
24	4.0	7.1	5.4	2.8	1.7	2.3	1.8	.4	.3	.4	.4	.8
25	3.3	5.6	5.0	3.0	1.5	2.1	1.6	.5	.3	.4	.4	.8
26	2.8	3.9	4.5	2.8	1.4	2.0	2.0	.6	.3	.4	1.2	.8
27	2.5	3.3	4.1	2.5	1.4	1.8	1.4	.7	.3	.5	3.3	.8
28	2.1	3.0	3.7	2.3	1.3	1.5	1.2	.9	.2	.5	8.2	.8
29	1.8	.....	3.5	2.1	1.3	1.4	1.0	.9	.3	.5	5.4	.8
30	1.3	.....	3.3	2.0	1.2	1.3	1.3	.8	.3	.5	3.2	.8
31	1.2	.....	3.2	.....	1.3	.....	1.3	.8	.....	.5	.....	.8
a1901.												
1	0.8	1.2	0.8	2.2	3.4	7.5	2.6	1.7	2.8	3.0	0.9	1.6
2	.9	1.1	.8	2.0	3.1	6.0	2.4	1.5	5.7	2.4	.9	1.5
3	.9	1.0	.8	3.3	2.8	4.8	2.3	1.4	5.3	2.1	1.0	1.4
4	.9	1.1	.8	5.4	2.6	4.0	2.1	1.4	4.1	1.9	1.0	1.7
5	.9	1.1	.8	7.7	2.5	3.5	2.0	1.3	3.2	1.9	.9	3.5
6	.8	1.1	.9	6.8	2.3	4.0	2.0	1.3	2.3	1.7	.9	2.9
7	.7	1.3	1.8	6.8	2.1	4.7	1.9	1.6	2.0	1.5	.9	2.6
8	.7	1.2	1.4	7.8	1.9	4.8	2.2	4.5	1.8	1.4	.9	2.4

a Gage heights April 16 to Dec. 31, 1901, are somewhat in error on account of uncertainty of the gage datums.

Daily gage height, in feet, of Potomac River at Point of Rocks, Md.—Con.

Day.	Jan.	Feb.	Mar.	Apr	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
*a*1901.												
9	.6	1.2	1.3	6.3	1.8	4.1	2.0	3.5	1.7	1.4	.9	2.2
10	.6	1.2	2.7	5.3	2.0	3.2	1.7	2.8	1.7	1.3	.9	2.3
11	.7	1.3	4.2	4.2	8.0	2.7	1.6	2.3	1.6	1.3	.9	2.8
12	1.1	1.4	12.4	3.3	9.1	2.5	1.5	2.3	1.6	1.2	.9	3.2
13	1.8	1.7	9.9	3.0	6.0	2.2	1.6	2.2	1.5	1.2	.9	3.0
14	4.6	1.7	6.2	3.2	4.6	2.4	2.0	2.2	1.5	1.2	.8	2.8
15	3.5	1.8	4.5	9.0	3.5	2.7	3.6	2.1	1.5	1.2	.8	8.1
16	2.8	1.7	3.9	15.0	3.0	3.0	5.1	2.0	1.8	1.2	.9	17.2
17	2.2	1.4	3.2	8.3	2.7	5.7	5.2	2.0	1.6	1.1	.9	13.3
18	2.0	1.1	2.8	7.4	2.4	8.5	5.5	2.3	1.5	1.1	.9	6.9
19	1.9	1.1	2.5	6.2	2.3	5.6	5.1	2.4	1.5	1.1	.9	5.0
20	1.7	1.0	2.3	5.4	2.2	4.5	4.6	2.6	1.4	1.1	.9	4.1
21	1.5	.9	2.5	11.4	2.0	3.7	3.6	3.0	1.4	1.1	.9	3.2
22	1.4	.9	3.0	20.8	1.9	5.6	3.1	2.7	1.4	1.1	.9	3.0
23	1.3	.8	3.2	15.8	12.6	4.6	2.8	2.3	1.3	1.1	.9	2.7
24	1.3	.9	3.3	11.2	14.2	4.5	2.5	2.0	1.3	1.0	1.8	2.5
25	1.4	.9	2.8	7.9	9.3	4.3	2.2	2.0	1.3	1.0	4.1	2.5
26	1.5	.9	2.5	6.6	7.2	4.0	2.1	2.0	1.2	1.0	4.4	2.7
27	1.5	1.0	2.6	5.6	7.5	3.6	2.2	2.2	1.2	1.0	3.2	3.0
28	1.3	1.0	2.5	4.8	7.6	3.3	2.0	2.7	1.2	.9	2.5	2.9
29	.9	.....	2.6	4.2	9.0	3.0	1.8	2.4	1.2	.9	2.0	4.4
30	1.0	.....	2.7	3.8	9.7	2.8	1.7	2.2	3.2	.9	1.7	13.8
31	1.2	.....	2.4	.....	8.6	.....	1.7	2.3	.....	.9	.....	18.4
*b*1902.												
1	11.7	3.7	22.5	5.7	2.7	1.8	1.6	1.6	.8	1.2	1.0	2.7
2	7.2	3.5	29.0	5.0	2.6	1.8	1.7	1.4	.9	1.2	1.0	2.8
3	5.6	3.3	16.1	4.5	2.6	1.7	1.8	1.7	.9	1.1	1.0	2.9
4	4.8	3.2	10.2	4.1	2.6	1.6	1.8	1.7	.9	1.0	1.0	3.4
5	4.2	2.8	8.1	4.0	2.5	1.6	1.7	1.8	.9	1.1	1.0	5.5
6	3.8	2.4	6.7	3.8	2.5	1.5	1.7	1.6	.9	1.2	1.0	4.4
7	3.5	2.5	5.8	4.0	2.5	1.5	1.6	1.5	.8	1.2	.9	4.2
8	3.2	2.6	6.7	6.4	2.4	1.5	1.6	1.5	.8	1.1	.9	4.0
9	3.1	2.5	7.4	16.4	3.1	1.4	1.5	1.4	.8	1.1	.9	3.8
10	3.0	2.5	8.5	14.3	2.7	1.4	1.5	1.3	.8	1.1	.9	3.5
11	2.8	*c*3.5	12.0	12.9	2.5	1.4	1.5	1.2	.8	1.1	.9	3.2
12	2.7	4.0	12.4	12.2	2.3	1.4	1.4	1.1	.8	1.4	.9	3.6
13	2.5	4.2	14.0	11.5	2.2	1.3	1.4	1.1	.7	1.6	1.0	4.9
14	2.3	4.4	13.8	9.3	2.2	1.4	1.4	1.0	.7	1.9	1.0	7.2
15	2.1	5.2	12.0	7.8	2.1	1.4	1.3	1.0	.7	2.0	1.0	6.8
16	2.1	5.4	10.2	6.5	2.1	1.4	1.3	1.0	.7	2.1	1.0	5.7
17	2.1	5.5	8.2	5.9	2.0	1.3	1.2	1.0	.7	2.0	1.0	7.2
18	2.1	5.2	10.6	5.3	1.9	1.3	1.2	1.0	.7	1.8	1.0	9.9
19	2.1	4.8	8.7	4.9	1.9	1.3	1.2	1.0	.7	1.6	1.0	8.0
20	2.1	4.5	6.6	4.6	2.6	1.3	1.2	1.0	.7	1.4	1.0	5.9
21	2.3	4.5	5.5	4.0	2.0	1.3	1.3	.9	.7	1.2	.9	5.2
22	3.0	5.6	4.5	3.5	2.0	1.3	1.3	.9	.7	1.1	.9	4.8
23	6.7	7.0	4.1	3.3	1.9	1.3	1.2	.9	.7	1.0	.9	5.0
24	5.2	4.1	3.8	3.0	1.9	1.3	1.1	.9	.7	.9	.9	5.2
25	3.2	4.4	3.6	2.9	1.9	1.2	1.1	1.0	.9	.9	1.3	4.8
26	3.0	17.75	3.5	2.8	2.0	1.4	1.1	1.0	.8	.9	1.5	4.2
27	3.5	27.2	3.5	2.9	2.2	1.5	1.0	.9	.8	.8	1.9	3.6

*a*Gage Heights April 16 to December 31, 1901, are somewhat in error.
*b*Gage heights January 1 to September 1, 1902, somewhat in error. Datum not known. Gage heights Sept. 2 to Dec. 31, 1902, refer to datum 41.75 feet below bench mark No. 1.
*c*Rise in gage Feb. 11 to 23, 1902, due to ice gorging.

Daily gage height, in feet, of Potomac River at Point of Rocks, Md.—Con

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
*b*1902.												
28	5.2	18.0	3.6	2.8	2.0	1.4	1.0	.9	.8	1.0	3.0	3.5
29	5.0	.....	3.7	2.7	1.9	1.4	1.0	1.0	.8	1.0	3.5	3.0
30	4.5	.....	4.3	2.7	1.9	1.4	1.6	.9	1.0	1.1	2.8	2.6
31	4.2	.....	6.4	.....	1.9	.....	1.7	.8	.....	1.1	.....	2.8
1903.												
1	2.6	6.5	14.2	7.7	3.0	3.7	8.7	1.7	2.0	1.2	1.1	1.1
2	2.4	6.1	15.3	7.0	2.9	4.9	5.8	1.7	2.1	1.1	1.1	1.1
3	4.9	6.0	8.9	6.1	2.8	4.0	4.5	1.6	2.2	1.1	1.0	1.1
4	11.6	6.3	6.6	5.0	2.8	3.4	4.0	1.7	2.1	1.1	1.0	1.1
5	10.3	8.2	5.7	4.9	2.8	3.0	3.5	1.8	2.0	1.0	1.0	1.1
6	7.6	9.2	5.3	4.6	2.7	2.6	4.7	1.9	1.9	1.0	1.0	1.1
7	5.7	6.7	5.0	4.3	2.7	2.4	8.2	2.3	1.8	1.0	1.0	1.1
8	4.8	6.3	4.8	4.1	2.6	6.4	5.8	2.3	1.7	1.1	1.1	1.1
9	4.2	5.2	4.6	4.5	2.5	8.2	4.0	2.2	1.6	2.3	1.1	1.0
10	3.5	4.5	4.8	6.1	2.4	7.4	3.4	2.0	1.5	2.0	1.1	1.0
11	3.0	4.1	5.4	5.6	2.3	6.5	3.0	2.9	1.5	1.9	1.0	1.0
12	2.8	3.7	5.0	5.4	2.3	5.1	3.5	2.8	1.4	1.8	1.0	1.0
13	2.7	3.7	4.6	5.3	2.2	5.3	5.6	2.5	1.4	1.8	1.0	1.0
14	2.6	3.9	4.3	5.6	2.1	6.0	3.9	2.3	1.5	1.7	1.0	1.0
15	2.7	3.9	4.0	14.4	2.1	5.6	3.5	2.0	1.5	1.7	1.0	1.1
16	2.8	4.0	3.8	15.1	2.0	4.5	3.2	2.0	1.4	1.6	1.0	1.2
17	2.9	6.8	3.6	14.0	2.0	4.0	3.0	1.9	1.5	1.5	1.1	*a*1.7
18	2.8	7.4	3.4	10.4	1.9	3.6	2.8	1.8	2.6	1.5	1.1	1.5
19	2.8	6.0	3.2	7.8	1.9	3.2	2.8	1.8	4.5	1.5	1.1	1.4
20	2.8	4.9	3.1	6.7	1.9	3.0	3.1	1.7	2.9	1.6	1.1	1.5
21	2.9	4.5	3.0	5.5	1.8	2.8	2.8	1.7	2.4	1.6	1.1	1.6
22	3.6	4.2	3.1	5.0	1.8	2.6	2.5	1.6	2.0	1.5	1.1	1.7
23	4.4	4.1	5.1	4.5	1.8	2.4	2.3	1.6	1.9	1.5	1.1	1.7
24	3.8	3.8	7.0	4.1	1.9	2.5	2.1	1.5	1.7	1.4	1.2	1.6
25	3.3	4.2	12.1	3.8	2.0	3.3	2.0	1.4	1.6	1.4	1.1	1.6
26	3.1	4.4	8.6	3.6	2.0	3.6	2.0	1.3	1.4	1.3	1.0	1.6
27	2.8	4.5	6.6	3.5	2.1	3.2	1.9	1.3	1.3	1.3	1.0	1.6
28	3.6	5.4	5.3	3.4	2.3	2.7	1.9	1.5	1.3	1.2	1.3	1.6
29	6.2	.....	4.7	3.2	2.4	6.2	1.8	2.1	1.2	1.2	1.1	1.7
30	7.3	.....	4.5	3.1	2.6	12.2	2.0	2.5	1.2	1.1	1.1	1.7
31	7.0	.....	5.1	.....	2.8	.....	1.8	2.1	.....	1.1	.....	1.6
1904.												
1	*c*1.5	*c*3.0	5.3	2.4	5.6	6.7	1.4	1.4	0.9	0.6	0.6	0.8
2	1.5	2.9	4.4	2.6	4.0	7.8	1.3	1.3	.8	.6	.6	.8
3	2.0	2.9	4.0	3.0	3.6	5.2	1.3	1.2	.8	.6	.7	.8
4	2.3	3.3	3.8	3.5	3.0	4.6	1.3	1.2	.8	.6	.7	.8
5	1.8	4.8	4.0	3.1	2.8	4.1	1.2	1.2	.9	.6	.7	.8
6	1.5	4.9	4.2	3.5	2.6	5.0	1.5	1.2	1.0	.6	.7	.8
7	1.5	4.9	4.5	3.0	2.5	4.4	1.5	1.3	.9	.6	.7	.8
8	1.5	3.3	5.0	2.4	2.8	4.0	1.6	1.4	.8	.6	.7	.8
9	1.6	3.5	4.8	2.3	2.7	3.6	1.6	1.5	.7	.5	.7	.8
10	1.6	5.7	5.4	2.3	2.6	3.2	1.7	1.4	.7	.5	.7	.9
11	1.6	5.0	4.5	2.6	2.5	2.8	2.9	1.3	.7	.5	.7	.9
12	1.7	3.9	3.8	3.1	2.5	2.6	2.6	1.3	.8	.6	.7	.9

*a*Ice conditions December 17 to 31, 1903.

*b*Gage heights January 1 to September 1, 1902, somewhat in error. Datum not known. Gage heights Sept. 2 to December 31, 1902, refer to datum 41.75 feet below bench mark No. 1.

*c*Ice conditions during part of January and February, 1904.

Daily gage height, in feet, of Potomac River at Point of Rocks, Md.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
13	1.6	3.6	3.3	2.8	2.4	2.5	3.4	1.2	1.0	.7	.7	.9
14	1.6	3.5	2.8	2.6	2.3	2.4	3.1	1.2	.9	.7	.8	.9
15	1.6	3.4	2.6	2.5	2.2	2.2	3.0	1.1	.9	.6	.8	.9
16	1.5	3.8	2.4	2.2	2.2	2.1	2.8	1.1	1.0	.6	.8	.9
17	1.5	3.8	2.4	2.1	2.1	2.0	2.4	1.1	1.0	.5	.7	.9
18	1.5	3.9	2.2	2.1	2.2	1.8	2.0	1.0	.9	.5	.8	.9
19	1.5	3.9	2.1	2.0	2.3	1.6	1.8	1.0	.8	.5	.8	.9
20	1.5	3.8	2.2	1.9	3.1	1.5	1.6	1.0	.7	.6	.8	1.0
21	1.5	3.8	2.3	1.9	6.2	1.5	1.4	1.0	.8	1.0	.7	1.0
22	2.0	4.5	2.4	1.8	4.7	2.5	1.4	.9	1.0	.9	.7	1.0
23	4.0	5.6	2.5	1.7	4.0	3.0	1.3	.9	.9	.8	.7	1.0
24	5.2	6.0	2.7	1.7	3.6	2.8	1.3	1.0	.8	.7	.7	1.0
25	7.4	6.6	3.7	1.6	3.1	2.5	1.3	1.0	.8	.7	.7	1.1
26	5.1	6.6	3.4	1.5	2.8	2.1	1.4	1.2	.8	.7	.7	1.4
27	3.6	7.6	3.0	1.6	2.5	1.7	1.4	1.1	.7	.7	.7	1.5
28	3.3	6.6	2.8	2.0	2.4	1.5	1.4	1.1	.7	.7	.7	1.8
29	3.2	6.0	2.6	3.7	2.3	1.5	1.5	1.0	.7	.6	.8	1.8
30	3.0	.....	2.5	6.3	2.2	1.4	1.5	1.0	.7	.6	.8	1.9
31	3.0	.....	2.4	.....	2.4	.....	1.5	.9	.....	.6	.....	2.0
1905.												
1	2.0	2.4	2.4	3.2	1.6	1.5	2.1	2.9	2.2	1.0	1.6	1.6
2	2.4	2.4	2.5	3.0	1.6	1.4	1.8	2.7	2.0	1.0	1.5	1.6
3	2.5	2.3	2.6	2.7	1.6	1.4	1.6	2.4	1.8	1.0	1.5	2.5
4	2.8	2.2	2.8	2.5	1.5	1.4	1.5	2.2	1.7	1.0	1.4	4.6
5	3.0	2.2	3.4	2.6	1.5	1.3	3.0	2.0	1.6	1.0	1.4	4.0
6	3.2	2.2	4.0	2.7	1.5	1.3	3.5	1.8	1.5	1.0	1.3	3.4
7	4.4	2.2	4.4	2.8	1.4	1.5	4.0	1.6	1.5	1.0	1.3	3.0
8	4.6	2.1	5.1	3.0	1.4	1.6	4.5	1.5	1.4	1.0	1.3	2.4
9	4.0	2.1	6.0	3.0	1.4	1.9	4.0	1.5	1.4	1.0	1.2	2.3
10	3.4	2.0	6.4	2.9	1.4	2.0	3.6	1.4	1.3	0.9	1.2	2.2
11	3.0	2.0	11.0	2.8	1.4	1.9	2.8	1.4	1.3	0.9	1.0	2.1
12	2.8	2.0	10.1	2.8	1.4	1.9	2.3	1.3	1.4	1.2	1.0	2.0
13	2.6	2.0	6.9	2.9	1.4	2.3	3.2	1.3	1.4	1.1	1.0	1.9
14	2.5	2.0	6.0	2.8	1.4	2.2	4.1	1.3	2.0	1.4	1.0	1.8
15	2.5	2.0	5.9	2.6	3.0	2.0	5.0	1.6	1.7	1.6	1.0	1.8
16	2.9	2.0	5.5	2.4	2.8	2.0	5.4	2.0	1.5	1.5	1.0	1.7
17	3.8	2.1	5.0	2.3	2.7	1.9	4.2	2.9	1.4	1.3	1.0	1.6
18	3.2	2.1	4.5	2.2	2.6	1.8	4.0	3.4	1.4	1.2	0.9	1.5
19	2.8	2.1	4.4	2.1	2.5	1.6	3.6	2.5	1.4	1.0	0.9	1.5
20	2.6	2.2	5.0	2.0	2.4	1.4	3.3	2.1	1.3	1.2	0.9	1.5
21	2.6	2.2	5.9	2.0	2.3	1.3	3.0	1.8	1.3	1.4	0.9	2.8
22	2.7	2.2	7.5	1.9	2.2	1.5	2.8	1.7	1.2	1.8	0.9	7.6
23	2.8	2.2	8.4	1.9	2.2	2.5	2.6	1.5	1.2	1.6	0.9	7.5
24	2.4	2.2	6.7	1.9	2.0	3.6	4.0	1.5	1.2	1.4	0.9	6.1
25	2.1	2.2	5.8	1.9	1.8	5.2	3.5	2.0	1.2	1.4	0.9	5.5
26	1.9	2.3	6.9	1.8	1.7	7.0	3.0	2.9	1.1	1.5	0.9	4.8
27	a3.0	2.3	5.9	1.8	1.6	5.0	2.6	3.4	1.1	1.6	0.9	4.1
28	2.6	2.4	5.2	1.7	1.5	3.6	2.3	3.9	1.1	1.7	0.9	3.4
29	2.6	.....	4.6	1.7	1.5	3.0	2.0	2.9	1.1	2.1	0.9	3.1
30	2.5	.....	4.0	1.7	1.4	2.6	1.8	2.8	1.0	2.0	1.3	3.0
31	2.5	.....	3.6	.....	1.3	.....	2.5	2.5	.....	1.8	.....	3.2

a Ice gorge January 27, 1905.

Rating table for Potomac River at Point of Rocks, Md., from February 17, 1895, to March 31, 1902.

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	1,040	1.80	6,200	3.40	14,160	6.00	30,020
0.30	1,180	1.90	6,660	3.50	14,700	6.20	31,380
0.40	1,340	2.00	7,120	3.60	15,260	6.40	32,780
0.50	1,540	2.10	7,580	3.70	15,820	6.60	34,180
0.60	1,760	2.20	8,060	3.80	16,380	6.80	35,620
0.70	2,000	2.30	8,540	3.90	16,940	7.00	37,080
0.80	2,280	2.40	9,020	4.00	17,520	7.20	38,560
0.90	2,600	2.50	9,500	4.20	18,680	7.40	40,080
1.00	2,940	2.60	10,000	4.40	19,840	7.60	41,600
1.10	3,300	2.70	10,500	4.60	21,040	7.80	43,160
1.20	3,680	2.80	11,000	4.80	22,240	8.00	44,720
1.30	4,080	2.90	11,520	5.00	23,480	8.50	48,700
1.40	4,480	3.00	12,040	5.20	24,740	9.00	52,700
1.50	4,900	3.10	12,560	5.40	26,020		
1.60	5,320	3.20	13,080	5.60	27,340		
1.70	5,760	3.30	13,620	5.80	28,660		

The above table is strictly applicable only for open channel conditions. It is based upon 23 discharge measurements made during 1895 to 1901, inclusive. It is well defined between gage heights 0.3 feet and 14.0 feet. The table has been extended beyond these limits. Above 9.00 feet the rating curve is a tangent, the difference being 830 per tenth.

Rating table for Potomac River at Point of Rocks, Md., from April 1, 1902 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	900	2.00	5,020	3.50	11,470	6.00	26,140
0.60	1,090	2.10	5,380	3.60	11,980	6.20	27,460
0.70	1,295	2.20	5,750	3.70	12,490	6.40	28,780
0.80	1,515	2.30	6,130	3.80	13,010	6.60	30,100
0.90	1,750	2.40	6,520	3.90	13,530	6.80	31,460
1.00	2,000	2.50	6,920	4.00	14,070	7.00	32,820
1.10	2,260	2.60	7,330	4.20	15,150	7.20	34,220
1.20	2,530	2.70	7,750	4.40	16,270	7.40	35,620
1.30	2,810	2.80	8,180	4.60	17,430	7.60	37,060
1.40	3,100	2.90	8,620	4.80	18,610	7.80	38,500
1.50	3,400	3.00	9,070	5.00	19,820	8.00	39,980
1.60	3,700	3.10	9,530	5.20	21,060	8.50	43,740
1.70	4,010	3.20	10,000	5.40	22,300	9.00	47,600
1.80	4,330	3.30	10,480	5.60	23,560	9.50	51,560
1.90	4,670	3.40	10,970	5.80	24,840	10.00	55,600

The above table is strictly applicable only for open channel conditions. It is based upon discharge measurements made during 1902 to 1905, inclusive. It is fairly well defined between gage heights 1.0 foot and 14.0 feet. The table has been extended beyond these limits. Above gage height 10.0 feet the rating curve is a tangent, the difference being 830 per tenth.

Estimated monthly discharge of Potomac River at Point of Rocks, Md.

(Drainage area, 9,654 square miles.)

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1895								
January	.....	.....	.....	.....	.....	.....	3.25	.....
February 17–28	15,260	5,320	7,413	.768	.343	.....	*a*1.16	.....
March	65,980	11,520	24,560	2.54	2.93	122	2.41	—.52
April	67,640	6,200	14,500	1.50	1.67	71	2.37	.70
May	29,340	7,120	12,540	1.30	1.50	61	2.46	.96
June	7,580	2,280	4,033	.418	.466	12	3.88	3.41
July	10,500	2,600	4,443	.460	.530	18	3.03	2.50
August	3,300	1,340	1,997	.207	.239	11	2.10	1.86
September	2,600	1,180	1,565	.162	.181	21	.85	.67
October	1,340	1,040	1,163	.120	.138	12	1.19	1.05
November	1,540	1,180	1,333	.138	.154	11	1.37	1.22
December	5,320	1,180	2,259	.234	.270	10	2.59	2.32
The year	.....	.....	.....	.....	.....	.....	26.66	.....
1896.								
*b*January	24,100	1,180	5,257	.545	.628	32	1.97	1.34
*b*February	37,080	2,600	10,470	1.08	1.16	33	3.48	2.32
March	.....	.....	.....	.....	.....	.....	3.55	.....
April	.....	.....	.....	.....	.....	.....	1.61	.....
*b*May 11–31	5,320	1,540	2,560	.265	.207	.....	*a*2.91	.....
*b*June	14,160	1,180	5,429	.562	.627	13	5.01	4.38
July	50,300	2,940	9,283	.962	1.11	19	5.79	4.68
August	9,500	1,540	3,449	.357	.412	24	1.69	1.27
September	25,380	1,180	2,175	.225	.251	4	6.09	5.84
October	159,400	2,000	12,490	1.29	1.49	162	.92	—.57
November	30,020	2,000	6,928	.718	.801	26	3.02	2.22
December	12,040	2,000	4,723	.489	.564	76	.74	.18
The year	.....	.....	.....	.....	.....	.....	36.78	.....

*a*Precipitation for complete month.

*b*Estimates January 1 to June 17, 1896, liable to considerable error, owing to possible error in gage.

Estimated monthly discharge of Potomac River at Point of Rocks, Md.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
*a*1897.								
January	8,540	2,280	4,284	.444	.512	33	1.55	1.04
February	182,200	6,660	42,660	4.42	4.60	78	5.88	1.28
March	31,380	11,520	20,850	2.16	2.49	104	2.40	—.09
April	28,000	5,760	10,830	1.12	1.25	55	2.28	1.03
May	94,200	5,760	22,950	2.38	2.74	57	4.77	2.03
June	7,580	4,080	5,997	.621	.693	28	2.43	1.74
July	10,500	2,940	5,315	.551	.635	16	4.08	3.44
August	6,200	3,300	4,092	.424	.489	17	2.93	2.44
September	2,940	2,000	2,337	.242	.270	17	1.60	1.33
October	2,600	1,760	1,968	.204	.235	17	1.43	1.19
November	4,480	1,340	2,096	.217	.242	6	4.10	3.86
December	19,260	2,600	6,579	.681	.785	24	3.22	2.44
The year	182,200	1,340	10,830	1.12	14.94	41	36.67	21.74
1898.								
January	41,600	3,300	14,660	1.52	1.75	46	3.78	2.03
February	18,100	5,760	8,339	.864	.900	84	1.07	.17
March	65,150	4,480	15,470	1.60	1.84	41	4.44	2.60
April	52,700	9,020	15,970	1.65	1.84	78	2.36	.52
May	69,720	6,200	18,060	1.87	2.16	45	4.76	2.60
June	8,060	2,600	4,178	.433	.483	27	1.81	1.33
July	5,760	1,540	2,418	.250	.288	9	3.21	2.92
August	115,400	3,680	22,280	2.31	2.66	38	7.00	4.34
September	3,680	2,000	2,497	.259	.289	22	1.32	1.03
October	86,730	1,760	13,580	1.41	1.63	25	6.41	4.78
November	15,260	5,320	8,557	.886	.988	41	2.41	1.42
December	54,360	6,200	15,330	1.59	1.83	63	2.91	1.08
The year	115,400	1,540	11,780	1.22	16.66	40	41.48	24.82

*a*1897 estimates are only approximate, owing to large errors in the chain length.

Estimated monthly discharge of Potomac River at Point of Rocks, Md.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1899.								
January	45,500	8,540	20,870	2.16	2.49	98	2.54	.05
February	100,800	7,120	28,130	2.91	3.03	70	4.44	1.41
March	115,400	14,160	35,240	3.65	4.21	106	3.96	—.25
April	25,380	5,760	11,750	1.22	1.36	99	1.37	.01
May	49,140	5,320	11,600	1.20	1.38	27	5.15	3.77
June	16,380	2,940	5,314	.550	.614	18	3.47	2.86
July	7,120	1,540	2,519	.261	.301	13	2.28	1.98
August	3,680	1,540	2,335	.242	.279	10	2.84	2.56
September	3,680	1,760	2,345	.243	.271	7	3.94	3.67
October	2,000	1,540	1,663	.172	.198	11	1.88	1.68
November	9,500	2,000	3,171	.328	.366	22	1.69	1.32
December	12,040	2,000	4,068	.421	.485	25	1.94	1.46
The year	115,400	1,540	10,750	1.11	14.98	42	35.50	20.52
1900.								
January	35,620	3,680	8,166	.846	.975	47	2.10	1.12
February	37,820	2,940	13,340	1.38	1.44	42	3.44	2.00
March	50,300	8,540	18,470	1.91	2.20	64	3.42	1.22
April	22,240	5,320	9,295	.963	1.07	80	1.34	.27
May	7,120	2,940	4,466	.463	.534	23	2.32	1.79
June	48,700	2,600	8,394	.869	.970	23	4.19	3.22
July	7,120	1,340	3,008	.312	.360	10	3.74	3.38
August	3,680	1,340	1,917	.199	.229	11	2.08	1.85
September	2,000	1,040	1,344	.139	.155	8	1.95	1.79
October	2,600	1,180	1,333	.138	.159	8	2.08	1.92
November	46,300	1,040	4,570	.473	.528	15	3.62	3.09
December	29,340	2,280	6,218	.644	.742	42	1.77	1.03
The year	50,300	1,040	6,710	.695	9.36	29	32.05	22.68

Estimated monthly discharge of Potomac River at Point of Rocks, Md.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
*a*1901.								
January	21,040	1,760	4,929	.511	.589	30	1.95	1.36
February	6,200	2,280	3,649	.378	.394	85	.46	.07
March	80,920	2,280	13,800	1.43	1.65	48	3.46	1.81
April	150,600	7,120	39,750	4.12	4.60	76	6.05	1.45
May	95,860	6,200	26,920	2.79	3.22	50	6.47	3.25
June	48,700	8,060	18,840	1.95	2.18	48	4.56	2.38
July	26,680	4,900	10,720	1.11	1.28	34	3.82	2.54
August	20,440	4,080	8,337	.864	.996	16	6.23	5.23
September	28,000	3,680	7,636	.791	.882	28	3.15	2.27
October	12,040	2,600	4,303	.446	.514	90	.57	.06
November	19,840	2,280	4,648	.481	.537	22	2.50	1.96
December	130,700	4,480	25,610	2.65	3.06	54	5.71	2.65
The year	150,600	1,760	14,100	1.46	19.90	44	44.93	25.03
*a*1902.								
January	75,110	7,580	17,520	1.81	2.09	75	2.78	.69
*b*February	203,800	9,020	32,520	3.37	3.51	90	3.88	.37
March	218,700	14,700	54,410	5.64	6.50	149	4.35	—2.15
April	108,700	7,750	28,760	2.99	3.34	104	3.20	—.14
May	9,530	4,670	5,973	.619	.714	36	1.97	1.26
June	4,330	2,530	3,186	.330	.368	11	3.45	3.08
July	4,330	2,000	3,086	.320	.369	13	2.75	2.38
August	4,330	1,515	2,464	.255	.294	13	2.16	1.87
September	2,000	1,295	1,490	.154	.172	8	2.01	1.84
October	5,380	1,515	2,767	.287	.331	10	3.36	3.03
November	11,470	1,750	2,837	.294	.328	13	2.49	2.16
December	54,780	7,330	18,970	1.96	2.26	50	4.50	2.24
The year	218,700	1,295	14,500	1.50	20.28	55	36.90	16.62

*a*Estimates April 16, 1901, to September 1, 1902, liable to some error on account of uncertainty of the gage datum.
*b*Ice gorge Februrary 11 to 23, 1902. No correction made in estimates.

Estimated monthly discharge of Potomac River at Point of Rocks, Md.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1903.								
January	68,880	6,520	17,200	1.78	2.05	58	3.51	1.46
February	49,160	12,490	22,190	2.30	2.40	69	3.49	1.09
March	99,590	9,070	26,730	2.77	3.19	89	3.59	.40
April	97,930	9,530	28,900	2.99	3.34	89	3.75	.41
May	9,070	4,330	6,212	.643	.741	25	2.92	2.18
June	73,860	6,520	17,970	1.86	2.08	32	6.57	4.49
July	45,260	4,330	12,760	1.32	1.52	33	4.67	3.15
August	8,620	2,810	4,826	.500	.576	16	3.67	3.09
September	16,850	2,530	4,669	.484	.540	24	2.29	1.75
October	6,130	2,000	3,212	.333	.384	15	2.57	2.19
November	2,810	2,000	2,175	.225	.251	27	.91	.66
*a*December	4,010	2,000	2,926	.303	.349	45	.78	.43
The year	99,590	2,000	12,480	1.29	17.42	45	38.72	21.30
1904.								
*b*January	35,620	3,400	7,287	.755	.870	42	2.05	1.18
*b*February	37,060	8,620	17,480	1.81	1.95	163	1.20	—.75
March	22,300	5,380	11,170	1.16	1.34	64	2.08	.74
April	28,120	3,400	7,406	.767	.856	35	2.46	1.60
May	27,460	5,380	9,362	.970	1.12	33	3.43	2.31
June	38,500	3,100	10,160	1.05	1.17	24	4.78	3.61
July	10,970	2,530	4,510	.467	.538	12	4.54	4.00
August	3,400	1,750	2,394	.248	.286	12	2.32	2.03
September	2,000	1,295	1,592	.165	.184	8	2.25	2.07
October	2,000	900	1,164	.121	.140	8	1.66	1.52
November	1,515	1,090	1,340	.139	.155	19	.79	.64
December	5,020	1,515	2,201	.228	.263	10	2.52	2.26
The year	38,500	900	6,339	.657	8.87	30	30.08	21.21

*a*Ice conditions December 17 to 31, 1903. No correction made in estimate.

*b*Ice conditions during portions of January and February, 1904. No correction made in estimate.

Estimated monthly discharge of Potomac River at Point of Rocks, Md.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1905.								
*a*January	17,430	4,670	8,626	.894	1.03	33	3.12	2.09
February	6,520	5,020	5,625	.583	.607	35	1.73	1.12
March	63,900	6,520	23,480	2.43	2.80	97	2.89	.09
April	10,000	4,010	6,581	.682	.761	44	1.72	.96
May	9,070	2,810	4,493	.465	.536	18	3.05	2.51
June	32,820	2,810	6,579	.681	.760	15	5.23	4.47
July	22,300	3,400	10,190	1.06	1.22	18	6.63	5.41
August	13,530	2,810	5,830	.604	.696	17	4.08	3.38
September	5,750	2,000	3,205	.332	.370	20	1.86	1.49
October	5,380	1,750	2,888	.299	.345	.....	.....	.....
November	3,700	1,750	2,267	.235	.262	.....	.....	.....
December	37,060	3,400	10,640	1.10	1.27	.....	.....	.....
The year	63,900	1,750	7,534	.780	10.66	.....	.....	.....

*a*Ice gorge January 27, 1905. No correction made in estimate.

SHENANDOAH RIVER AT MILLVILLE, W. VA.

Shenandoah River is formed by the junction of the North Fork and the South Fork at Riverton, Va., and flows in a northeasterly direction into West Virginia, where it empties into the Potomac at Harpers Ferry.

The Millville station was established April 15, 1895, by C. C. Babb. It is located about one-fourth mile above the Baltimore and Ohio Railroad station at Millville, W. Va. The highway runs within a few rods of the stream at the gaging station. The station is best reached by driving from Harpers Ferry, W. Va. The vertical gage is spiked to a large sycamore tree on the left bank a few hundred feet downstream from the cable. Bench mark No. 1 is a copper plug in the upstream side of the base of the second tree downstream from the gage. Its elevation is 6.68 feet above the zero of the gage. Bench mark No. 2 is the upper surface of the head of a wire nail driven horizontally in a blaze on the base of the first tree upstream from the gage. Its elevation is 7.42 feet above the zero of the gage. Bench mark No. 3 is the upper surface of the head of a wire spike

driven in a blaze on the tree to which the gage is fastened, on the side away from the river. Its elevation is 9.43 feet above the zero of the gage. Discharge measurements are made from a three-fourths-inch cable, from which is suspended a car. The cable, which is suspended over the branches of two large sycamore trees and is securely anchored to the bank at both ends, has a total span of 500 feet. The initial point for soundings is the side of the tree to which the cable is attached on the left bank. The channel is straight for several hundred feet above and below the station, and the current is swift and unobstructed. Both banks are low and liable to overflow. There is but one channel at all stages. The bed of the stream is composed of mud and rocks. The gage is read once each day by W. R. Nicewarner, the railroad station agent.

Discharge measurements of Shenandoah River at Millville, W. Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1895.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
April 24	C. C. Babb	1,824	1.18	1.90	2,162
*a*May 1	do	4,843	4.07	7.50	19,710
*a*May 2	do	4,393	3.61	6.80	15,860
May 4	do	3,463	3.18	5.20	10,980
May 8	do	2,395	1.80	3.08	4,311
May 24	do	2,656	2.16	3.60	5,745
June 8	do	1,645	.92	1.50	1,516
June 15	do	2,135	1.42	2.35	3,044
June 22	do	1,464	.77	1.10	1,126
July 12	do	1,549	.74	1.30	1,150
1896.					
June 22	D. C. Humphreys	1,903	1.32	1.99	2,513
1897.					
June 24	Davis & Paul	1,438	.95	1.20	1,371
July 23	G. H. Matthes	1,960	1.42	1.82	2,791
September 4	do	1,128	.56	0.52	632
October 25	E. G. Paul	1,144	.71	0.72	814

*a*The data for these measurements were partly estimated. They were not considered in preparing the rating tables

Discharge measurements of Shenandoah River at Millville, W. Va.—Con.

Date	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge
1898.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
January 24	E. G. Paul	1,948	1.54	2.20	3,001
August 16	do	2,916	2.69	*a*4.30	7,834
October 1	do	1,308	.77	0.90	1,001
1899.					
January 27	E. G. Paul	1,948	1.62	2.40	3,156
March 10	do	3,289	3.29	5.00	10,840
May 16	do	2,045	1.35	2.10	2,753
September 3	do	1,340	.81	0.90	1,086
October 29	do	1,159	.66	0.60	766
1900.					
February 24	E. G. Paul	3,926	3.31	5.90	12,980
June 19	do	3,192	2.86	4.55	9,132
September 15	C. R. Olberg	1,098	.45	0.40	500
1901.					
July 22	E. G. Paul	2,499	2.17	3.30	5,419
December 27	do	2,007	1.64	2.35	3,291
1902.					
August 17	E. G. Paul	1,225	0.66	0.70	811
1903.					
August 26	W. C. Sawyer	1,455	0.76	1.00	1,107
1904.					
June 13	F. H. Brundage	1,771	1.06	1.70	1,883
July 4	Hoyt and Hall	1,578	0.72	1.20	1,137
July 10	Hoyt and Grover	1,561	0.88	1.34	1,371
September 28	E. C. Murphy	1,147	0.49	0.50	564
October 20	do	1,126	0.44	0.41	494
1905.					
April 22	N. C. Grover	1,604	0.99	1.40	1,595
September 20	R. H. Bolster	1,325	0.60	0.84	799

*a*Gage height is uncertain.

Daily gage height, in feet, of Shenandoah River at Millville, W. Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1895.												
1	.....	.....	.....	.....	7.4	2.1	2.0	1.1	0.7	0.6	0.5	.6
2	.....	.....	.....	.....	6.9	1.9	4.1	1.0	1.3	0.6	0.5	.6
3	.....	.....	.....	.....	6.2	1.8	3.0	1.0	1.0	.6	0.6	.6
4	.....	.....	.....	.....	5.45	1.7	2.4	1.0	.9	.5	.6	.6
5	.....	.....	.....	.....	4.4	1.7	2.0	1.0	.8	.5	.6	.6
6	.....	.....	.....	.....	3.85	1.6	1.8	1.0	.6	.5	.6	.6
7	.....	.....	.....	.....	3.3	1.6	1.7	.9	.6	.5	.6	.6
8	.....	.....	.....	.....	3.05	1.5	1.5	.9	.6	.5	.6	.6
9	.....	.....	.....	.....	2.9	1.4	1.4	.9	1.0	.5	.6	.6
10	.....	.....	.....	.....	2.6	1.4	1.4	.9	.8	.5	.7	.6
11	.....	.....	.....	.....	2.6	1.3	1.4	.9	.7	.5	.7	.6
12	.....	.....	.....	.....	2.4	1.3	1.3	.9	1.0	.5	.7	.6
13	.....	.....	.....	.....	2.4	1.3	1.3	.9	.9	.5	.7	.6
14	.....	.....	.....	.....	2.3	1.4	1.3	.8	.9	.5	.7	.6
15	.....	.....	.....	2.8	2.3	2.4	1.2	.7	.7	.5	.7	.6
16	.....	.....	.....	3.0	2.3	1.8	1.1	.7	.7	.5	.6	.6
17	.....	.....	.....	2.7	2.2	1.5	1.2	.6	.6	.5	.6	.6
18	.....	.....	.....	2.5	2.2	1.3	1.5	.6	.6	.5	.6	.6
19	.....	.....	.....	2.4	2.2	1.2	1.2	.8	.6	.5	.6	.7
20	.....	.....	.....	2.3	2.3	1.2	1.1	.8	.6	.5	.6	.7
21	.....	.....	.....	2.3	2.4	1.1	1.0	.8	.7	.5	.6	.7
22	.....	.....	.....	2.0	2.7	1.1	1.0	.8	.6	.5	.6	.7
23	.....	.....	.....	2.0	3.85	1.0	1.0	.7	.6	.5	.6	.7
24	.....	.....	.....	1.9	3.75	1.0	1.2	.6	.6	.5	.6	.7
25	.....	.....	.....	1.8	3.2	1.0	1.2	.6	.6	.5	.6	1.1
26	.....	.....	.....	1.8	2.8	1.0	2.1	.6	.6	.5	.6	1.0
27	.....	.....	.....	1.8	2.7	1.0	2.2	.6	.6	.4	.6	1.0
28	.....	.....	.....	1.7	2.7	2.2	1.9	.5	.6	.4	.6	1.0
29	.....	.....	.....	2.1	2.5	1.9	1.7	.5	.6	.4	.6	1.3
30	.....	.....	.....	3.1	2.3	1.8	1.5	.5	.6	.4	.6	1.4
31	.....	.....	.....	.....	2.1	.....	1.3	1.5	.....	.4	.....	1.4
1896.												
1	1.3	1.4	2.6	4.6	1.4	.9	1.6	1.3	0.7	a19.7	0.9	2.6
2	1.9	1.6	2.4	4.2	1.4	.9	1.6	1.2	.6	a10.0	.9	3.8
3	1.8	1.8	2.3	3.8	1.5	.9	1.5	1.1	.6	5.6	.9	3.1
4	1.8	2.0	2.0	3.6	1.7	.9	1.5	1.0	.6	4.0	.9	2.6
5	1.7	2.6	1.7	3.2	1.8	.9	1.5	1.0	.6	3.4	1.0	2.0
6	1.6	2.9	1.5	2.8	1.9	.8	1.5	1.0	.6	2.8	1.1	2.0
7	1.6	3.8	1.4	2.6	2.4	1.0	1.6	1.1	.5	2.1	3.2	2.0
8	1.6	5.6	1.5	2.6	2.2	1.4	1.6	1.1	.5	2.0	2.7	2.0
9	1.4	4.1	1.5	2.0	2.0	1.9	3.15	1.0	.5	1.9	2.4	2.0
10	1.3	3.7	1.5	2.0	2.0	2.7	4.65	1.0	.5	1.8	2.1	2.0
11	1.3	3.2	1.5	2.0	1.9	2.8	3.6	1.0	.6	1.8	1.9	1.9
12	1.2	2.9	1.4	2.0	1.7	2.4	2.5	1.4	.6	1.6	1.9	1.9
13	1.2	2.5	1.4	2.0	1.7	1.6	2.2	1.6	.6	1.4	1.9	1.8
14	1.0	2.4	1.4	1.9	1.6	1.6	2.2	1.5	.6	1.4	1.9	1.8
15	1.0	3.8	1.5	1.7	2.4	1.9	2.2	1.4	.6	1.4	1.9	1.7
16	1.0	3.5	1.5	1.7	3.0	1.9	2.2	1.4	.6	1.4	1.8	1.7
17	1.0	3.0	1.6	1.6	2.5	1.8	2.1	1.7	.6	1.3	1.7	1.7
18	1.0	2.7	3.0	1.6	2.4	1.9	2.0	1.6	.6	1.3	1.6	1.7
19	1.0	2.5	4.2	1.6	2.4	2.2	2.0	1.3	.6	1.3	1.6	1.7
20	1.0	2.4	4.6	1.5	2.2	2.0	1.8	1.2	.8	1.2	1.5	1.6

a Gage heights estimated October 1 and 2, 1896.

Daily gage height, in feet, of Shenandoah River at Millville, W. Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1896.												
21	.9	2.4	5.5	1.5	1.8	1.9	1.6	1.2	.8	1.1	1.5	1.5
22	.9	2.3	4.6	1.5	1.6	2.0	1.5	1.2	.8	1.1	1.5	1.5
23	.9	2.2	4.0	1.5	1.5	2.2	4.1	1.0	.7	1.0	1.5	1.4
24	2.4	2.2	3.5	1.5	1.6	2.0	3.0	1.0	.6	1.0	1.5	1.4
25	5.1	1.8	3.0	1.5	1.5	1.9	3.3	1.0	.6	1.0	1.4	1.6
26	5.3	1.7	2.9	1.4	1.5	1.8	2.6	.9	.6	1.0	1.4	1.6
27	4.35	1.6	2.8	1.4	1.5	1.8	2.0	.9	.6	1.0	1.4	1.6
28	3.35	1.5	2.7	1.4	1.4	2.2	1.7	.8	.6	1.0	1.4	1.8
29	2.0	2.0	2.7	1.4	1.4	2.3	1.5	.8	.6	1.0	1.4	1.8
30	1.9	.....	2.6	1.4	1.4	1.9	1.4	.8	5.75	1.0	1.6	1.8
31	1.7	.....	4.6	.....	1.1	.....	1.3	.8	.....	.9	.....	1.8
1897.												
1	a1.6	1.1	3.8	2.1	1.5	1.6	1.1	1.1	.7	.5	.9	a .8
2	1.5	1.1	3.6	2.1	1.8	1.6	1.0	1.0	.7	.5	.9	.8
3	1.4	1.6	3.6	2.0	9.35	1.5	1.0	.9	.7	.5	.9	.7
4	1.4	2.0	3.6	2.0	7.2	1.7	1.0	.9	.6	.5	1.1	.8
5	1.3	2.2	3.6	2.2	5.2	1.7	1.1	.9	.6	.5	1.4	1.0
6	1.3	2.2	3.6	2.4	4.7	1.9	1.0	1.5	.6	.5	1.1	1.8
7	1.3	.....	3.4	2.3	3.6	1.8	.8	.9	.5	.35	.8	1.2
8	1.2	.....	3.3	2.4	3.2	1.7	.8	.9	.5	.35	.8	1.1
9	1.2	.....	3.0	2.4	2.9	1.6	.8	.9	.5	.35	.7	.9
10	1.1	6.1	2.8	2.4	2.5	1.6	.8	.8	.4	.35	.8	.9
11	1.1	5.4	2.7	2.4	2.4	1.4	.....	1.2	.4	.4	.7	.8
12	1.1	4.8	2.6	2.4	2.4	1.4	1.1	1.0	.4	.5	.7	.9
13	1.4	4.1	2.6	2.3	2.5	1.4	1.0	.9	.4	.5	.5	.9
14	1.4	6.0	2.8	2.3	4.35	1.3	1.0	.8	.4	.5	.5	1.0
15	1.3	4.7	2.8	2.3	6.6	1.3	1.2	.7	.4	.5	.7	1.7
16	1.2	5.75	3.5	2.2	4.9	1.3	.9	.7	.4	.5	.65	2.4
17	1.1	5.9	3.6	2.2	3.9	1.3	.9	.7	.4	.5	.7	2.7
18	1.1	5.3	3.4	2.1	3.5	1.2	.9	.7	.4	.45	.6	2.2
19	1.1	4.9	3.2	2.1	3.2	1.2	.8	.6	.4	.4	.6	1.8
20	1.1	4.6	3.2	2.0	2.9	1.6	1.9	.6	.4	.4	.5	1.6
21	1.1	4.5	3.6	1.9	2.6	1.6	2.6	.6	.4	.45	.6	1.3
22	1.2	6.45	3.4	1.8	2.4	1.4	2.6	.6	.4	.5	.6	1.3
23	1.2	10.05	3.3	1.8	2.3	1.3	1.8	.6	.4	.5	.6	1.3
24	1.2	10.05	3.2	1.7	2.2	1.2	1.5	1.0	.6	.55	.55	1.3
25	1.1	6.7	3.0	1.7	2.2	1.1	1.3	1.3	1.2	.7	.5	1.3
26	1.1	5.5	2.9	1.6	2.2	1.1	1.2	1.0	.5	.8	.5	2.0
27	1.1	4.6	2.7	1.5	1.8	1.1	1.1	.9	.5	.9	.8	1.5
28	1.1	4.6	2.5	1.5	1.6	1.0	1.2	.8	.5	.8	.9	1.6
29	1.1	.....	2.4	1.4	1.6	1.0	1.5	.7	.4	.8	.7	1.5
30	1.1	.....	2.1	1.4	1.6	.9	1.3	.7	.4	.8	.6	1.2
31	1.0	.....	2.0	.....	1.6	.....	1.1	.8	.....	.9	.....	1.1
1898.												
1	1.5	b2.1	1.1	4.0	2.3	1.9	1.2	2.2	1.5	.9	2.8	2.1
2	1.3	2.1	1.1	3.9	2.2	1.8	.....	1.4	1.5	.9	2.4	2.1
3	1.2	1.8	1.1	3.2	2.0	1.7	.8	1.2	1.55	1.0	2.5	2.1
4	1.4	1.7	1.1	3.0	1.9	1.6	.8	1.4	1.5	1.0	2.7	2.5
5	1.0	2.1	1.0	2.8	1.7	1.6	.9	3.6	1.4	1.2	2.1	5.4

a Ice conditions during January and December, 24 to 31, 1897.
b Ice conditions during February, 1898.

Daily gage height, in feet, of Shenandoah River at Millville, W. Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1898.												
6	1.2	1.6	1.1	2.6	1.7	1.6	.9	8.3	1.4	1.8	2.0	6.0
7	.9	1.8	1.0	2.4	2.0	1.4	.9	4.1	1.4	1.5	2.0	4.6
8	1.3	1.8	1.0	2.3	6.3	1.3	.9	1.9	1.4	1.7	1.9	3.8
9	.9	1.6	1.0	2.2	8.9	1.2	.9	3.9	1.3	1.5	1.9	3.0
10	1.1	1.3	.9	2.0	7.4	1.1	.9	6.6	1.3	1.4	1.8	2.8
11	1.6	1.3	.9	1.8	5.4	1.1	.8	a11.7	1.1	1.3	1.9	2.6
12	1.2	1.3	.9	1.7	4.4	1.1	.7	10.0	1.1	1.2	1.8	2.4
13	2.0	1.1	.9	1.7	3.7	1.0	.7	6.0	1.1	1.0	1.7	2.4
14	1.9	1.1	.9	1.7	3.3	1.4	.7	5.1	1.1	1.0	1.8	2.2
15	2.0	1.1	.9	2.2	2.9	1.4	.7	4.1	1.0	1.0	1.7	1.9
16	3.6	1.0	.9	4.5	2.8	1.4	.7	3.9	1.0	1.0	1.7	2.2
17	2.9	.9	1.1	5.6	2.7	1.3	.7	3.6	1.0	1.1	1.7	2.2
18	2.6	.9	2.3	4.4	2.4	1.4	.7	3.4	1.1	1.1	1.7	2.2
19	2.1	1.0	2.0	3.8	2.2	1.9	.8	2.8	1.0	7.75	1.8	2.3
20	2.1	1.0	2.1	3.4	2.1	1.8	.9	3.4	1.0	8.4	2.3	2.0
21	2.1	1.0	2.1	2.8	2.0	1.5	1.1	2.7	1.0	5.0	2.7	2.0
22	2.0	1.3	2.0	2.6	2.0	1.7	1.1	2.4	1.0	5.0	2.5	2.0
23	2.0	1.3	1.9	2.4	2.4	1.4	1.0	2.3	1.1	9.1	2.5	2.3
24	2.3	1.3	1.9	2.2	2.9	1.4	.9	2.1	1.1	5.7	2.5	2.9
25	2.3	1.2	2.9	2.1	3.4	1.5	1.6	2.0	1.1	4.4	2.3	4.0
26	2.2	1.2	3.1	2.1	2.9	1.2	1.5	2.0	1.4	3.5	2.3	3.5
27	2.6	1.1	2.9	2.1	2.4	1.1	1.5	1.6	1.2	3.4	2.2	3.0
28	2.4	1.1	2.6	2.3	2.4	1.1	1.4	1.8	1.1	2.2	2.0	2.8
29	2.2	.....	2.6	2.2	2.4	1.1	1.4	1.6	1.1	3.0	2.0	2.5
30	1.5	.....	2.9	2.2	2.1	1.1	2.6	1.6	1.0	2.9	2.2	2.4
31	1.8	.....	3.4	.....	1.9	.....	2.1	1.6	.....	2.9	.....	2.3
1899.												
1	b2.5	b2.3	.....	3.1	1.7	2.05	0.9	1.0	1.1	0.8	1.55	0.8
2	2.2	2.1	.....	3.0	1.6	2.35	.9	.8	.9	.7	2.75	.8
3	2.8	1.7	.....	2.8	1.6	3.0	.8	.9	.9	.7	3.2	.75
4	2.6	2.0	.....	2.7	1.6	2.1	.8	1.3	1.1	.7	2.4	.7
5	3.3	2.4	.....	2.6	2.0	1.8	.8	.9	.8	.7	1.9	.75
6	3.8	2.5	.....	2.5	1.9	1.5	.8	.8	.7	.7	1.8	.7
7	4.6	2.3	.....	2.4	1.9	1.4	.7	1.1	.8	.7	1.6	.7
8	6.7	2.5	.....	2.5	1.8	1.4	.8	1.0	.7	.7	1.4	.7
9	5.0	2.5	.....	3.1	2.0	1.5	.9	1.2	.7	.8	1.3	.7
10	4.5	2.3	5.0	3.0	2.3	1.4	1.0	1.0	.7	.8	1.2	.7
11	3.8	2.4	5.5	2.9	3.1	1.3	.9	1.6	.8	.7	1.1	.7
12	3.5	.....	5.2	2.7	2.8	1.4	.8	.9	1.2	.8	1.0	.75
13	3.3	.....	4.6	2.6	2.6	1.4	.8	.8	.9	.7	1.0	.9
14	3.0	2.3	4.0	2.5	2.7	1.3	.7	.9	.8	.7	1.0	2.9
15	2.9	2.4	4.0	2.4	2.2	1.3	.7	.8	.8	.7	.9	2.2
16	3.0	2.5	4.0	2.3	2.1	1.3	.9	.7	.7	.6	.9	1.9
17	2.9	2.7	4.5	2.2	1.9	1.2	.8	.8	.7	.6	.9	1.6
18	2.9	3.0	3.9	2.2	1.9	1.1	.7	.8	.6	.6	.8	1.4
19	2.9	3.0	3.8	2.2	2.5	1.0	.7	.8	.6	.6	.9	1.3
20	2.8	3.4	3.8	2.2	2.3	1.0	.7	.7	.8	.6	.8	1.2
21	2.6	4.0	3.8	2.2	2.0	1.0	.7	.7	.9	.6	.8	1.2
22	2.4	c	3.7	1.9	1.9	.9	.7	.6	.9	.6	.8	1.1
23	2.4	.....	3.5	1.9	1.7	1.0	.6	.6	1.5	.6	.8	1.1
24	2.4	.....	3.3	1.9	1.7	.9	.6	.6	1.1	.6	.8	1.1

a Gage height estimated August 11, 1898.

b Ice conditions January 1 to February 21, 1899.

c River frozen February 22 to March 9, 1899. No readings taken.

Daily gage height, in feet, of Shenandoah River at Millville, W. Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1899.												
25	2.4	.....	3.1	1.8	1.6	.9	.7	.5	1.0	.6	.8	1.3
26	2.3	.....	3.0	2.0	1.5	.9	.6	.5	.9	.5	.85	1.2
27	2.5	.....	2.9	1.9	1.5	.9	.6	.6	.9	.6	.85	1.7
28	2.3	.....	2.9	1.8	1.4	.9	.6	.7	.9	.6	.8	1.4
29	2.2	.....	3.0	1.8	1.4	.9	.6	.8	.8	.6	.8	1.65
30	2.1	.....	3.6	1.7	1.3	1.0	1.5	1.0	.8	.6	.8	1.1
31	2.1	.....	3.3	.....	1.6	.....	1.0	1.3	.....	.7	.....	1.1
1900.												
1	1.25	2.1	3.0	2.55	1.8	1.5	1.3	1.15	0.6	0.6	0.8	2.0
2	1.3	1.2	4.8	2.5	1.75	1.5	1.25	1.0	.6	.7	.8	1.7
3	1.2	1.6	6.5	2.4	1.7	1.3	1.25	1.05	.6	.7	.8	1.5
4	1.15	1.55	4.8	2.25	1.6	1.3	1.2	1.0	.6	.7	.9	1.6
5	1.2	*a*2.0	3.9	2.2	1.6	1.3	1.2	.9	.55	.6	.9	2.25
6	1.3	*a*2.0	3.4	2.1	1.5	1.25	1.3	.85	.5	.55	.9	4.8
7	1.3	1.5	2.9	2.0	1.5	1.15	1.1	.8	.5	.5	.85	3.6
8	1.3	1.4	2.8	1.9	1.4	1.1	1.0	.75	.45	.5	.9	2.8
9	1.2	1.4	2.7	1.85	1.4	.95	.9	.7	.45	.75	.85	3.4
10	1.15	1.4	2.6	1.8	1.4	1.0	.85	.7	.45	.6	.8	2.2
11	1.2	1.4	2.5	1.7	1.3	.95	.8	.7	.45	.55	.8	1.9
12	1.1	1.4	2.4	1.7	1.3	.9	.8	.65	.45	.5	.8	1.75
13	1.3	1.5	2.3	1.7	1.3	1.0	.8	.7	.4	.5	.8	1.6
14	1.4	1.9	2.2	1.7	1.2	.9	.75	.6	.4	.7	.75	1.5
15	1.5	3.8	2.1	1.7	1.2	1.1	.75	.6	.4	.9	.75	1.4
16	1.3	3.3	2.1	1.6	1.15	1.3	.7	.55	.5	1.1	.75	1.35
17	1.2	2.8	2.1	1.6	1.1	2.3	.7	.6	.6	.9	.7	1.3
18	1.15	2.5	2.0	1.55	1.1	2.7	.65	.6	.55	.8	.7	1.2
19	1.2	2.3	2.0	1.6	1.2	4.5	.65	.6	1.1	.8	.65	1.15
20	1.8	2.2	3.3	1.65	1.1	3.7	1.2	.6	.8	.7	.65	1.15
21	6.0	2.5	5.95	2.1	1.9	3.0	.8	.65	.7	.6	.6	1.1
22	5.9	2.45	6.2	2.4	1.9	2.6	1.0	.6	.6	.55	.65	1.0
23	4.2	4.35	4.7	2.55	1.7	2.1	1.1	.55	.55	.5	.7	1.0
24	3.3	5.9	3.9	3.0	1.6	1.9	1.4	.6	.55	.65	.7	1.0
25	2.8	4.5	3.45	3.0	1.4	1.7	2.5	.6	.5	.8	.7	1.0
26	2.5	3.8	3.15	2.7	1.25	1.55	2.8	.55	.5	2.1	1.1	1.0
27	2.25	3.4	3.0	2.5	1.5	1.45	1.7	.65	.45	1.6	2.1	.95
28	2.0	2.8	2.95	2.3	1.5	1.4	1.5	.7	.5	1.25	4.5	.9
29	1.9	.....	2.8	2.15	1.5	1.35	1.3	.6	.55	1.1	3.15	.9
30	1.8	.....	2.7	2.0	1.4	1.3	1.3	.6	.65	.95	2.45	.9
31	1.85	.....	2.6	.....	1.3	.....	1.2	.6	.....	.9	.....	.9
1901.												
1	*b*0.9	*b*1.5	0.7	2.0	3.0	4.7	3.5	1.8	2.8	3.7	0.95	1.3
2	.9	1.6	.7	1.95	2.8	4.2	2.7	1.6	3.3	2.8	.95	1.2
3	.9	1.1	.7	2.5	2.7	3.7	2.4	1.5	3.0	2.4	.9	1.25
4	.95	1.0	.75	4.7	2.5	3.35	2.2	1.45	2.8	2.1	.9	1.5
5	.7	1.2	.75	5.7	2.4	3.3	1.15	1.4	2.3	1.8	.9	1.7
6	.9	2.3	.75	4.6	2.3	3.6	2.0	1.7	2.0	1.7	.9	1.8
7	.7	1.6	.8	4.2	2.2	4.1	2.5	2.1	1.9	1.5	.85	1.9
8	.8	1.6	.7	4.15	2.1	4.9	2.6	5.1	1.8	1.5	.85	1.8
9	.7	1.2	.8	3.6	2.1	4.5	2.0	3.8	1.6	1.5	.85	1.7

a Backwater from ice February 5 and 6, 1900.

b Water backed by ice during part of January and February, 1901.

Daily gage height, in feet, of Shenandoah River at Millville, W. Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901.												
10	*a*.8	*a*1.2	.8	3.2	5.5	3.7	1.9	2.7	1.5	1.4	.85	1.7
11	.9	1.2	1.7	2.85	3.25	3.1	1.8	2.2	1.45	1.4	.85	1.7
12	2.1	.9	7.3	2.6	4.2	2.8	1.85	2.3	1.5	1.35	.85	1.7
13	2.3	1.2	5.3	2.4	3.5	2.6	2.1	3.1	1.9	1.35	.85	2.0
14	3.5	1.3	3.9	3.0	3.0	3.5	3.0	3.4	1.6	1.4	.8	2.0
15	2.9	1.3	3.2	10.25	2.7	2.9	4.3	2.6	1.5	1.35	.8	7.35
16	2.4	1.5	2.75	9.6	2.5	5.8	5.8	2.2	1.6	1.3	.8	10.5
17	2.1	1.0	2.4	6.1	2.3	10.1	5.2	2.75	1.5	1.2	.8	6.2
18	1.9	.9	2.2	4.9	2.25	5.7	4.2	2.6	1.5	1.1	.8	4.7
19	1.8	.8	2.0	4.3	2.2	4.6	4.3	2.6	1.45	1.1	.8	3.8
20	1.4	.8	1.8	4.6	2.15	3.9	3.9	2.6	1.4	1.1	.8	3.2
21	1.4	.8	2.0	10.55	2.0	3.5	3.5	2.2	1.3	1.0	.8	2.8
22	1.5	.9	2.2	*b*	2.5	5.7	3.2	2.1	1.25	1.0	.8	1.2
23	1.4	.9	2.4	8.5	11.1	5.5	2.7	2.0	1.2	1.0	1.0	1.2
24	1.3	.8	2.55	6.5	8.4	3.8	2.4	1.9	1.2	1.1	2.4	2.5
25	1.3	.9	2.3	5.3	6.3	3.2	2.2	2.2	1.15	1.0	2.7	2.4
26	1.3	.6	2.1	4.8	6.0	2.9	2.0	2.1	1.15	1.0	2.3	1.8
27	1.3	.8	2.1	4.3	6.7	2.9	2.1	2.2	1.1	1.0	1.8	2.3
28	1.3	.8	2.1	3.9	6.2	3.1	1.85	2.5	1.1	1.0	1.7	2.7
29	1.5	.....	2.6	3.5	6.3	2.7	1.8	2.6	1.3	1.0	1.5	4.0
30	1.4	.....	2.4	3.2	5.6	3.0	1.85	2.3	5.3	1.0	1.3	10.8
31	1.2	.....	2.15	.....	4.9	.....	1.8	3.0	.....	1.0	.....	*b*
1902.												
1	7.4	*c*3.1	14.5	3.75	2.2	1.45	1.3	0.9	0.65	0.9	0.8	2.7
2	5.3	2.85	9.0	3.4	2.15	1.4	1.2	1.5	.65	.85	.8	2.45
3	4.5	3.0	7.2	3.2	2.2	1.35	1.15	1.9	.6	.8	.8	3.1
4	4.0	3.0	5.7	3.1	2.25	1.3	1.1	1.7	.6	.7	.8	3.2
5	3.5	2.8	5.0	2.9	2.1	1.3	1.05	1.3	.6	.9	.75	4.5
6	3.25	2.5	4.5	2.8	2.05	1.3	1.1	1.2	.65	1.0	.75	3.4
7	3.0	2.8	4.2	2.6	2.0	1.4	1.1	1.1	.6	.8	.7	3.7
8	2.85	2.7	4.2	2.8	4.0	1.25	1.05	1.05	.55	.75	.7	3.2
9	2.75	2.2	5.5	6.0	2.7	1.2	1.05	1.0	.6	1.1	.7	2.9
10	2.6	2.2	7.8	6.9	2.4	1.2	1.0	.9	.55	1.0	.65	2.65
11	2.5	2.1	8.0	7.2	2.1	1.15	.95	.8	.55	.9	.65	2.6
12	2.4	2.2	7.4	6.2	2.0	1.1	.9	.8	.55	1.0	.6	2.35
13	2.25	2.1	7.2	5.6	2.0	1.1	.9	.8	.5	1.2	.65	2.8
14	2.4	2.0	7.0	5.0	1.95	1.0	.9	.8	.5	1.75	.7	3.4
15	2.2	2.1	6.0	4.4	1.9	1.1	.8	.8	.55	1.55	.65	3.4
16	2.1	1.5	5.0	3.9	1.8	1.2	.8	.75	.55	1.3	.6	3.4
17	2.0	1.9	5.2	3.6	1.7	1.2	.8	.7	.5	1.15	.65	4.4
18	1.9	2.0	5.9	3.4	1.7	1.1	.8	.7	.5	1.0	.8	4.3
19	1.85	2.0	5.0	3.2	1.75	1.6	.75	.85	.5	.95	.8	4.0
20	1.8	1.7	4.4	3.0	1.8	1.4	.75	.8	.55	.9	.9	3.5
21	1.9	1.0	4.1	2.8	1.75	1.2	.8	.8	.6	.85	.8	3.1
22	3.2	2.4	3.8	2.7	1.7	1.2	.8	.8	.6	.8	.9	2.9
23	3.4	4.5	3.5	2.6	1.65	1.1	.8	.8	.6	.75	1.0	2.7
24	2.9	3.9	3.2	2.5	1.6	1.1	.75	.8	.55	.7	1.0	2.5
25	2.5	4.7	3.1	2.4	1.6	1.2	.75	.75	.55	.7	1.0	2.3
26	2.3	*d*	2.95	2.3	1.6	1.2	.8	.75	.6	.7	1.2	2.2
27	2.5	*d*	2.8	2.25	2.2	1.15	1.0	.7	.6	.65	2.0	2.1
28	3.6	11.0	2.75	2.2	1.75	1.1	.9	.7	.6	.9	2.5	2.1
29	4.4	.....	3.0	2.2	1.6	1.3	1.3	.7	.65	.85	2.4	2.1
30	3.6	.....	3.8	2.2	1.55	1.4	1.3	.65	1.0	.8	2.1	1.9
31	3.3	.....	3.9	.....	1.5	.....	1.4	.65	.....	.8	.....	1.8

*a*Water backed by ice during part of January and February, 1901.
*b*No reading; river out of banks April 22 and December 31, 1901.
*c*Ice conditions during part of February, 1902.
*d*Flood; no observation February 26 to 27, 1902.

Daily gage height, in feet, of Shenandoah River at Millville, W. Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
1	1.7	4.0	7.2	6.4	2.5	4.4	4.6	1.3	1.2	1.1	0.9	0.7
2	1.7	3.6	6.5	5.0	2.4	3.8	4.2	1.35	2.2	1.1	.9	.7
3	6.1	3.3	5.0	4.4	2.3	3.2	3.0	1.3	2.7	1.1	.9	.7
4	8.7	3.3	4.2	4.1	2.2	2.5	2.75	1.5	2.05	1.05	.9	.65
5	5.9	3.8	3.8	3.9	2.15	2.2	2.5	1.6	1.7	1.05	.95	.6
6	4.75	4.2	3.5	3.7	2.1	2.0	3.4	1.9	1.55	1.0	1.0	.6
7	4.0	3.7	3.25	3.5	2.1	3.9	4.65	2.0	1.45	1.0	.9	.6
8	3.5	3.3	3.2	3.3	2.05	9.2	3.7	1.7	1.3	1.8	.9	.55
9	3.1	2.7	3.6	3.3	2.0	6.5	2.3	1.5	1.25	2.1	.9	.6
10	2.8	2.5	3.4	3.3	1.9	8.9	2.0	1.55	1.2	2.0	.9	.8
11	2.7	2.3	3.3	3.2	1.85	4.9	1.95	1.4	1.2	1.8	.9	.7
12	2.7	2.1	3.2	3.0	1.8	4.6	1.9	1.4	1.3	1.65	.9	.7
13	2.2	2.3	3.2	3.1	1.75	4.0	2.7	1.35	1.2	1.55	.9	.7
14	2.3	2.7	3.0	5.4	1.7	4.3	2.6	1.3	1.2	1.5	.85	.8
15	2.0	2.6	2.95	7.8	1.7	3.6	2.8	1.3	1.2	1.4	.85	.8
16	2.3	2.6	2.8	6.6	1.65	3.1	2.7	1.25	1.1	1.3	.85	a1.1
17	2.2	3.3	2.7	6.1	1.65	2.8	2.2	1.25	1.3	1.3	.9	.5
18	2.35	4.6	2.6	5.0	1.6	2.6	2.0	1.2	2.1	1.25	.9	.7
19	2.3	4.1	2.55	4.4	1.55	2.4	1.9	1.5	4.6	1.2	.85	.8
20	1.95	3.6	2.5	3.9	1.55	2.1	1.8	1.45	3.1	1.2	.85	.9
21	2.2	3.4	2.5	3.7	1.5	2.0	1.7	1.3	2.7	1.2	.85	1.1
22	3.5	3.3	2.5	3.6	1.5	2.0	1.65	1.25	2.2	1.15	.85	1.0
23	6.0	3.0	4.1	3.3	1.5	1.9	1.6	1.2	1.8	1.1	.8	1.2
24	3.4	3.0	7.3	3.1	1.5	1.9	1.55	1.1	1.6	1.05	.8	1.4
25	2.8	3.2	7.6	3.0	1.5	1.85	1.5	1.05	1.5	1.0	.8	1.2
26	2.6	3.5	5.7	2.9	1.8	1.8	1.5	1.0	1.4	1.0	.8	.8
27	2.3	3.5	4.3	2.8	1.8	2.65	1.45	.95	1.3	1.0	.75	.9
28	3.35	4.0	3.8	2.7	1.7	3.2	1.35	1.1	1.25	.95	.7	1.0
29	6.9	.....	3.4	2.65	1.7	5.2	1.3	1.8	1.2	.95	.6	.9
30	5.2	.....	3.4	2.55	1.85	5.7	1.25	1.25	1.15	.95	.6	.8
31	4.5	.....	5.5	.....	2.05	.....	1.25	1.2	.....	.95	.....	.8
1904.												
1	0.8	.....	.....	1.8	3.3	4.0	1.5	1.15	0.6	0.45	0.45	b0.45
2	.85	.....	.....	1.8	3.3	2.6	1.4	1.05	.6	.4	.45	.45
3	1.2	.....	.....	1.75	2.7	2.3	1.3	1.1	.6	.4	.4	.5
4	1.2	.....	.....	1.7	2.4	2.1	1.2	1.25	.6	.4	.5	.5
5	1.0	.....	.....	1.6	2.15	2.6	1.1	1.4	.6	.4	.45	.5
6	1.0	.....	.....	1.5	2.1	2.85	1.2	1.4	.6	.4	.45	.55
7	1.1	.....	.....	1.5	1.95	4.0	1.15	1.7	.6	.45	.45	.5
8	1.1	.....	2.3	1.5	2.0	2.9	1.3	1.8	.6	.45	.45	.5
9	1.3	.....	4.9	1.6	2.0	2.4	1.25	1.45	.55	.4	.4	.5
10	1.2	.....	3.5	1.7	2.3	2.15	1.35	1.4	.55	.4	.4	.5
11	1.2	.....	3.0	2.45	2.5	2.0	5.6	1.35	.5	.4	.5	.85
12	1.1	.....	2.5	2.4	2.45	1.85	3.7	1.4	.5	.5	.45	.5
13	1.1	.....	2.3	2.2	2.3	1.75	2.8	1.35	.6	.5	.5	.65
14	1.0	.....	2.0	2.0	2.05	1.5	2.1	1.3	.6	.55	.6	.65
15	1.0	.....	1.9	1.75	1.9	1.4	1.75	1.1	.9	.5	.6	.75
16	1.0	.....	1.8	1.65	1.85	1.35	1.5	1.05	.9	.5	.5	.6
17	1.0	.....	1.75	1.6	1.8	1.4	1.4	1.0	.8	.5	.5	1.65
18	1.0	.....	1.7	1.55	1.8	1.65	1.3	1.0	.75	.5	.5	1.8
19	1.1	.....	1.6	1.45	1.9	1.4	1.3	.95	.7	.5	.55	1.55

a Backwater December 16, 1903.
b Backwater during part of December, 1904.

Daily gage height, in feet, of Shenandoah River at Millville, W. Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
20	1.1	.....	1.5	1.45	2.3	1.35	1.2	.9	.65	.45	.5	.8
21	1.3	.....	1.45	1.3	3.5	1.6	1.2	.9	.6	.6	.5	.7
22	1.6	.....	1.5	1.25	2.95	1.7	1.2	.85	.65	.6	.5	.7
23	2.3	.....	1.6	1.2	2.45	1.9	1.15	.9	.6	.6	.5	.7
24	2.6	.....	1.6	1.15	2.15	1.6	1.1	.8	.55	.55	.5	.7
25	.....	.....	1.65	1.1	2.0	1.45	1.2	.9	.5	.5	.5	.8
26	.....	.....	1.8	1.1	1.95	1.3	1.3	.8	.5	.5	.45	1.15
27	.....	.....	1.85	1.3	2.3	1.2	1.2	.75	.5	.45	.45	1.1
28	.....	.....	1.8	2.5	1.95	1.15	1.1	.7	.5	.4	.45	1.3
29	.....	.....	1.75	4.3	1.7	1.1	1.1	.6	.5	.4	.45	2.25
30	.....	.....	1.7	3.85	1.7	1.6	1.25	.55	.45	.4	.45	1.2
31	.....	.....	1.7	.....	1.55	.....	1.1	.6	.....	.4	.....	1.1
1905.												
1	1.0	1.4	3.35	2.2	1.2	1.2	1.9	2.1	1.15	0.6	0.7	0.6
2	.95	1.2	2.75	2.05	1.15	1.2	1.75	1.7	1.0	.55	.7	.6
3	.85	1.3	2.7	1.9	1.15	1.5	1.75	1.4	.95	.5	.65	.65
4	1.4	1.3	2.8	1.8	1.1	1.2	1.6	1.3	.9	.5	.65	.6
5	1.6	1.2	2.8	1.8	1.1	1.1	1.6	1.2	1.0	.5	.65	.6
6	1.55	1.2	*a*4.1	2.0	1.0	1.0	1.6	1.1	1.05	.5	.65	.8
7	2.1	1.2	2.5	2.45	1.0	1.15	2.3	1.1	1.0	.5	.65	1.35
8	2.8	1.25	2.5	2.45	1.0	2.0	2.1	1.1	1.0	.5	.65	1.2
9	2.5	1.25	2.8	2.3	.95	1.2	2.3	1.1	.95	.5	.65	1.1
10	2.0	1.3	3.7	2.1	.95	1.0	2.1	1.05	.8	.5	.65	1.0
11	1.8	1.35	4.75	2.0	1.0	1.0	1.9	1.05	.8	.5	.6	.95
12	1.5	1.45	4.3	1.95	1.0	1.1	2.0	1.0	.85	.55	.6	.9
13	2.0	1.4	3.3	1.9	1.0	.9	2.8	.95	.8	.7	.6	.85
14	2.6	1.25	3.2	1.8	.95	.8	2.6	.95	.8	.7	.6	.8
15	2.9	1.25	2.9	1.7	2.0	.8	3.8	1.1	.8	.7	.6	.8
16	2.5	1.3	2.6	1.7	2.0	.75	5.3	1.1	.75	.7	.6	.8
17	2.0	1.55	2.4	1.65	2.1	.75	3.3	3.2	.8	.65	.6	.8
18	2.0	1.55	2.3	1.6	2.3	.7	2.7	2.3	.8	.65	.6	.8
19	2.0	1.5	2.2	1.5	2.1	.7	2.3	1.9	.85	.65	.55	.9
20	1.7	1.6	2.1	1.45	1.8	.7	2.0	1.5	.8	.65	.55	.9
21	1.6	1.55	2.4	1.4	1.7	.9	1.8	1.4	.8	.6	.6	2.31
22	1.5	1.5	2.7	1.4	1.5	3.3	1.8	1.3	.8	.6	.6	4.1
23	1.4	1.55	4.0	1.4	1.4	3.2	1.8	1.2	.8	.6	.6	5.3
24	1.3	1.6	3.4	1.35	1.3	3.5	2.8	1.1	.8	.6	.6	4.25
25	1.6	2.0	3.2	1.3	1.3	5.9	2.4	1.1	.75	.6	.6	3.6
26	1.6	2.2	3.6	1.2	1.2	4.8	2.2	1.9	.6	.65	.6	3.2
27	1.85	2.6	3.2	1.2	.9	3.5	1.9	2.1	.6	.8	.6	2.75
28	1.6	3.0	2.9	1.2	1.0	3.0	1.6	1.8	.6	.9	.6	2.4
29	1.5	.....	2.7	1.3	1.0	2.5	1.4	1.5	.55	.85	.6	2.2
30	1.6	.....	2.5	1.3	1.0	2.1	1.9	1.25	.55	.85	.6	2.3
31	1.5	.....	2.3	.....	1.1	.....	2.4	1.1	.....	.85	.....	2.3

*a*Backwater March 6, 1905

Rating table for Shenandoah River at Millville, W. Va., from April, 1895, to February 6, 1897, and from March 8, 1904, to Dec. 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	430	2.00	2,380	3.70	6,100	6.80	17,840
0.40	480	2.10	2,560	3.80	6,380	7.00	18,800
0.50	540	2.20	2,750	3.90	6,670	7.20	19,780
0.60	610	2.30	2,940	4.00	6,960	7.40	20,780
0.70	690	2.40	3,130	4.20	7,560	7.60	21,820
0.80	780	2.50	3,330	4.40	8,200	7.80	22,880
0.90	880	2.60	3,530	4.60	8,860	8.00	24,020
1.00	980	2.70	3,730	4.80	9,540	8.20	25,200
1.10	1,090	2.80	3,940	5.00	10,260	8.40	26,400
1.20	1,200	2.90	4,150	5.20	11,020	8.60	27,700
1.30	1,320	3.00	4,370	5.40	11,780	8.80	29,000
1.40	1,450	3.10	4,600	5.60	12,580	9.00	30,400
1.50	1,580	3.20	4,840	5.80	13,400	9.20	31,800
1.60	1,720	3.30	5,080	6.00	14,240	9.40	33,200
1.70	1,870	3.40	5,320	6.20	15,120	9.60	34,600
1.80	2,030	3.50	5,570	6.40	16,000	9.80	36,000
1.90	2,200	3.60	5,830	6.60	16,920	10.00	37,500

The above table is strictly applicable only for open channel conditions. It is based upon 14 discharge measurements made during 1895 and 1904 to 1905. It is well defined between gage heights 0.4 feet and 5.2 feet. Estimates above 5.0 feet are based upon a discharge curve which is the product of a well defined area curve and a fairly accurate extension of the velocity curve. The discharge curves 1895 to 1905 are the same above 10.0 feet gage height.

Rating table for Shenandoah River at Millville, W. Va., from February 10, 1897 to January 24, 1904.

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.20	470	2.10	2,770	4.00	7,380	6.80	18,300
0.30	520	2.20	2,960	4.10	7,700	7.00	19,220
0.40	580	2.30	3,150	4.20	8,020	7.20	20,140
0.50	650	2.40	3,350	4.30	8,340	7.40	21,100
0.60	730	2.50	3,560	4.40	8,680	7.60	22,060
0.70	820	2.60	3,770	4.50	9,020	7.80	23,060
0.80	910	2.70	3,990	4.60	9,360	8.00	24,060
0.90	1,010	2.80	4,210	4.70	9,700	8.20	25,100
1.00	1,120	2.90	4,440	4.80	10,060	8.40	26,200
1.10	1,230	3.00	4,670	4.90	10,420	8.60	27,300
1.20	1,350	3.10	4,910	5.00	10,800	8.80	28,500
1.30	1,480	3.20	5,150	5.20	11,560	9.00	29,800
1.40	1,620	3.30	5,400	5.40	12,320	9.20	31,200
1.50	1,760	3.40	5,650	5.60	13,120	9.40	32,700
1.60	1,910	3.50	5,910	5.80	13,940	9.60	34,200
1.70	2,070	3.60	6,180	6.00	14,780	9.80	35,800
1.80	2,240	3.70	6,460	6.20	15,640	10.00	37,500
1.90	2,410	3.80	6,760	6.40	16,520		
2.00	2,590	3.90	7,060	6.60	17,400		

The above table is strictly applicable only for open channel conditions. It is based upon 14 discharge measurements made during 1897 to 1903. It is well defined between gage heights 0.5 feet and 5.0 feet.

Estimated monthly discharge of Shenandoah River at Millville, W. Va.

(Drainage area, 2,995 square miles.)

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1895.								
January	.....	.....	.....	.....	.....	.....	5.54	.....
February	.....	.....	.....	.....	.....	.....	1.34	.....
March	.....	.....	.....	.....	.....	.....	2.73	.....
April 15 to 30	4,600	1,870	2,904	.970	.576	.....	*a*3.78	.....
May	20,780	2,560	5,570	1.86	2.14	65	3.28	1.14
June	3,130	980	1,613	.539	.601	14	4.14	3.54
July	7,260	980	1,880	.628	.724	16	4.44	3.72
August	1,580	540	806	.269	.310	17	1.82	1.51
September	1,320	610	722	.241	.269	41	.66	.39
October	610	480	537	.179	.206	20	1.06	.85
November	690	540	621	.207	.231	15	1.57	1.34
December	1,450	610	754	.252	.290	9	3.09	2.80
The year	.....	.....	.....	.....	.....	.....	33.45	.....
1896.								
January	11,400	880	2,434	.813	.937	38	2.49	1.55
February	12,580	1,450	3,709	1.24	1.34	35	3.78	2.44
March	12,180	1,450	3,842	1.28	1.48	35	4.25	2.77
April	8,860	1,450	2,807	.937	1.05	85	1.24	.19
May	4,370	1,090	2,127	.710	.819	36	2.28	1.46
June	3,940	780	2,056	.686	.765	13	5.71	4.95
July	9,030	1,320	2,858	.954	1.10	18	6.21	5.11
August	1,870	780	1,150	.384	.443	14	3.20	2.76
September	13,190	540	1,042	.348	.388	5	7.22	6.83
*b*October	139,700	880	7,768	2.59	2.99	623	.48	—2.51
November	4,840	880	1,835	.613	.684	16	4.16	3.48
December	6,380	1,450	2,296	.767	.884	383	.23	—.65
The year	139,700	540	2,827	.944	12.88	31	41.25	28.37

*a*Precipitation for whole month, April, 1895.

*b*Estimates October 1 and 2, 1896, approximate.

Estimated monthly discharge of Shenandoah River at Millville, W. Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1897.								
*a*January	1,720	980	1,220	.407	.469	33	1.41	.94
February (25 da).	37,870	1,090	11,680	3.90	3.63	.....	*b*6.28	.....
March	6,760	2,590	4,946	1.65	1.90	81	2.34	.44
April	3,350	1,620	2,671	.892	.995	53	1.90	.90
May	30,620	1,760	6,243	2.08	2.40	47	5.13	2.73
June	2,410	1,010	1,632	.545	.608	19	3.18	2.57
*c*July	3,770	910	1,426	.476	.549	13	4.14	3.59
August	1,760	730	987	.330	.380	27	1.41	1.03
September	1,350	580	664	.222	.248	25	1.01	.76
October	1,010	550	692	.231	.266	10	2.59	2.32
November	1,620	650	859	.287	.320	12	2.59	2.27
*a*December	3,990	820	1,619	.541	.624	18	3.51	2.89
The year	.....	.....	.....	.....	.....	.....	35.49	.....
1898.								
January	6,180	1,010	2,435	.813	.937	31	3.05	2.11
*d*February	2,770	1,010	1,612	.538	.560	75	.75	.19
March	5,650	1,010	2,227	.744	.858	23	3.73	2.87
April	13,120	2,070	4,353	1.45	1.62	61	2.66	1.04
May	29,150	2,070	5,711	1.91	2.20	42	5.21	3.01
June	2,410	1,120	1,647	.550	.614	21	2.86	2.25
*e*July	3,770	820	1,249	.417	.481	11	4.18	3.70
*f*August	50,900	1,350	8,164	2.73	3.15	41	7.73	4.58
September	1,835	1,120	1,360	.454	.506	26	1.97	1.46
October	30,500	1,010	5,684	1.90	2.19	31	7.10	4.91
November	4,210	2,070	2,827	.944	1.05	59	1.79	.74
December	14,780	2,410	4,498	1.50	1.73	55	3.13	1.40
The year	50,900	820	3,481	1.16	15.90	36	44.16	28.26

*a*Ice conditions during January and December 24-31, 1897. No corrections made in estimates.
*b*Precipitation for whole month, February, 1897.
*c*Estimate July 11, 1897, interpolated.
*d*Ice conditions during February, 1898. No correction made in estimates.
*e*Estimate July 2, 1898, interpolated.
*f*Gage height August 11, 1898, estimated. Discharge approximate.

Estimated monthly discharge of Shenandoah River at Millville, W. Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1899.								
*a*January	17,840	2,770	5,116	1.71	1.97	78	2.52	.55
*ab*February 1 to 21	7,380	2,070	3,675	1.23	.960	.....	*c*4.95	.....
March 10 to 31	12,720	4,440	7,065	2.36	1.93	.....	*c*5.12	.....
April	4,910	2,070	3,289	1.10	1.23	106	1.16	—.07
May	4,910	1,480	2,533	.846	.975	20	4.95	3.97
June	4,670	1,010	1,607	.537	.599	29	2.09	1.49
July	1,760	730	877	.293	.338	14	2.51	2.17
August	1,910	650	992	.331	.382	10	3.94	3.56
September	1,760	730	989	.330	.368	10	3.78	3.41
October	910	650	785	.262	.302	13	2.34	2.04
November	5,150	910	1,403	.468	.522	64	.81	.29
December	4,440	820	1,398	.467	.538	40	1.34	.80
The year	.....	.....	.....	.....	.....	.....	35.51	.....
1900.								
January	14,780	1,230	2,970	.992	1.14	44	2.57	1.43
*d*February	14,360	1,350	3,833	1.28	1.33	36	3.73	2.40
March	16,960	2,590	5,866	1.96	2.26	61	3.72	1.46
April	4,670	1,835	2,803	.936	1.04	55	1.89	.85
May	2,410	1,230	1,689	.564	.650	27	2.42	1.77
June	9,020	1,010	2,249	.751	.838	14	5.98	5.14
July	4,210	775	1,374	.459	.529	14	3.76	3.23
August	1,290	690	829	.277	.319	17	1.93	1.61
September	1,230	580	696	.232	.259	8	3.14	2.88
October	2,770	650	947	.316	.364	11	3.19	2.83
November	9,020	730	1,453	.485	.541	18	2.94	2.40
December	10,060	1,010	2,232	.745	.859	47	1.83	.97
The year	16,960	580	2,245	.750	10.13	27	37.10	26.97

a Ice conditions during January and February, 1899. No correction made in estimates.
b Estimates February 12 and 13, 1899, interpolated.
c Precipitation for whole months February and March, 1899.
d Backwater from ice February 5th and 6th, 1900. Discharge corrected.

Estimated monthly discharge of Shenandoah River at Millville, W. Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1901.								
*a*January	5,910	820	1,812	.605	.698	30	2.31	1.61
*a*February	3,150	730	1,315	.439	.457	139	.33	—.13
March	20,620	820	3,376	1.13	1.30	34	3.80	2.50
*b*April	50,000	2,500	12,840	4.29	4.79	77	6.24	1.45
May	45,920	2,590	8,704	2.91	3.36	58	5.82	2.46
June	38,240	3,770	8,225	2.75	3.07	41	7.54	4.47
July	13,940	1,290	4,437	1.48	1.71	39	4.38	2.67
August	11,180	1,620	3,528	1.18	1.36	23	5.92	4.56
September	11,940	1,230	2,496	.833	.929	25	3.78	2.85
October	6,460	1,120	1,769	.591	.681	99	.69	.01
November	3,990	910	1,341	.448	.500	25	2.01	1.51
*b*December	50,000	1,350	8,124	2.71	3.12	51	6.12	3.00
The year	50,000	730	4,831	1.61	21.98	45	48.94	26.96
1902.								
January	21,100	2,240	5,176	1.73	1.99	74	2.69	.70
*c*February	50,000	1,120	8,611	2.88	3.00	67	4.46	1.46
March	77,900	4,100	13,880	4.63	5.34	148	3.61	—1.73
April	20,140	2,960	6,785	2.27	2.53	113	2.23	—.30
May	7,380	1,760	2,606	.870	1.00	38	2.64	1.64
June	1,910	1,120	1,402	.468	.522	18	2.93	2.41
July	1,620	865	1,097	.366	.422	19	2.17	1.75
August	2,410	775	1,062	.355	.409	18	2.22	1.81
September	1,120	650	724	.242	.270	10	2.59	2.32
October	2,155	775	1,069	.357	.412	11	3.65	3.24
November	3,560	730	1,157	.386	.431	13	3.21	2.78
December	9,020	2,240	4,728	1.58	1.82	54	3.38	1.56
The year	77,900	650	4,025	1.34	18.15	51	35.78	17.63

*a*Slight backwater during part of January and February, 1901. No correction made in estimates.

*b*April 22 and December 31, 1901, river out of banks. Discharge estimated 50,000 sec.-feet.

*c*Ice conditions during part of February, 1902. No correction made in estimates. February 26 and 27, 1902, river out of banks. Discharge estimated 50,000 second-feet

Estimated monthly discharge of Shenandoah River at Millville, W. Va.—Con.

Month	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1903.								
January	27,900	2,070	6,802	2.27	2.62	64	4.08	1.46
February	9,360	2,770	5,448	1.82	1.90	54	3.49	1.59
March	22,060	3,560	7,907	2.64	3.04	73	4.15	1.11
April	23,060	3,665	7,880	2.63	2.93	81	3.62	.69
May	3,560	1,760	2,321	.775	.894	33	2.69	1.80
June	31,200	2,240	7,448	2.49	2.78	36	7.63	4.85
July	9,530	1,415	3,453	1.15	1.33	43	3.06	1.73
August	2,590	1,065	1,590	.531	.612	17	3.53	2.92
September	9,360	1,230	2,249	.751	.838	35	2.42	1.58
October	2,770	1,065	1,454	.485	.559	23	2.39	1.83
November	1,120	730	961	.321	.358	44	.82	.46
*a*December	1,620	650	927	.310	.357	38	.96	.60
The year	31,200	650	4,037	1.35	18.22	47	38.84	20.62
1904.								
January 1 to 24	3,770	910	1,428	.477	.426	.....	*b*1.80	.....
February	.....	.....	.....	.....	.....	.....	1.26	.....
March 8 to 31	9,900	1,515	2,546	.850	.759	.....	*b*2.08	.....
April	7,880	1,090	2,191	.732	.817	31	2.64	1.82
May	5,570	1,650	2,779	.928	1.07	31	3.43	2.36
June	6,960	1,090	2,430	.811	.905	16	5.57	4.67
July	12,580	1,090	1,930	.644	.742	15	5.04	4.30
August	2,030	575	1,096	.366	.422	17	2.53	2.11
September	880	510	620	.207	.231	12	1.95	1.72
October	610	480	521	.174	.201	17	1.20	1.00
November	610	480	528	.176	.196	21	.95	.75
*c*December	2,845	510	780	.260	.300	12	2.46	2.16
The year	.....	.....	.....	.....	.....	.....	30.91	.....

*a*Backwater December 16, 1903. Discharge corrected.
*b*Precipitation for whole months January and March, 1904.
*c*Backwater during part of December, 1904. Discharge corrected.

Estimated monthly discharge of Shenandoah River at Millville, W. Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1905.								
January	4,150	830	2,065	.689	.794	28	2.86	2.06
February	4,370	1,200	1,684	.562	.585	27	2.14	1.56
*a*March	9,370	2,560	4,387	1.46	1.68	69	2.44	.76
April	3,230	1,200	1,945	.649	.724	38	1.90	1.18
May	2,940	880	1,382	.461	.531	14	3.93	3.40
June	13,820	690	2,552	.852	.950	17	5.50	4.55
July	11,400	1,450	2,994	1.00	1.15	19	5.98	4.83
August	4,840	930	1,557	.520	.600	19	3.19	2.59
September	1,145	575	810	.270	.301	18	1.65	1.35
October	880	540	640	.214	.247	9	2.84	2.59
November	690	575	624	.208	.232	26	.90	.67
December	11,400	610	2,336	.780	.899	24	3.82	2.92
The year	13,820	540	1,915	.639	8.69	23	37.15	28.46

*a*Backwater March 6, 1905. Discharge corrected.

SHENANDOAH RIVER (SOUTH BRANCH) NEAR FRONT ROYAL, VA.

This station was established June 26, 1899, by A. P. Davis. It is located about one mile above the bridge, which is near the Norfolk and Western Railway Station. The railroad follows the right bank of the stream. The gage is a vertical timber spiked to a large sycamore tree on the left bank, about 800 feet upstream from the cable. A high-water gage, reading from 14 to 26 feet, was established September 18, 1905. It is a vertical board spiked to the shore side of a large sycamore tree 325 feet upstream from the regular gage. Bench mark No. 1 is a headless spike on the river side of an elm tree on the left bank, 8 feet downstream from the gage. It is 1.5 feet above the ground, and has an elevation of 10.49 feet above the zero of the gage. Bench mark No. 2 is a nail driven horizontally into the downstream side of the stump of a large sycamore tree 270 feet downstream from the gage. It is 0.5 feet above the ground and is immediately below a blaze. Its elevation is 14.55 feet above the zero of the gage. Bench mark No. 3 is the top of a large iron staple ring, 3 feet above ground on the shore side of the tree to which the high-

water gage is attached. Its elevation is 14.32 feet above the zero of the gage.

Discharge measurements are made from a cable, which has a span of 300 feet and is suspended over the branches of two large sycamore trees, with its right end fastened to the tree and its left anchored in the ground. The initial point for soundings is on the main cable, 0.5 foot from the tree on the left bank. The channel is straight for 600 feet above and below the station, and the current is sluggish. The railroad embankment a few feet back from the river on the right bank is overflowed at extreme flood stages only. The left bank is low, liable to overflow, and is fringed with trees. The bed of the stream is composed of bed rock and is very uneven; in places the rock is overlain by silt, and this is liable to shift. The gage is read twice each day by Miss Brentie Johnson.

Discharge measurements of Shenandoah River (South Branch) near Front Royal, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1899.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
September 1	E. G. Paul	784	.79	4.40	616
1900.					
February 14	E. G. Paul	1,235	1.58	5.75	1,955
June 19	do	*a*1,790	3.18	7.90	5,703
September 8	C. R. Olberg	*a*563	0.95	4.00	536
1901.					
July 21	E. G. Paul	1,584	2.66	6.95	4,211
1902.					
August 15	E. G. Paul	*a*639	.82	4.20	527
1903.					
August 19	Paul and Sawyer	*a*868	1.23	4.90	1,065
1904.					
June 11	F. H. Brundage	*a*846	1.35	4.79	1,140
June 30	Hoyt and Hall	840	1.08	4.55	906
September 27	E. C. Murphy	509	.77	3.50	390
October 19	do	516	.64	3.42	331
1905.					
April 4	R. Follansbee	860	1.40	4.78	1,203
May 16	do	1,068	1.56	5.28	1,663
September 18	R. H. Bolster	657	.80	3.95	527
October 27	R. Follansbee	596	.77	3.84	459
December 26	do	1,274	1.87	5.94	2,387

a Area of flowing water.

Daily gage height, in feet, of Shenandoah River (South Branch) near Front Royal, Va

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1899.												
1	.....	.....	.....	.....	.....	.....	4.3	4.4	4.4	4.45	5.5	4.4
2	.....	.....	.....	.....	.....	.....	4.3	4.35	4.35	4.4	8.05	4.4
3	.....	.....	.....	.....	.....	.....	4.2	4.2	4.3	4.3	6.7	4.3
4	.....	.....	.....	.....	.....	.....	4.2	4.25	4.2	4.3	5.85	4.3
5	.....	.....	.....	.....	.....	.....	4.1	4.25	4.5	4.3	5.8	4.2
6	.....	.....	.....	.....	.....	.....	4.2	4.2	4.3	4.3	5.65	4.2
7	.....	.....	.....	.....	.....	.....	4.2	4.3	4.2	4.3	5.35	4.2
8	.....	.....	.....	.....	.....	.....	4.25	4.65	4.15	4.35	5.2	4.2
9	.....	.....	.....	.....	.....	.....	4.55	4.3	4.25	4.4	5.05	4.3
10	.....	.....	.....	.....	.....	.....	4.7	4.5	4.75	4.4	4.85	4.3
11	.....	.....	.....	.....	.....	.....	4.3	4.45	4.65	4.4	4.8	4.3
12	.....	.....	.....	.....	.....	.....	4.2	4.3	4.55	4.4	4.7	4.45
13	.....	.....	.....	.....	.....	.....	4.15	4.2	4.45	4.3	4.7	6.95
14	.....	.....	.....	.....	.....	.....	4.2	4.2	4.4	4.3	4.6	6.25
15	.....	.....	.....	.....	.....	.....	4.15	4.2	4.3	4.3	4.6	5.75
16	.....	.....	.....	.....	.....	.....	4.25	4.3	4.3	4.2	4.55	5.45
17	.....	.....	.....	.....	.....	.....	4.15	4.35	4.3	4.2	4.5	5.25
18	.....	.....	.....	.....	.....	.....	4.15	4.25	4.2	4.2	4.5	5.15
19	.....	.....	.....	.....	.....	.....	4.15	4.3	4.2	4.2	4.5	5.0
20	.....	.....	.....	.....	.....	.....	4.1	4.25	4.55	4.2	4.5	4.95
21	.....	.....	.....	.....	.....	.....	4.1	4.2	5.8	4.1	4.5	4.85
22	.....	.....	.....	.....	.....	.....	4.1	4.1	5.3	4.15	4.4	4.75
23	.....	.....	.....	.....	.....	.....	4.15	4.1	4.85	4.2	4.4	4.7
24	.....	.....	.....	.....	.....	.....	4.1	4.0	4.6	4.2	4.5	4.9
25	.....	.....	.....	.....	.....	.....	4.1	3.9	5.0	4.2	4.5	4.9
26	.....	.....	.....	.....	.....	4.4	4.05	4.0	4.6	4.2	4.55	5.1
27	.....	.....	.....	.....	.....	4.3	4.1	4.0	4.55	4.2	4.5	5.1
28	.....	.....	.....	.....	.....	4.25	4.2	4.3	4.6	4.2	4.4	5.0
29	.....	.....	.....	.....	.....	4.35	4.3	5.15	4.5	4.2	4.4	5.0
30	.....	.....	.....	.....	.....	4.3	4.8	5.05	4.5	4.2	4.4	5.15
31	.....	.....	.....	.....	.....	.....	4.25	4.6	.....	4.2	.....	5.65
1900.												
1	5.55	4.95	6.4	5.9	5.3	4.95	4.8	4.6	4.1	4.3	4.5	5.3
2	5.55	4.8	10.65	5.75	5.25	4.85	4.7	4.55	4.1	4.25	4.5	5.35
3	5.6	5.0	8.8	5.7	5.15	4.8	4.6	4.45	4.1	4.25	4.4	5.15
4	5.55	5.6	7.55	5.6	5.1	4.8	4.6	4.4	4.1	4.25	4.45	5.55
5	5.5	5.2	6.9	5.5	5.0	4.8	4.6	4.4	4.1	4.4	4.55	5.8
6	5.35	5.65	6.6	5.4	5.0	4.8	4.5	4.3	4.0	4.3	4.6	7.6
7	5.1	5.4	6.35	5.4	5.0	4.7	4.5	4.3	4.0	4.4	4.5	6.75
8	5.05	5.0	6.2	5.3	4.9	4.7	4.5	4.3	4.0	4.4	4.5	6.1
9	4.95	5.0	6.1	5.2	4.8	4.7	4.4	4.2	4.0	4.3	4.5	5.95
10	5.05	5.0	6.0	5.2	4.8	4.6	4.4	4.2	4.0	4.4	4.4	5.85
11	4.85	5.0	5.9	5.2	4.8	4.6	4.4	4.2	4.0	4.45	4.45	5.6
12	4.95	4.95	5.8	5.1	4.7	4.5	4.4	4.2	3.9	4.45	4.45	5.45
13	5.0	5.1	5.7	5.1	4.7	4.4	4.3	4.2	3.9	4.4	4.4	5.15
14	5.6	6.35	5.6	5.1	4.7	4.7	4.3	4.2	3.9	4.25	4.4	5.1
15	5.65	7.2	5.6	5.1	4.7	5.7	4.3	4.1	4.3	4.25	4.4	5.0
16	5.0	6.5	5.5	5.1	4.7	6.25	4.3	4.1	4.65	4.3	4.3	4.9
17	4.8	6.2	5.5	5.0	4.6	7.25	4.3	4.1	4.95	4.3	4.3	4.85
18	4.8	5.95	5.5	5.0	4.5	7.95	4.2	4.0	4.65	4.4	4.3	4.8
19	5.0	5.7	5.65	5.0	4.7	7.65	4.2	4.0	4.15	4.4	4.3	4.75
20	7.2	5.55	6.55	5.4	5.3	6.85	4.2	4.0	4.15	4.3	4.3	4.7
21	10.7	5.45	9.55	5.75	5.75	6.2	4.55	4.1	4.15	4.25	4.3	4.6
22	8.35	6.25	8.35	5.9	5.55	5.8	4.9	4.2	4.15	5.05	4.4	4.6

Daily gage height, in feet, of Shenandoah River (South Branch) near Front Royal, Va. Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1900.												
23	7.15	8.9	7.5	6.55	5.35	5.3	4.85	4.25	4.1	6.25	4.85	4.6
24	6.5	8.65	6.6	6.7	5.25	5.35	4.65	4.3	4.2	6.95	4.95	4.6
25	6.15	7.35	6.55	6.25	5.2	5.2	4.85	4.3	4.3	6.75	5.65	4.6
26	5.8	6.85	6.45	6.3	5.35	5.1	4.95	4.3	4.35	5.6	6.65	4.6
27	5.6	6.55	6.3	5.75	5.05	5.1	5.0	4.25	4.15	6.35	8.45	4.5
28	5.55	6.2	6.25	5.55	4.9	5.2	4.9	4.2	4.05	5.05	7.3	4.5
29	5.55	.....	6.15	5.4	4.85	5.05	4.85	4.2	4.0	4.65	6.35	4.5
30	5.5	.....	6.0	5.4	4.8	4.9	4.8	4.1	4.2	4.55	5.85	4.5
31	5.2	.....	5.95	.....	5.45	.....	4.7	4.1	.....	4.5	.....	4.5
1901.												
1	4.5	4.65	4.3	5.45	6.25	7.7	7.2	6.05	6.75	9.55	4.5	5.7
2	4.5	4.6	4.25	5.6	6.1	7.3	7.05	5.95	6.6	9.35	4.5	5.55
3	4.4	4.6	4.3	5.85	5.95	6.9	6.8	5.9	6.35	8.6	4.9	5.4
4	4.4	4.9	4.3	9.8	5.8	6.75	6.4	6.05	6.1	7.45	4.8	5.35
5	4.4	5.1	4.3	8.3	5.75	6.55	6.05	5.45	5.85	6.65	4.75	5.25
6	4.4	4.9	4.3	8.2	5.6	6.45	6.2	6.65	5.65	5.8	4.65	5.15
7	4.4	4.9	4.2	7.7	5.55	6.7	6.3	8.2	5.45	5.65	4.6	5.1
8	4.4	4.5	4.25	7.25	5.5	7.5	6.2	7.8	5.9	5.45	4.5	5.2
9	4.2	4.5	4.3	6.7	5.9	7.15	6.05	7.0	5.75	5.25	4.5	5.35
10	4.25	4.9	4.35	6.45	7.4	6.85	5.95	6.45	5.55	5.05	4.5	5.4
11	4.4	4.9	7.05	6.15	7.25	6.6	5.7	6.8	5.35	4.95	4.5	5.5
12	5.3	4.8	10.25	5.85	7.0	6.15	5.45	6.65	5.2	4.8	4.5	5.55
13	7.35	4.7	7.7	5.6	6.5	5.95	5.3	6.55	5.05	5.3	4.45	5.6
14	7.15	4.5	6.7	5.65	6.2	5.85	11.5	6.45	4.9	5.05	4.4	5.7
15	6.75	4.5	6.25	16.3	6.45	5.7	9.6	6.25	5.4	4.95	4.4	11.5
16	6.3	4.5	5.85	11.0	6.45	7.15	9.3	6.15	5.25	4.9	4.4	14.95
17	5.75	4.9	5.65	8.65	5.95	9.9	8.1	5.95	5.05	4.8	4.5	10.1
18	5.45	4.85	5.5	7.95	5.8	8.7	7.5	5.9	4.95	4.75	4.4	8.05
19	5.3	4.75	5.4	7.55	5.65	7.3	7.35	5.75	4.8	4.7	4.4	7.6
20	5.3	4.6	5.25	7.25	5.6	6.85	7.0	6.55	4.75	4.9	4.4	7.25
21	5.3	4.5	5.2	18.5	5.5	10.3	6.75	7.5	4.7	4.85	4.4	6.45
22	5.3	4.3	5.7	15.8	8.25	8.65	6.55	8.05	4.9	4.8	4.4	5.85
23	5.15	4.3	5.35	11.35	17.5	7.6	6.35	7.75	4.75	4.7	4.55	5.65
24	5.0	4.4	5.4	8.9	10.5	6.75	6.25	7.45	4.7	4.7	5.7	5.45
25	4.95	4.4	5.4	7.8	9.4	6.45	6.0	4.95	4.65	4.6	6.15	5.4
26	4.85	4.35	5.5	7.35	11.5	6.25	5.8	5.5	4.6	4.6	6.0	5.35
27	4.9	4.3	5.65	7.2	10.9	6.15	5.4	6.4	4.5	4.8	5.55	5.55
28	4.8	4.3	5.75	6.95	9.5	6.1	6.85	6.45	5.15	4.7	5.3	6.55
29	4.8	.....	5.95	6.65	8.9	6.0	6.7	6.25	6.9	4.6	4.95	10.0
30	4.7	.....	5.85	6.35	8.5	7.35	6.6	5.95	8.7	4.6	4.75	18.0
31	4.7	.....	5.5	.....	6.1	.....	6.35	5.8	.....	4.55	.....	13.5
1902.												
1	9.5	6.1	23.5	6.55	5.4	4.9	4.6	4.4	4.0	5.0	4.25	5.8
2	9.15	5.25	13.0	6.45	5.35	4.8	4.55	4.4	4.0	4.3	4.25	6.3
3	8.3	6.7	9.9	6.25	5.3	4.75	4.5	4.6	3.95	6.0	4.4	6.95
4	7.7	6.05	9.5	6.15	6.5	4.7	4.45	4.6	3.9	5.1	4.3	7.25
5	8.4	6.6	8.9	5.95	6.35	4.6	4.4	4.6	3.9	5.0	4.3	7.85
6	8.15	5.9	8.4	7.4	6.15	4.55	4.5	4.5	3.8	4.3	4.3	7.6
7	8.0	5.7	7.95	7.25	5.85	4.5	4.45	4.5	3.8	4.3	4.2	6.85
8	7.75	6.9	7.5	7.7	5.65	4.9	4.4	4.4	4.0	4.25	4.2	6.55
9	7.55	5.9	9.1	9.1	5.5	4.9	4.4	4.3	4.2	4.2	4.2	6.4
10	7.3	5.7	10.5	10.5	5.35	4.85	4.3	4.4	4.1	4.1	4.2	6.15

Daily gage height, in feet, of Shenandoah River (South Branch) near Front Royal, Va. Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1902.												
11	6.55	5.9	13.25	10.5	5.5	4.8	4.3	4.35	4.1	4.1	4.25	5.95
12	6.0	6.1	11.85	9.6	5.45	4.8	4.2	4.3	4.65	4.9	4.35	5.75
13	5.9	6.1	10.1	6.9	5.4	4.7	4.6	4.3	4.0	5.5	4.35	6.4
14	5.8	5.75	8.5	6.75	5.4	4.6	4.6	4.2	4.0	5.65	4.25	6.35
15	5.75	5.45	8.1	6.6	5.3	4.8	4.5	4.2	4.0	5.35	4.1	6.3
16	5.65	5.5	8.8	6.45	5.3	4.8	4.5	4.15	4.0	5.0	4.1	6.55
17	5.55	5.4	8.45	6.25	5.3	4.7	4.45	4.25	4.1	4.65	4.6	6.85
18	5.5	5.35	8.2	6.15	5.4	4.65	4.4	4.3	4.1	4.45	4.5	8.1
19	5.5	5.3	7.8	6.0	5.4	4.6	4.35	4.35	3.9	4.4	4.5	7.6
20	5.45	5.25	7.35	6.2	5.4	4.55	4.5	4.35	3.85	4.4	4.45	6.6
21	5.35	5.2	6.75	6.15	5.3	4.45	4.5	4.3	3.8	4.35	4.4	6.5
22	6.3	7.45	6.45	6.0	5.25	4.8	4.4	4.2	3.8	4.3	4.35	6.4
23	5.75	6.2	7.9	5.8	5.2	4.75	4.4	4.1	4.0	4.3	4.3	6.35
24	5.3	7.35	7.9	5.7	5.1	4.7	4.3	4.2	4.1	4.3	4.35	6.25
25	5.3	11.0	7.8	5.55	5.2	4.6	4.25	4.15	4.15	4.35	4.4	5.9
26	5.25	15.0	7.7	5.5	5.1	4.5	4.2	4.1	4.2	4.35	4.5	6.15
27	6.4	20.0	7.6	5.6	5.1	4.5	5.5	4.1	4.2	4.4	5.75	5.55
28	7.3	14.5	7.45	5.55	5.0	4.4	5.35	4.0	4.2	4.5	6.25	5.5
29	8.55	.....	6.55	5.45	4.9	4.7	5.05	4.0	6.0	4.35	5.7	5.5
30	6.7	.....	6.7	5.4	4.8	4.7	4.75	4.0	5.55	4.3	5.2	5.4
31	5.45	.....	6.65	.....	4.75	.....	4.55	4.0	.....	4.3	.....	5.3
1903.												
1	5.25	7.05	12.25	9.15	5.8	7.4	8.55	4.9	7.6	4.6	4.4	4.75
2	6.1	6.6	9.4	8.1	5.7	6.5	7.0	4.9	6.45	4.6	4.45	4.8
3	9.3	6.4	7.9	7.6	5.7	5.95	6.75	4.9	5.65	4.5	4.5	4.8
4	11.25	8.2	7.45	7.35	5.6	5.75	6.55	5.35	5.35	4.5	4.55	4.9
5	8.75	7.65	7.1	7.25	5.45	5.4	6.15	5.5	5.2	4.5	4.55	4.5
6	7.7	7.15	6.75	6.95	5.5	6.0	5.75	5.6	5.15	4.5	4.5	4.5
7	7.15	6.95	6.55	6.8	5.4	7.95	6.25	5.15	5.05	4.4	4.45	4.4
8	6.7	6.65	6.65	6.7	5.4	11.0	5.95	4.85	4.85	5.5	4.4	4.35
9	6.5	6.45	6.85	6.65	5.35	10.15	5.75	4.75	4.75	5.5	4.4	4.3
10	6.1	6.25	6.75	6.55	5.3	7.9	5.55	4.7	4.8	6.0	4.45	4.4
11	5.8	6.05	6.7	6.45	5.3	7.85	5.35	4.85	4.75	4.5	4.5	4.5
12	5.75	6.1	6.6	6.35	5.25	7.7	5.25	5.3	4.7	4.7	4.4	4.55
13	5.7	6.3	6.5	6.25	5.2	7.7	5.5	5.1	4.7	4.6	4.4	4.6
14	5.75	6.15	6.45	8.4	5.15	6.7	8.15	4.8	4.7	4.55	4.4	4.5
15	5.75	6.1	6.25	10.55	5.1	6.65	7.6	4.75	4.6	4.5	4.4	4.5
16	5.4	6.7	6.15	9.35	5.05	6.6	5.9	4.7	4.5	4.4	4.4	4.4
17	5.4	7.6	6.0	8.4	5.1	6.5	5.6	4.75	4.4	4.4	4.4	4.4
18	5.4	8.75	5.9	7.9	5.1	6.45	5.35	4.8	7.8	4.5	4.5	4.3
19	5.3	7.7	5.85	7.45	5.0	6.4	5.25	4.7	7.5	4.6	4.5	4.3
20	5.3	7.1	5.75	7.1	5.0	6.4	5.05	4.7	6.7	4.65	4.4	4.3
21	5.75	6.65	5.7	6.9	5.0	6.4	5.0	4.6	6.55	4.55	4.3	4.35
22	6.95	6.25	5.85	6.8	4.95	6.35	5.9	4.6	5.55	4.5	4.3	4.4
23	7.25	6.15	7.4	6.65	4.9	6.3	5.6	4.5	5.4	4.5	4.3	4.5
24	6.6	6.6	11.6	6.45	4.9	6.25	5.75	4.5	5.3	4.5	4.4	4.5
25	6.25	6.8	9.65	6.25	5.0	5.95	5.7	4.5	5.2	4.5	4.4	4.75
26	5.85	6.65	8.15	6.2	5.0	5.75	5.6	4.5	5.1	4.45	4.5	5.1
27	5.95	6.7	7.65	6.15	5.1	6.35	5.45	4.4	4.95	4.5	4.5	5.05
28	7.3	7.3	6.95	6.05	5.15	7.4	5.25	4.5	4.85	4.5	4.7	5.1
29	9.75	.....	6.85	6.0	5.2	8.55	4.95	4.9	4.75	4.45	4.65	5.5
30	8.6	.....	7.0	5.9	5.5	8.45	4.75	5.3	4.6	4.4	4.7	5.5
31	7.6	.....	10.65	.....	5.95	.....	4.8	5.75	.....	4.4	.....	5.2

Daily gage height, in feet, of Shenandoah River (South Branch) near Front Royal, Va. Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
1	*a*4.95	4.2	4.85	5.2	6.4	4.95	4.5	4.1	3.6	3.4	3.42	*b*3.45
2	4.75	4.1	4.85	5.05	5.85	5.05	4.4	4.05	3.6	3.4	3.4	3.4
3	4.75	4.15	5.05	4.85	5.45	5.3	4.3	4.1	3.6	3.4	3.4	3.5
4	5.05	4.25	4.95	4.7	5.15	6.2	4.2	4.3	3.6	3.4	3.4	3.5
5	5.05	4.25	5.05	4.65	5.1	6.45	4.1	4.4	3.6	3.4	3.42	3.5
6	4.8	4.0	5.0	4.6	5.0	6.5	4.1	4.5	3.65	3.4	3.4	3.45
7	4.7	4.05	5.05	4.6	5.0	6.0	4.05	4.7	3.7	3.4	3.42	3.42
8	4.6	4.85	7.3	4.6	5.0	5.4	4.0	4.45	3.7	3.4	3.45	3.45
9	4.55	4.65	7.4	4.7	5.15	5.05	4.2	4.4	3.7	3.4	3.5	3.45
10	4.45	4.85	6.7	5.25	5.7	4.95	5.5	4.75	3.7	3.4	3.42	3.52
11	4.4	4.85	6.0	5.75	5.85	4.75	7.95	4.6	3.7	3.4	3.4	4.15
12	4.5	4.7	5.75	5.7	5.65	4.7	7.45	4.5	3.7	3.45	3.4	4.4
13	4.55	4.6	5.55	5.35	5.35	4.65	5.4	4.4	3.7	3.55	3.4	4.6
14	4.55	4.5	5.2	5.15	5.25	4.55	4.75	4.2	3.65	3.45	3.55	4.8
15	4.4	4.4	5.1	4.95	4.9	4.5	4.55	4.15	4.15	3.4	3.5	3.95
16	4.25	4.4	5.0	4.85	4.9	4.4	4.4	4.1	3.95	3.4	3.52	4.1
17	4.25	4.35	4.9	4.8	4.9	4.6	4.35	4.0	3.7	3.4	3.5	4.1
18	4.3	4.4	4.9	4.65	5.3	4.65	4.3	4.0	3.6	3.4	3.45	4.2
19	4.4	4.6	4.9	4.55	5.7	4.4	4.35	3.9	3.6	3.4	3.45	3.9
20	4.35	4.75	4.7	4.5	7.6	4.55	4.25	3.8	3.6	3.45	3.4	3.9
21	4.35	4.85	4.7	4.5	6.75	5.0	4.1	3.8	3.5	3.55	3.42	3.7
22	4.9	5.4	4.7	4.4	5.9	5.15	4.1	3.75	3.5	3.5	3.4	3.7
23	6.75	6.9	4.95	4.4	5.45	5.05	4.0	3.65	3.5	3.45	3.42	3.88
24	8.15	7.9	4.95	4.3	5.25	4.75	4.3	3.6	3.5	3.4	3.42	3.95
25	*c*5.75	*c*7.7	4.95	4.4	5.1	4.4	4.4	3.6	3.5	3.4	3.42	3.9
26	5.05	7.15	5.05	4.45	5.0	4.3	4.3	3.55	3.5	3.4	3.4	3.8
27	4.8	6.35	5.1	5.5	4.95	4.35	4.2	3.5	3.4	3.42	3.4	3.95
28	4.65	5.75	5.1	6.25	4.9	4.4	4.35	3.5	3.4	3.4	3.4	3.9
29	4.45	5.2	5.0	6.8	4.9	4.7	4.15	3.5	3.4	3.4	3.4	4.5
30	4.35	.....	5.25	6.65	4.8	4.5	4.2	3.55	3.4	3.4	3.4	4.2
31	4.25	.....	5.3	.....	4.8	.....	4.2	3.6	.....	3.4	.....	4.0
1905.												
1	*d*3.7	*d*4.15	.....	5.4	4.3	4.35	4.85	4.85	4.3	3.7	3.82	3.7
2	3.85	4.05	.....	5.4	4.2	4.25	4.7	4.7	4.38	3.7	3.7	3.8
3	3.95	4.0	.....	5.28	4.2	4.15	4.55	4.6	4.85	3.7	3.8	3.8
4	4.0	4.15	.....	5.2	4.0	4.3	4.5	4.5	4.65	3.6	3.78	3.75
5	4.0	4.35	6.15	4.75	4.2	4.25	6.25	4.4	4.5	3.6	3.75	3.8
6	4.0	4.25	5.85	5.15	4.15	4.2	5.7	4.4	4.4	3.6	3.8	3.82
7	4.6	4.2	5.4	5.3	4.2	4.1	5.35	4.35	4.35	3.55	3.75	3.88
8	5.15	4.3	5.05	5.15	4.1	4.1	5.05	4.25	4.3	3.6	3.7	4.25
9	5.2	4.3	5.5	5.1	4.05	4.0	4.95	4.2	4.15	3.6	3.72	4.18
10	4.6	4.5	6.65	5.1	4.0	4.0	4.8	4.1	4.0	3.6	3.72	4.05
11	4.45	4.45	8.25	5.0	4.05	4.0	4.65	4.1	3.9	3.6	3.7	4.0
12	4.85	4.4	7.4	4.8	4.15	4.0	5.15	4.0	3.88	3.65	3.8	4.12
13	4.85	4.35	6.9	4.9	4.0	4.0	6.2	4.25	3.8	3.6	3.72	4.05
14	5.1	4.4	6.52	4.8	5.45	3.9	7.45	4.4	3.9	3.7	3.7	3.95
15	5.55	4.45	6.15	4.8	5.2	3.9	6.8	5.25	4.0	3.72	3.6	4.05
16	5.2	4.35	6.0	4.7	5.28	3.8	7.6	6.2	3.95	3.8	3.65	4.15
17	5.05	4.35	5.85	4.7	5.55	3.8	6.45	6.28	3.9	3.7	3.58	4.15
18	4.9	4.4	5.8	4.6	5.55	3.8	5.7	5.65	3.9	3.7	3.65	4.25
19	4.9	4.3	5.8	4.5	5.2	3.8	5.25	5.1	3.9	3.75	3.7	4.12

*a*Ice conditions during January, 1904. Ice about 8 inches thick.
*b*Ice conditions during December, 1904. Ice about 3 inches thick.
*c*Gage heights January 25 to February 25, 1904, approximate. Gage not in correct position.
*d*Ice conditions during January and February 1905.

Daily gage height, in feet, of Shenandoah River (South Branch) near Front Royal, Va. Continued.

Day.	Jan.	Feb	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
20	a4.45	a4.3	5.75	4.4	4.45	4.2	5.0	4.78	3.9	3.75	3.7	4.0
21	4.32	4.4	5.95	4.35	4.65	5.25	4.85	4.45	3.9	3.72	3.75	5.5
22	4.22	4.4	7.0	4.3	4.45	4.95	4.6	4.3	3.8	3.72	3.68	8.32
23	4.28	4.75	7.6	4.3	4.4	5.05	5.8	4.25	3.82	3.6	3.68	8.0
24	4.1	4.95	6.9	4.3	4.35	6.2	6.9	4.2	3.82	3.5	3.62	6.75
25	3.95	5.7	6.75	4.42	4.3	9.35	6.55	4.15	3.75	3.6	3.6	6.4
26	4.15	6.45	5.55	4.4	4.25	7.3	6.35	4.1	3.7	3.65	3.65	5.95
27	4.15	8.0	6.35	4.5	4.2	6.1	6.2	4.1	3.7	3.78	3.7	5.55
28	4.1	.....	6.25	4.45	4.3	5.65	6.05	4.3	3.78	3.82	3.7	5.25
29	4.3	.....	5.95	4.3	4.15	5.25	5.5	4.4	3.8	3.8	3.65	5.25
30	4.25	.....	5.65	4.3	4.55	4.9	5.15	4.35	3.68	3.8	3.62	5.45
31	4.05	.....	5.55	.....	4.55	.....	5.0	4.3	.....	3.82	.....	5.85

*a*Ice conditions during January and February, 1905.

Rating table for Shenandoah River (South Branch) near Front Royal, Va., from June, 1899, to December 31, 1903.

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.80	305	4.80	950	5.80	2,080	6.80	3,660
3.90	350	4.90	1,030	5.90	2,220	7.00	4,010
4.00	400	5.00	1,120	6.00	2,370	7.20	4,370
4.10	455	5.10	1,220	6.10	2,520	7.40	4,750
4.20	515	5.20	1,330	6.20	2,670	7.60	5,150
4.30	580	5.30	1,440	6.30	2,830	7.80	5,570
4.40	650	5.40	1,560	6.40	2,990	8.00	6,000
4.50	720	5.50	1,680	6.50	3,150		
4.60	795	5.60	1,810	6.60	3,320		
4.70	870	5.70	1,940	6.70	3,490		

The above table is strictly applicable only for open channel conditions. It is based upon 5 discharge measurements made during 1899 to 1903. It is well defined between gage heights 4.2 feet and 6.0 feet. Above gage height 8.0 feet estimates are based upon a discharge curve which is the product of a well defined area curve and an approximate extension of the velocity curve. The discharge curves for the periods 1899 to 1905 inclusive, are the same above gage height 10.6 feet.

Rating table for Shenandoah River (South Branch) near Front Royal, Va., 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.*
3.40	320	4.50	890	5.60	2,070	6.70	3,770
3.50	350	4.60	970	5.70	2,210	6.80	3,940
3.60	385	4.70	1,060	5.80	2,350	6.90	4,120
3.70	425	4.80	1,150	5.90	2,490	7.00	4,300
3.80	465	4.90	1,250	6.00	2,640	7.20	4,680
3.90	510	5.00	1,350	6.10	2,790	7.40	5,080
4.00	560	5.10	1,460	6.20	2,940	7.60	5,480
4.10	610	5.20	1,570	6.30	3,100	7.80	5,900
4.20	670	5.30	1,690	6.40	3,260	8.00	6,320
4.30	740	5.40	1,810	6.50	3,430		
4.40	810	5.50	1,940	6.60	3,600		

The above table is strictly applicable only for open channel conditions. It is based upon 8 discharge measurements made during 1904 and 1905. It is well defined between gage heights 3.4 feet and 5.3 feet. Above gage height 8.0 feet estimates are based upon a discharge curve which is the product of a well defined area curve and an approximate extension of the velocity curve.

Estimated monthly discharge of Shenandoah River (South Branch) near Front Royal, Va.

(Drainage area, 1,569 square miles.)

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1899.								
January	.....	.....	.....	.....	.....	.....	2.52	.....
February	.....	.....	.....	.....	.....	.....	4.95	.....
March	.....	.....	.....	.....	.....	.....	5.12	.....
April	.....	.....	.....	.....	.....	.....	1.16	.....
May	.....	.....	.....	.....	.....	.....	4.95	.....
June 26–30	650	547	594	.378	.070	.....	a2.09	.....
July	950	428	538	.343	.395	16	2.51	2.11
August	1,275	350	599	.382	.440	11	3.94	3.50
September	2,080	485	759	.484	.540	14	3.78	3.24
October	685	455	559	.356	.410	18	2.34	1.93
November	6,110	650	1,236	.788	.879	109	.81	—.07
December	3,920	515	1,121	.714	.823	61	1.34	.52
The year	.....	.....	.....	.....	.....	.....	35.51	.....

a Precipitation for complete month, June, 1899.

Estimated monthly discharge of Shenandoah River (South Branch) near Front Royal, Va. Continued.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1900.								
January	12,800	950	2,265	1.44	1.66	65	2.57	0.91
February	8,060	950	2,492	1.59	1.66	45	3.73	2.07
March	12,680	1,680	3,551	2.26	2.61	70	3.72	1.11
April	3,490	1,120	1,755	1.12	1.25	66	1.89	.64
May	2,010	720	1,160	.739	.852	35	2.42	1.57
June	5,890	650	1,708	1.09	1.22	20	5.98	4.76
July	1,120	515	776	.495	.571	15	3.76	3.19
August	795	400	538	.343	.395	21	1.93	1.53
September	1,070	350	499	.318	.355	11	3.14	2.78
October	3,920	547	1,042	.664	.765	24	3.19	2.43
November	7,005	580	1,285	.819	.914	31	2.94	2.03
December	5,150	720	1,417	.903	1.04	57	1.83	.79
The year	12,800	350	1,540	.982	13.29	36	37.10	23.81
1901.								
January	4,655	515	1,366	.871	1.00	43	2.31	1.31
February	1,220	580	818	.521	.542	164	.33	—.21
March	11,580	515	1,975	1.26	1.45	38	3.80	2.35
April	46,200	1,810	8,374	5.34	5.96	95	6.24	.28
May	40,900	1,680	5,768	3.68	4.24	73	5.82	1.58
June	11,720	1,940	4,302	2.74	3.06	41	7.54	4.48
July	15,070	1,440	3,912	2.49	2.87	65	4.38	1.51
August	6,440	1,075	3,204	2.04	2.35	40	5.92	3.57
September	7,580	720	1,825	1.16	1.29	34	3.78	2.49
October	9,730	758	2,020	1.29	1.49	216	0.69	—.80
November	2,595	650	966	.616	.687	34	2.01	1.32
December	43,500	1,220	5,984	3.81	4.39	72	6.12	1.73
The year	46,200	515	3,319	2.11	29.33	60	48.94	19.61

Estimated monthly discharge of Shenandoah River (South Branch) near Front Royal, Va. Continued.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1902.								
January	9,600	1,385	3,730	2.38	2.74	102	2.69	—0.05
February	54,700	1,330	6,439	4.10	4.27	96	4.46	.19
March	76,800	3,070	9,871	6.29	7.25	201	3.61	—3.64
April	12,260	1,560	3,826	2.44	2.72	122	2.23	—.49
May	3,150	910	1,579	1.01	1.16	44	2.64	1.48
June	1,030	650	861	.549	.612	21	2.93	2.32
July	1,680	515	754	.481	.554	25	2.17	1.62
August	795	400	571	.364	.420	19	2.22	1.80
September	2,370	305	531	.338	.377	15	2.59	2.21
October	2,370	455	848	.540	.623	17	3.65	3.03
November	2,750	455	784	.500	.558	17	3.21	2.65
December	6,220	1,440	3,040	1.94	2.24	66	3.38	1.14
The year	76,800	305	2,736	1.74	23.52	66	35.78	12.26
1903.								
January	14,320	1,385	3,859	2.46	2.84	70	4.08	1.24
February	7,700	2,445	3,768	2.40	2.50	72	3.49	.99
March	17,390	1,940	5,043	3.21	3.70	89	4.15	.45
April	12,400	2,220	4,494	2.86	3.19	88	3.62	.43
May	2,295	1,030	1,417	.903	1.04	39	2.69	1.65
June	13,610	1,560	4,308	2.74	3.06	40	7.63	4.57
July	7,225	910	2,338	1.49	1.72	56	3.06	1.34
August	2,010	650	1,046	.667	.769	22	3.53	2.76
September	5,570	650	1,738	1.11	1.24	51	2.42	1.18
October	2,370	650	842	.537	.619	26	2.39	1.77
November	870	580	691	.440	.491	60	.82	.33
December	1,680	580	853	.544	.627	66	.96	.33
The year	17,390	580	2,533	1.61	21.80	56	38.84	17.04

Estimated monthly discharge of Shenandoah River (South Branch) near Front Royal, Va. Continued.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1904.								
*ab*January	6,650	705	1,293	.824	.950	53	1.80	.85
*b*February	6,110	560	1,649	1.05	1.13	90	1.26	.13
March	5,080	1,060	1,746	1.11	1.28	62	2.08	.80
April	3,940	740	1,486	.947	1.06	40	2.64	1.58
May	5,480	1,150	1,875	1.20	1.38	40	3.43	2.05
June	3,430	740	1,375	.876	.977	18	5.57	4.59
July	6,215	560	1,117	.712	.821	16	5.04	4.22
August	1,105	350	613	.391	.451	18	2.53	2.08
September	640	320	395	.252	.281	14	1.95	1.67
October	368	320	326	.208	.240	20	1.20	.96
November	368	320	329	.210	.234	24	.95	.72
*a*December	1,150	320	530	.338	.390	16	2.46	2.07
The year	6,650	320	1,061	.676	9.19	30	30.91	21.72

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1905.					
*c*January	2,005	425	917	.584	.673
*c*February 1 to 27	6,320	560	1,140	.726	.729
March 5 to 31	6,870	1,405	3,104	1.98	1.99
April	1,810	740	1,143	.728	.812
May	2,005	560	920	.586	.676
June	9,380	465	1,372	.874	.975
July	5,480	890	2,236	1.42	1.64
August	3,068	560	1,014	.646	.745
September	1,200	417	595	.379	.423
October	474	350	417	.266	.307
November	474	378	425	.271	.302
December	7,024	425	1,476	.941	1.08

*a*Ice conditions during January and December, 1904. No correction made in the estimates.
*b*Estimates January 25 to February 25, 1904, approximate.
*c*Ice conditions during January and February, 1905. No correction made in the estimates.

SOUTH RIVER AT BASIC, VA.

This station was established June 29, 1905, by N. C. Grover, in connection with the investigation of stream pollution in the Shenandoah River Valley. It is located at the highway bridge, one-half mile below the Chesapeake and Ohio Railway bridge at Basic, Va. A standard chain gage is fastened to the upstream handrail of the bridge. The length of the chain from the end of the weight to the outer edge of the ring is 20.84 feet. Discharge measurements are made from the upstream side of the single span bridge to which the gage is fastened. The initial point for soundings is the face of the right abutment. The channel is straight for 300 feet above and 500 feet below the station. The current is sluggish. Both banks are subject to overflow, the right bank only during very high water. The bed of the stream is composed of rocks and mud and is liable to change after floods. The approximate depth of the water is 3 to 4 feet at medium stage. Gage-height observations and measurements are affected by flour mills above the station, which cause rapid fluctuations in the gage height at times. Bench mark No. 1 is the upstream corner of the lowest step of the wing wall of the bridge at the right bank, nearest the river. It is marked with red paint. Its elevation is 13.97 feet above the datum of the gage. Bench mark No. 2 is at the corner of the wing wall next above bench mark No 1. Its elevation is 14.98 feet above the datum of the gage. During 1905 the gage was read once each day by F. J. Bates.

Discharge measurements of South River at Basic, Va.

Date.	Hydrographer.	Width	Area of section.	Mean velocity.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet*
June 29	Follansbee and Biggi	70	156	.58	2.62	90
June 11	N. C. Grover	70	136	.47	2.59	64
September 16	Bolster and Winter	70	146	.43	2.52	63
December 29	Robert Follansbee	73	268	1.69	4.05	454

Daily gage height, in feet, of South River at Basic, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1	.....	.....	.....	.....	.....	.....	2.6	2.6	2.5	2.4	2.3	2.2
2	.....	.....	.....	.....	.....	.....	2.5	2.7	2.5	2.3	2.1	2.3
3	.....	.....	.....	.....	.....	.....	2.7	2.5	2.5	2.5	2.2	2.4
4	.....	.....	.....	.....	.....	.....	2.6	2.5	2.5	2.3	2.1	2.9
5	.....	.....	.....	.....	.....	.....	2.55	2.5	2.6	2.2	2.2	2.9
6	.....	.....	.....	.....	.....	.....	2.6	2.5	2.3	2.2	2.3	2.8
7	.....	.....	.....	.....	.....	.....	3.0	2.5	2.2	2.4	2.3	2.6
8	.....	.....	.....	.....	.....	.....	2.8	2.5	2.3	2.4	2.3	2.5
9	.....	.....	.....	.....	.....	.....	2.7	2.5	2.4	2.5	2.3	2.5
10	.....	.....	.....	.....	.....	.....	3.0	2.6	2.5	2.4	2.3	2.5
11	.....	.....	.....	.....	.....	.....	2.7	2.6	2.5	2.5	2.1	2.5
12	.....	.....	.....	.....	.....	.....	4.25	2.6	2.5	2.7	2.3	2.6
13	.....	.....	.....	.....	.....	.....	4.3	2.6	2.2	2.3	2.4	2.3
14	.....	.....	.....	.....	.....	.....	5.0	2.7	2.2	2.2	2.3	2.4
15	.....	.....	.....	.....	.....	.....	3.5	2.7	2.2	2.4	2.2	2.3
16	.....	.....	.....	.....	.....	.....	3.2	2.9	2.2	2.4	2.1	2.3
17	.....	.....	.....	.....	.....	.....	3.0	2.8	2.6	2.2	2.4	2.5
18	.....	.....	.....	.....	.....	.....	2.9	2.7	3.2	2.6	2.2	2.5
19	.....	.....	.....	.....	.....	.....	2.9	2.7	2.8	2.6	2.3	2.5
20	.....	.....	.....	.....	.....	.....	2.8	2.7	2.7	2.4	2.3	2.5
21	.....	.....	.....	.....	.....	.....	2.8	2.6	2.7	2.3	2.1	5.5
22	.....	.....	.....	.....	.....	.....	2.7	2.6	2.6	2.4	2.3	4.1
23	.....	.....	.....	.....	.....	.....	2.4	2.5	2.4	2.5	2.3	3.9
24	.....	.....	.....	.....	.....	.....	2.5	2.5	2.5	2.4	2.3	3.7
25	.....	.....	.....	.....	.....	.....	2.9	2.5	2.6	2.1	2.1	3.4
26	.....	.....	.....	.....	.....	.....	2.8	2.8	2.5	2.4	2.3	3.2
27	.....	.....	.....	.....	.....	.....	2.8	2.6	2.6	2.5	2.1	3.1
28	.....	.....	.....	.....	.....	.....	2.7	2.5	2.6	2.3	2.0	2.9
29	.....	.....	.....	.....	.....	2.5	2.8	2.5	2.4	2.4	2.2	3.7
30	.....	.....	.....	.....	.....	2.5	2.7	2.3	2.4	2.4	2.3	3.3
31	.....	.....	.....	.....	.....	.....	2.6	2.3	.....	2.6	.....	3.2

SOUTH RIVER AT PORT REPUBLIC, VA.

This station was established August 6, 1895, and discontinued April 1, 1899. It was located at the highway bridge about 300 feet above the junction of this river with North River. The banks are high and not subject to overflow. Part of the flow of the river is diverted and used above the bridge in a power plant. This water flows under the bridge in the tailrace, and was always included in the measurements. It did not, however, affect the observed gage height. The bed of the river is composed of gravel and cobblestones and is permanent. The current is swift at all stages and normal to the bridge.

Discharge measurements of South River at Port Republic, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1895.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
[a]August 5	C. C. Babb	56	1.30	.....	72
August 6	....do	74	1.55	1.62	114
August 29	D. C. Humphreys	68	1.28	1.34	87
1896.					
June 5	D. C. Humphreys	79	1.43	1.40	113
July 30	....do	83	1.68	1.63	139
1897.					
March 23	F. H. Anschutz	180	2.36	2.30	426
April 19	G. H. Matthes	.....	.....	1.88	202
June 1	A. P. Davis	90	2.02	1.87	182
July 24	G. H. Matthes	71	1.86	1.40	132
November 7	....do	84	2.05	1.80	173
1899.					
March 11	E. G. Paul	360	4.41	3.70	1,592

[a]Measurement made at Basic City, 200 feet above iron highway bridge. The surface of the water then was 19.29 feet below the top of the foot rail of the bridge, opposite the third or center vertical on the upper side of the bridge.

Daily gage height, in feet, of South River at Port Republic, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1895.												
1	.....	.....	.....	.....	.....	.....	.....	.....	1.34	1.2	1.2	1.3
2	.....	.....	.....	.....	.....	.....	.....	.....	1.34	1.2	1.2	1.4
3	.....	.....	.....	.....	.....	.....	.....	.....	1.34	1.2	1.3	1.4
4	.....	.....	.....	.....	.....	.....	.....	.....	1.32	1.2	1.3	1.35
5	.....	.....	.....	.....	.....	.....	.....	.....	1.32	1.2	1.3	1.3
6	.....	.....	.....	.....	.....	.....	.....	1.15	1.32	1.2	1.3	1.3
7	.....	.....	.....	.....	.....	.....	.....	1.12	1.3	1.2	1.3	1.3
8	.....	.....	.....	.....	.....	.....	.....	1.1	1.3	1.2	1.3	1.3
9	.....	.....	.....	.....	.....	.....	.....	1.1	1.3	1.2	1.3	1.4
10	.....	.....	.....	.....	.....	.....	.....	1.1	1.45	1.2	1.3	1.3
11	.....	.....	.....	.....	.....	.....	.....	1.1	1.35	1.2	1.3	1.3
12	.....	.....	.....	.....	.....	.....	.....	1.08	1.35	1.2	1.3	1.3
13	.....	.....	.....	.....	.....	.....	.....	1.06	1.32	1.2	1.3	1.3
14	.....	.....	.....	.....	.....	.....	.....	1.06	1.3	1.2	1.3	1.3
15	.....	.....	.....	.....	.....	.....	.....	1.06	1.3	1.2	1.3	1.3
16	.....	.....	.....	.....	.....	.....	.....	1.05	1.3	1.2	1.3	1.3
17	.....	.....	.....	.....	.....	.....	.....	1.05	1.3	1.2	1.3	1.3
18	.....	.....	.....	.....	.....	.....	.....	1.05	1.3	1.2	1.3	1.3
19	.....	.....	.....	.....	.....	.....	.....	1.05	1.25	1.2	1.3	1.3
20	.....	.....	.....	.....	.....	.....	.....	1.05	1.25	1.2	1.25	1.3
21	.....	.....	.....	.....	.....	.....	.....	1.05	1.25	1.2	1.25	1.3
22	.....	.....	.....	.....	.....	.....	.....	1.05	1.25	1.2	1.25	2.1
23	.....	.....	.....	.....	.....	.....	.....	1.05	1.25	1.2	1.25	1.8
24	.....	.....	.....	.....	.....	.....	.....	1.04	1.25	1.2	1.25	1.6
25	.....	.....	.....	.....	.....	.....	.....	1.42	1.25	1.2	1.25	1.6
26	.....	.....	.....	.....	.....	.....	.....	1.4	1.25	1.2	1.3	1.6
27	.....	.....	.....	.....	.....	.....	.....	1.4	1.2	1.2	1.3	1.8
28	.....	.....	.....	.....	.....	.....	.....	1.37	1.2	1.2	1.3	2.1
29	.....	.....	.....	.....	.....	.....	.....	1.34	1.2	1.2	1.3	2.1
30	.....	.....	.....	.....	.....	.....	.....	1.3	1.2	1.2	1.3	2.1
31	.....	.....	.....	.....	.....	.....	.....	1.3	.....	1.2	.....	2.0
1896.												
1	1.8	2.0	2.0	3.2	1.7	1.6	1.8	1.5	1.4	5.0	1.6	2.7
2	1.8	2.0	2.0	3.0	1.7	1.5	1.8	1.5	1.4	3.3	1.6	2.55
3	1.8	2.3	2.0	2.8	2.2	1.5	1.7	1.5	1.4	3.0	1.6	2.4
4	1.7	2.5	2.0	2.7	2.2	1.5	1.6	1.5	1.4	2.75	1.6	2.4
5	1.6	2.5	2.0	2.5	2.2	1.5	1.6	1.5	1.4	2.4	4.1	2.35
6	1.5	3.15	1.9	2.5	2.2	1.5	1.7	1.45	1.4	2.3	3.5	2.1
7	1.4	3.6	1.9	2.4	2.1	2.5	1.7	1.45	1.4	2.3	3.0	2.1
8	1.4	3.1	1.9	2.3	2.0	2.5	1.7	1.4	1.4	2.2	2.6	2.0
9	1.3	3.1	1.9	2.3	1.9	2.5	4.8	1.4	1.4	2.1	2.4	1.9
10	1.3	2.7	1.9	2.2	1.9	2.0	3.2	1.4	1.4	2.0	2.3	1.8
11	1.3	2.5	1.85	2.2	1.9	1.8	2.7	1.4	1.4	2.0	2.15	1.7
12	1.3	2.3	1.85	2.2	1.8	1.8	2.5	1.4	1.4	1.95	2.15	1.6
13	1.3	2.3	1.85	2.2	1.7	1.7	2.4	1.4	1.35	1.95	2.1	1.5
14	1.2	2.8	1.85	2.15	3.0	1.6	2.3	2.0	1.35	1.9	2.1	1.5
15	1.2	2.7	2.0	2.15	2.0	1.6	2.3	1.6	1.35	1.85	2.0	1.5
16	1.2	2.5	2.0	2.1	1.8	1.6	2.0	1.6	1.35	1.85	2.0	1.45
17	1.2	2.4	2.2	2.0	1.8	2.5	2.0	1.6	1.35	1.85	1.9	1.45
18	1.2	2.3	2.2	2.0	1.7	2.2	1.7	1.5	1.35	1.85	1.9	1.45
19	1.2	2.3	2.8	1.9	1.6	2.2	1.8	1.5	1.35	1.85	1.85	1.45
20	1.2	2.2	4.3	1.9	1.6	2.5	1.8	1.5	1.35	1.8	1.85	1.45
21	1.2	2.2	3.0	1.9	1.6	2.0	1.7	1.5	1.35	1.75	1.8	1.45
22	1.2	2.2	2.6	1.8	1.6	2.0	1.7	1.5	1.3	1.7	1.8	1.45

Daily gage height, in feet, of South River at Port Republic, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1896.												
23	1.3	2.1	2.6	1.8	1.6	1.8	1.7	1.5	1.3	1.65	1.8	1.45
24	4.9	2.1	2.5	1.8	1.6	1.7	1.7	1.5	1.25	1.65	1.8	1.45
25	3.6	2.1	2.5	2.0	1.6	1.7	1.7	1.65	1.25	1.65	1.75	1.45
26	3.0	2.0	2.4	2.0	1.6	2.0	1.7	1.5	1.25	1.65	1.7	1.45
27	2.7	2.0	2.4	1.9	1.6	2.0	1.7	1.5	1.25	.....	1.65	1.45
28	2.4	2.0	2.4	1.8	1.6	2.0	1.7	1.5	1.25	1.6	1.65	1.45
29	2.3	2.0	2.5	1.75	1.6	1.9	1.6	1.5	9.7	1.6	2.0	1.45
30	2.2	.....	3.3	1.7	1.6	1.9	1.6	1.45	17.0	1.6	3.1	1.45
31	2.1	.....	3.2	.....	1.6	.....	1.5	1.45	.....	1.6	.....	1.45
1897.												
1	1.45	1.85	2.6	2.0	1.75	1.85	1.6	1.5	1.2	1.3	1.75	1.5
2	1.45	1.85	2.5	2.0	9.3	1.8	1.65	1.5	1.2	1.3	2.8	1.5
3	1.45	1.85	2.4	2.0	4.5	1.75	1.65	1.5	1.2	1.3	2.5	1.5
4	1.45	1.85	2.4	2.0	3.3	1.75	1.6	1.5	1.2	1.3	2.1	1.5
5	1.45	1.85	2.35	2.0	3.0	1.9	1.55	1.5	1.2	1.3	2.0	1.5
6	1.45	1.95	2.3	2.1	2.8	1.75	1.55	1.5	1.2	1.3	2.0	1.5
7	1.45	5.0	2.3	2.1	2.5	1.7	1.55	1.5	1.2	1.3	1.8	1.5
8	1.45	4.1	2.3	2.1	2.5	1.65	1.55	1.45	1.2	1.3	1.75	1.5
9	1.45	3.2	2.25	2.1	2.4	1.6	1.55	1.4	1.2	1.3	1.7	1.5
10	1.45	3.05	2.25	2.1	2.3	1.55	1.55	1.4	1.2	1.3	1.7	1.5
11	1.45	2.95	2.25	2.0	2.3	1.5	1.55	1.4	1.2	1.3	1.7	1.5
12	1.45	2.9	2.25	2.0	2.3	1.5	1.55	1.4	1.3	1.3	1.65	1.5
13	1.45	3.15	2.2	1.9	3.2	1.65	1.5	1.4	1.3	1.45	1.65	1.5
14	1.45	3.15	2.3	1.9	4.8	1.65	1.5	1.4	1.3	1.45	1.65	1.5
15	1.45	3.15	2.4	1.9	3.2	1.65	1.5	1.35	1.3	1.45	1.65	1.45
16	1.45	3.4	2.6	1.9	2.85	1.65	1.5	1.35	1.3	1.45	1.65	2.4
17	1.45	3.4	2.6	1.9	2.7	1.6	1.5	1.35	1.3	1.45	1.65	2.0
18	1.45	3.2	2.6	1.85	2.5	1.6	1.5	1.3	1.3	1.45	1.65	1.9
19	1.45	3.2	2.6	1.85	2.4	1.6	1.7	1.25	1.3	1.45	1.65	1.9
20	1.45	3.1	2.6	1.8	2.35	1.65	1.6	1.2	1.3	1.45	1.65	1.85
21	1.45	3.1	2.7	1.8	2.3	1.8	1.55	1.2	1.3	1.5	1.6	1.8
22	1.45	3.6	2.5	1.8	2.25	1.7	1.5	1.2	1.3	1.5	1.55	1.8
23	1.45	6.75	2.3	1.8	2.2	1.65	1.5	1.2	1.3	1.5	1.55	1.8
24	1.65	4.1	2.35	1.8	2.2	1.6	1.5	1.2	1.3	1.5	1.55	1.8
25	1.85	3.3	2.25	1.8	2.2	1.6	1.45	1.2	1.3	1.5	1.5	1.8
26	1.85	3.2	2.15	1.8	2.15	1.6	1.4	1.2	1.3	1.5	1.5	1.8
27	1.85	3.1	2.05	1.8	2.15	1.6	1.4	1.2	1.3	1.5	1.5	1.8
28	1.85	2.8	2.1	1.8	2.1	1.6	1.4	1.2	1.3	2.0	1.5	1.8
29	1.85	.....	2.1	1.8	2.1	1.6	1.4	1.2	1.3	1.9	1.5	1.8
30	1.85	.....	2.1	1.75	2.0	1.6	1.4	1.2	1.3	1.85	1.5	1.8
31	1.85	.....	2.0	.....	1.95	.....	1.4	1.2	.....	1.75	.....	1.8
1898.												
1	1.8	2.0	1.5	2.25	2.1	1.75	1.6	2.1	1.6	1.35	2.5	1.9
2	1.8	2.0	1.5	2.25	2.05	1.65	1.6	2.0	1.5	1.35	2.35	1.8
3	1.8	2.0	1.6	2.25	2.0	1.6	1.55	2.0	1.5	1.35	2.2	1.8
4	1.75	2.0	1.6	2.2	2.0	1.6	1.55	2.0	1.5	1.35	2.15	2.5
5	1.75	2.0	1.6	2.15	1.9	1.6	1.55	4.4	1.5	1.75	2.1	4.0
6	1.65	1.95	1.6	2.15	2.2	1.6	1.55	3.0	1.5	3.0	2.1	3.0
7	1.65	1.9	1.6	2.15	4.1	1.6	1.55	2.4	1.5	2.9	2.05	2.9
8	1.6	1.85	1.6	2.1	5.0	1.6	1.55	2.4	1.5	2.6	2.0	2.7
9	1.6	1.8	1.6	2.0	4.1	1.55	1.55	2.3	1.5	2.3	2.0	2.5
10	1.6	1.75	1.6	2.1	3.5	1.55	1.5	6.4	1.5	2.15	2.0	2.4

Daily gage height, in feet, of South River at Port Republic, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1898.												
11	1.6	1.7	1.6	2.05	3.1	1.5	1.45	6.6	1.5	2.0	2.0	2.35
12	1.55	1.7	1.6	2.0	2.9	1.85	1.4	3.6	1.5	1.95	2.0	2.3
13	1.55	1.65	1.6	2.0	2.6	1.75	1.4	3.0	1.5	1.9	2.0	2.3
14	1.55	1.6	1.6	2.0	2.6	1.65	1.4	3.0	1.5	1.8	1.9	2.25
15	1.55	1.55	1.6	2.75	2.5	1.55	1.6	2.8	1.5	1.8	1.9	2.2
16	1.55	1.5	1.6	3.0	2.4	1.75	1.6	2.6	1.5	1.8	1.9	2.15
17	1.55	1.5	1.85	2.8	2.4	1.75	1.6	2.4	1.5	1.75	1.9	2.1
18	1.55	1.5	1.85	2.7	2.3	1.75	1.6	2.3	1.5	1.75	1.85	2.1
19	1.55	1.5	1.85	2.5	2.2	1.75	1.6	2.3	1.5	7.5	1.85	2.1
20	1.55	1.5	1.8	2.4	2.1	1.75	1.6	2.2	1.5	3.8	2.15	2.0
21	1.55	1.5	1.8	2.25	2.0	1.75	1.6	2.2	1.5	3.8	2.1	2.0
22	1.55	1.5	1.8	2.15	2.6	1.75	1.6	2.2	1.5	7.6	2.1	2.0
23	2.0	1.5	1.8	2.1	2.0	1.7	1.6	2.2	1.65	4.5	2.1	2.6
24	2.0	1.5	1.9	2.1	2.0	1.7	1.7	2.1	1.65	4.0	2.1	2.6
25	2.0	1.5	1.9	2.2	1.9	1.7	1.7	2.0	1.6	3.1	2.1	2.5
26	2.0	1.5	1.9	2.5	1.9	1.7	1.7	1.9	1.5	3.0	2.1	2.45
27	2.0	1.5	2.0	2.3	1.85	1.65	1.7	1.8	1.45	2.8	2.1	2.4
28	2.0	1.5	2.0	2.25	1.8	1.6	1.7	1.7	1.4	2.6	2.1	2.35
29	2.0	.....	2.0	2.2	1.8	1.6	1.7	1.6	1.35	2.5	2.1	2.3
30	2.0	.....	2.0	2.1	1.8	1.6	1.7	1.6	1.35	2.5	2.0	2.3
31	2.0	.....	2.2	.....	1.8	.....	2.1	1.6	.....	2.5	.....	2.3
1899.												
1	2.5	2.1	4.0	2.5	.....	.....	.....	.....	.....	.....	.....	.....
2	2.5	2.1	3.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	2.4	2.1	3.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	2.3	2.1	5.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	2.3	2.1	12.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	3.4	2.1	6.7	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	5.0	2.1	5.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	3.8	2.2	4.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	3.6	2.2	3.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	3.0	2.3	3.9	.....	.....	.....	.....	.....	.....	.....	.....	.....
11	2.9	2.3	3.7	.....	.....	.....	.....	.....	.....	.....	.....	.....
12	2.75	2.3	3.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	2.6	2.3	3.4	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	2.6	2.4	3.3	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	2.6	2.5	3.4	.....	.....	.....	.....	.....	.....	.....	.....	.....
16	2.6	2.6	3.3	.....	.....	.....	.....	.....	.....	.....	.....	.....
17	2.5	2.6	3.2	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	2.4	2.6	2.9	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	2.2	2.8	3.2	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	2.2	3.0	3.7	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	2.2	3.5	3.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	2.2	5.0	3.2	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	2.2	5.6	3.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	2.2	4.1	2.9	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	2.2	3.5	2.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	2.2	4.4	2.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	2.2	6.5	2.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	2.2	5.3	2.7	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	2.2	.....	2.7	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	2.2	.....	2.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	2.1	.....	2.5	.....	.....	.....	.....	.....	.....	.....	.....	.....

Rating table for South River at Port Republic, Va., from August 5, 1895 to April 1, 1899.

Gage Height	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.3	95	2.2	350	3.8	1,535	5.4	2,720
1.4	105	2.4	495	4.0	1,685	5.6	2,870
1.5	120	2.6	645	4.2	1,835	5.8	3,015
1.6	140	2.8	795	4.4	1,980	6.0	3,165
1.7	160	3.0	945	4.6	2,125	6.5	3,535
1.8	180	3.2	1,090	4.8	2,275	7.0	3,905
1.9	210	3.4	1,240	5.0	2,425		
2.0	250	3.6	1,390	5.2	2,575		

This rating table is not well defined; therefore, the estimates made from it are only approximate.

Estimated monthly discharge of South River at Port Republic, Va.

(Drainage area, 246 square miles.)

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1895.					
August 6–31	105	70	80	.33	.32
September	112	85	94	.38	.43
October	85	85	85	.35	.40
November	95	85	93	.38	.43
December	290	95	136	.55	.63
1896.					
January	2,350	85	305	1.24	1.43
February	1,390	250	517	2.10	2.19
March	1,905	195	473	1.11	1.28
April	1,090	160	375	1.52	1.70
May	945	140	218	.89	1.02
June	570	120	255	1.04	1.16
July	2,275	120	322	1.31	1.51
August	250	105	123	.50	.58
September	9,200	90	597	2.43	2.71
October	2,425	140	362	1.47	1.69
November	1,760	140	376	1.53	1.71
December	720	112	208	.85	.98
The year	9,200	85	344	1.33	17.96

Estimated monthly discharge of South River at Port Republic, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1897.					
January	195	112	131	.53	.61
February	3,717	195	1,072	4.36	4.54
March	720	250	459	1.87	2.16
April	290	170	211	.86	.95
May	5,607	170	797	3.24	3.74
June	210	120	152	.62	.69
July	160	105	125	.51	.59
August	120	85	103	.42	.48
September	95	85	91	.37	.41
October	250	95	119	.48	.55
November	795	120	192	.78	.87
December	495	112	166	.67	.77
The year	5,607	85	301	1.23	16.36
1898.					
January	250	130	175	.71	.82
February	250	120	162	.66	.69
March	350	120	177	.72	.83
April	945	250	408	1.66	1.85
May	2,425	180	561	2.28	2.63
June	195	120	153	.62	.69
July	290	105	142	.58	.67
August	3,605	140	690	2.80	3.23
September	150	100	121	.49	.55
October	4,345	100	835	3.39	3.91
November	570	195	282	1.15	1.28
December	1,685	180	484	1.97	2.27
The year	4,345	100	349	1.42	19.42

LEWIS CREEK NEAR STAUNTON, VA.

This station was established June 30, 1905, by N. C. Grover, in connection with the investigation of stream pollution in the Shenandoah Valley. It is located at the private bridge across Lewis Creek, on the property of William Glenn, 2 miles from Staunton. A vertical staff gage, graduated to feet and tenths, is fastened to a tree 6 feet downstream from the bridge. Discharge measurements are made from the downstream side of the bridge, the initial point for soundings being the gate post near the left end of the bridge. The channel is straight for 300 feet above and below the station. The current is sluggish. Both banks are about 5 feet high and do not overflow except during very high water. The bed of the stream is composed of soft mud. There is but one channel at all stages. The stream is composed almost wholly of sewage from the city of Staunton, and is very shallow at ordinary stages. Bench mark No. 1 is a nail in the locust tree to which the gage is attached, one foot above the ground on the upstream side. Its elevation is 7.59 feet above the zero of the gage. Bench mark No. 2 is a nail in a locust tree 50 feet upstream from the gage, one foot above the ground, on the downstream side. Its elevation is 7.01 feet above the zero of the gage. Bench mark No. 3 is the under side of the lowest timber course at the northeast corner of house, near the gage. Its elevation is 9.92 feet above the zero of the gage. During 1905 the gage was read once each day by Ashby Glenn.

Discharge measurements of Lewis Creek near Staunton, Va.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
June 30	Follansbee and Biggi.	16	7.9	.48	.51	3.8
December 29	Robert Follansbee	16	10.1	.61	.60	6.2

Daily gage height, in feet, of Lewis Creek near Staunton, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1	.....	.....	.....	.....	.....	.....	.65	.45	.5	.4	.4	.5
2	.....	.....	.....	.....	.....	.....	.88	.55	.4	.4	.5	.5
3	.....	.....	.....	.....	.....	.....	.7	.45	.45	.65	.5	.6
4	.....	.....	.....	.....	.....	.....	.65	.45	.4	.4	.5	.4
5	.....	.....	.....	.....	.....	.....	.5	.6	.45	.4	.5	.5
6	.....	.....	.....	.....	.....	.....	.5	.5	.45	.35	.6	.5
7	.....	.....	.....	.....	.....	.....	.7	.5	.45	.4	.65	.45
8	.....	.....	.....	.....	.....	.....	.6	.45	.45	.4	.5	.5
9	.....	.....	.....	.....	.....	.....	.55	.5	.45	.6	.4	.5
10	.....	.....	.....	.....	.....	.....	.5	.45	.45	.5	.4	.4
11	.....	.....	.....	.....	.....	.....	.5	.35	.45	1.0	.55	.4
12	.....	.....	.....	.....	.....	.....	1.1	.45	.45	.8	.5	.4
13	.....	.....	.....	.....	.....	.....	.7	.45	.5	.7	.6	.45
14	.....	.....	.....	.....	.....	.....	.5	.45	.6	.5	.6	.5
15	.....	.....	.....	.....	.....	.....	.55	.5	.6	.4	.5	.6
16	.....	.....	.....	.....	.....	.....	.55	.5	.5	.4	.5	.65
17	.....	.....	.....	.....	.....	.....	.5	.45	.5	.5	.45	.5
18	.....	.....	.....	.....	.....	.....	.5	.6	.45	.45	.75	.5
19	.....	.....	.....	.....	.....	.....	.55	.5	.45	.45	.45	.5
20	.....	.....	.....	.....	.....	.....	.4	.45	.45	.6	.4	.45
21	.....	.....	.....	.....	.....	.....	.5	.45	.45	.6	.45	.4
22	.....	.....	.....	.....	.....	.....	1.05	.45	.5	.5	.55	.45
23	.....	.....	.....	.....	.....	.....	.6	.55	.45	.6	.35	.45
24	.....	.....	.....	.....	.....	.....	.6	.45	.45	.7	.35	.5
25	.....	.....	.....	.....	.....	.....	.55	.5	.45	.65	.5	.5
26	.....	.....	.....	.....	.....	.....	.5	.5	.4	.6	.5	.5
27	.....	.....	.....	.....	.....	.....	.6	.5	.4	.6	.5	.45
28	.....	.....	.....	.....	.....	.....	.45	.5	.4	.6	.45	.65
29	.....	.....	.....	.....	.....	.....	.5	.5	.4	.4	.4	.55
30	.....	.....	.....	.....	.....	.....	.45	.4	.4	.45	.4	.5
31	.....	.....	.....	.....	.....	.....	.5	.5	.....	.5	.....	.4

NORTH RIVER AT PORT REPUBLIC, VA.

This station was established August 6, 1895, and was discontinued April 1, 1899. It was located at the highway bridge about 500 feet above the junction of this River with South River. Measurements were made from the downstream side of the bridge. The banks are high and not subject to overflow. The bed is very rough but permanent. The current is broken and uneven at low stages. A dam about 200 feet above the bridge controls the flow at low stages.

Discharge measurements of North River at Port Republic, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1895.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
August 6	C. C. Babb	281	1.33	2.18	375
*a*August 29	D. C. Humphreys	.....	.....	2.09	258
1896.					
June 5	D. C. Humphreys	276	1.55	2.20	427
July 31	do	310	1.38	2.48	428
*b*July 31	do	.....	.....	2.46	335
1897.					
March 23	D. C. Humphreys	757	1.94	3.54	1,466
April 19	G. H. Matthes	.....	.....	2.60	712
June 1	A. P. Davis	387	1.43	2.60	552
July 24	G. H. Matthes	270	1.59	2.30	431
November 7	do	217	1.13	2.00	245
1899.					
March 11	E. G. Paul	1,117	3.06	4.80	3,423

*a*Result obtained by deducting the discharge of the South River, 87 second-feet, from total discharge of the South Fork of Shenandoah River, 345 second-feet, measured below the junction.

*b*Result obtained as on August 29, 1895, by deducting 139 second-feet, discharge of South River, from 474 second-feet, discharge of South Fork.

Daily gage height, in feet, of North River at Port Republic, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1895.												
1	.....	.....	.....	.....	.....	.....	.....	.....	2.03	1.9	1.75	1.85
2	.....	.....	.....	.....	.....	.....	.....	.....	2.03	1.9	1.75	1.9
3	.....	.....	.....	.....	.....	.....	.....	.....	2.0	1.9	1.85	1.9
4	.....	.....	.....	.....	.....	.....	.....	.....	2.0	1.9	1.85	1.85
5	.....	.....	.....	.....	.....	.....	.....	.....	2.0	1.9	1.85	1.8
6	.....	.....	.....	.....	.....	.....	.....	2.2	2.0	1.9	1.85	1.85
7	.....	.....	.....	.....	.....	.....	.....	2.2	2.0	1.9	1.85	1.85
8	.....	.....	.....	.....	.....	.....	.....	2.15	2.0	1.85	1.85	1.85
9	.....	.....	.....	.....	.....	.....	.....	2.15	4.3	1.85	1.85	1.9
10	.....	.....	.....	.....	.....	.....	.....	2.15	2.2	1.85	1.85	1.8
11	.....	.....	.....	.....	.....	.....	.....	2.15	2.1	1.85	1.9	1.8
12	.....	.....	.....	.....	.....	.....	.....	2.08	2.1	1.85	1.9	1.8
13	.....	.....	.....	.....	.....	.....	.....	2.08	2.0	1.85	1.9	1.8
14	.....	.....	.....	.....	.....	.....	.....	2.08	2.0	1.85	1.9	1.8
15	.....	.....	.....	.....	.....	.....	.....	2.08	2.0	1.85	2.0	1.8
16	.....	.....	.....	.....	.....	.....	.....	2.07	2.0	1.75	2.0	1.8
17	.....	.....	.....	.....	.....	.....	.....	2.07	1.9	1.75	2.0	1.8
18	.....	.....	.....	.....	.....	.....	.....	2.07	1.9	1.75	2.0	1.8
19	.....	.....	.....	.....	.....	.....	.....	2.07	1.9	1.75	2.0	1.8
20	.....	.....	.....	.....	.....	.....	.....	2.07	1.9	1.75	1.9	1.8
21	.....	.....	.....	.....	.....	.....	.....	2.05	1.9	1.75	1.9	1.8
22	.....	.....	.....	.....	.....	.....	.....	2.05	1.9	1.75	1.85	2.1
23	.....	.....	.....	.....	.....	.....	.....	2.05	1.9	1.75	1.85	1.9
24	.....	.....	.....	.....	.....	.....	.....	2.05	1.9	1.75	.....	1.8
25	.....	.....	.....	.....	.....	.....	.....	2.4	1.9	1.75	.....	1.8
26	.....	.....	.....	.....	.....	.....	.....	2.3	1.9	1.75	.....	1.8
27	.....	.....	.....	.....	.....	.....	.....	2.2	1.9	1.75	.....	1.9
28	.....	.....	.....	.....	.....	.....	.....	2.15	1.9	1.75	.....	2.4
29	.....	.....	.....	.....	.....	.....	.....	2.09	1.9	1.75	1.85	2.45
30	.....	.....	.....	.....	.....	.....	.....	2.05	1.9	1.75	1.85	2.4
31	.....	.....	.....	.....	.....	.....	.....	2.03	.....	1.75	.....	2.5
1896.												
1	3.0	2.5	2.6	5.4	2.32	2.42	2.8	2.43	2.0	7.5	2.35	4.4
2	2.7	2.5	2.6	5.0	2.52	2.32	2.7	2.43	1.95	4.5	2.35	3.5
3	2.5	2.8	2.6	4.6	2.52	2.32	2.7	2.55	1.9	4.0	2.35	3.3
4	2.4	3.8	2.6	4.2	3.32	2.22	2.6	2.45	1.9	3.5	2.35	3.3
5	2.4	3.8	2.6	4.0	3.32	2.2	2.6	2.4	1.9	3.3	4.7	3.25
6	2.4	5.0	2.5	3.6	3.32	2.2	2.8	2.4	1.85	3.2	6.0	3.1
7	2.4	5.7	2.5	3.5	3.12	4.5	2.8	2.3	1.85	3.1	4.3	3.05
8	2.3	4.5	2.5	3.5	2.92	3.0	2.8	2.3	1.8	3.0	3.6	2.9
9	2.3	4.1	2.5	3.4	2.72	2.6	7.5	2.3	1.8	2.9	3.3	2.8
10	2.3	3.7	2.5	3.3	2.72	2.5	5.3	2.25	1.75	2.8	3.3	2.7
11	2.3	3.5	2.4	3.3	2.72	2.3	3.9	2.2	1.7	2.65	3.2	2.65
12	2.3	3.3	2.4	3.2	2.62	2.3	3.6	2.2	1.7	2.55	3.0	2.6
13	2.3	3.3	2.4	3.2	2.52	2.2	3.3	2.2	1.7	2.5	2.8	2.55
14	2.2	5.2	2.4	3.0	5.82	2.2	3.0	3.6	1.7	2.5	2.8	2.55
15	2.2	4.7	2.6	3.0	3.82	2.2	3.3	2.7	2.0	2.5	2.7	2.5
16	2.1	3.8	2.6	.....	3.22	2.2	3.0	2.7	1.9	2.5	2.7	2.5
17	2.1	3.6	2.8	.....	3.02	2.5	3.1	3.0	1.8	2.5	2.65	2.45
18	2.0	3.1	3.2	.....	2.82	2.4	2.7	2.4	1.8	2.45	2.65	2.45
19	2.0	3.0	4.8	.....	2.62	2.4	2.7	2.3	1.8	2.45	2.6	2.45
20	2.0	2.7	7.2	.....	2.62	3.3	2.7	2.25	1.7	2.4	2.6	2.45
21	2.0	2.7	5.0	.....	2.62	3.0	2.6	2.25	1.7	2.4	2.55	2.45
22	2.0	2.7	4.8	.....	2.62	2.9	2.5	2.25	1.7	2.35	2.5	2.45

Daily gage height, in feet, of North River at Port Republic, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1896.												
23	2.1	2.7	4.0	.....	2.62	2.5	2.5	2.2	1.7	2.35	2.5	2.45
24	6.15	2.7	3.8	.....	2.52	2.4	2.5	2.2	1.65	2.35	2.45	2.45
25	5.3	2.7	3.5	.....	2.52	2.4	3.0	2.4	1.65	2.35	2.4	2.4
26	4.0	2.6	3.5	.....	2.52	3.2	2.7	2.2	1.65	2.35	2.4	2.4
27	3.3	2.6	3.5	.....	2.52	3.0	2.7	2.2	1.65	.....	2.35	2.4
28	3.0	2.6	3.5	2.22	2.42	3.0	2.6	2.15	1.65	2.35	2.35	2.4
29	2.8	2.6	4.4	2.22	2.42	2.9	2.6	2.15	7.2	2.35	3.0	2.4
30	2.6	.....	6.5	2.22	2.42	2.9	2.5	2.1	18.0	2.35	5.5	2.4
31	2.5	.....	5.9	.....	2.42	.....	2.45	2.1	.....	2.35	.....	2.35
1897.												
1	2.35	2.35	3.6	2.7	2.4	2.6	2.35	2.15	2.0	1.8	2.2	1.85
2	2.35	2.35	3.5	2.7	11.5	2.55	2.45	2.15	2.0	1.8	2.0	1.85
3	2.35	2.35	3.4	2.6	7.3	2.5	2.45	2.15	2.0	1.8	2.6	1.85
4	2.35	2.35	3.4	2.6	5.15	2.5	2.4	2.15	2.0	1.8	2.0	1.85
5	2.35	2.35	3.35	2.6	4.3	3.0	2.35	2.15	1.95	1.8	2.0	2.0
6	2.3	2.55	3.3	2.9	3.8	2.85	2.25	2.15	1.95	1.8	2.0	2.0
7	2.3	7.0	3.3	2.9	3.5	2.6	2.2	2.1	1.9	1.8	2.0	1.95
8	2.3	5.5	3.3	2.9	3.3	2.55	2.4	2.1	1.9	1.8	1.95	1.95
9	2.3	4.8	3.25	2.9	3.1	2.5	2.3	2.1	1.9	1.8	1.9	1.9
10	2.3	4.3	3.25	3.0	3.0	2.5	2.2	2.1	1.85	1.8	1.9	1.85
11	2.3	4.0	3.25	3.0	3.0	2.45	2.15	2.05	1.85	1.8	1.9	1.85
12	2.3	3.9	3.25	3.0	3.0	2.4	2.5	2.05	1.85	1.8	1.85	1.85
13	2.3	5.45	3.2	2.9	4.9	2.4	2.4	2.05	1.85	2.0	1.85	1.85
14	2.3	4.7	3.3	2.9	7.5	2.4	2.4	2.05	1.85	2.0	1.8	1.85
15	2.25	5.0	3.5	2.9	5.2	2.4	2.3	2.0	1.85	2.0	1.8	2.65
16	2.25	5.3	3.5	2.9	4.4	2.4	2.2	2.0	1.85	1.95	1.9	2.45
17	2.25	5.2	3.7	2.9	4.0	2.4	2.2	2.0	1.85	1.95	1.9	2.25
18	2.25	4.6	3.7	2.8	3.6	2.4	2.15	2.0	1.85	1.95	1.9	2.1
19	2.25	4.5	3.7	2.65	3.45	2.4	3.5	2.0	1.8	1.95	1.9	2.25
20	2.25	4.3	3.7	2.6	3.25	2.5	3.5	2.0	1.8	1.95	1.9	2.25
21	2.25	4.2	3.9	2.55	3.15	2.45	2.5	.....	1.8	2.0	1.85	2.25
22	2.25	4.8	3.6	2.5	3.1	2.4	2.4	2.0	1.8	2.0	1.85	2.25
23	2.25	9.85	3.35	2.5	3.0	2.4	2.35	2.0	1.8	2.0	1.85	2.25
24	2.25	6.7	3.4	2.5	2.95	2.4	2.35	2.0	1.8	2.0	1.85	2.25
25	2.25	5.4	3.3	2.5	2.9	2.4	2.3	2.0	1.8	2.0	1.85	2.25
26	2.25	4.5	3.2	2.5	2.85	2.4	2.25	2.0	1.8	2.0	1.85	2.25
27	2.25	4.4	3.1	2.45	2.8	2.35	2.2	2.0	1.8	2.0	1.85	2.25
28	2.25	3.8	3.0	2.45	2.75	2.35	2.15	2.0	1.8	2.1	1.85	2.25
29	2.25	.....	2.9	2.45	2.7	2.35	2.15	2.0	1.8	2.05	1.85	2.25
30	2.25	.....	2.8	2.4	2.65	2.35	2.15	2.0	1.8	1.95	1.85	2.2
31	2.25	.....	2.7	.....	2.6	.....	2.15	2.0	.....	1.95	.....	2.15
1898.												
1	2.15	2.7	2.1	3.85	2.65	2.35	2.2	4.25	2.6	2.4	3.0	2.4
2	2.15	2.7	2.1	3.5	2.6	2.3	2.2	4.25	2.5	2.4	2.8	2.3
3	2.15	2.7	2.1	3.3	2.5	2.15	2.2	4.0	2.5	2.4	2.65	2.3
4	2.1	2.7	2.1	3.15	2.45	2.15	2.2	4.5	2.5	2.4	2.6	3.0
5	2.1	2.7	2.1	3.0	2.4	2.15	2.2	8.0	2.5	3.0	2.6	7.0
6	2.1	2.65	2.1	2.9	3.0	2.1	2.2	5.0	2.5	2.9	2.6	5.0
7	2.05	2.65	2.1	2.9	6.4	2.1	2.2	5.0	2.5	2.8	2.5	3.6
8	2.05	2.6	2.1	2.8	7.25	2.1	2.2	4.6	2.5	2.6	2.5	3.3
9	2.0	2.5	2.1	2.6	6.3	2.1	2.2	4.0	2.5	2.4	2.45	3.0
10	2.6	2.4	2.1	2.75	5.0	2.0	2.15	9.0	2.5	2.25	2.4	2.9

Daily gage height, in feet, of North River at Port Republic, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1898.												
11	2.55	2.3	2.1	2.75	4.0	2.0	2.1	9.0	2.5	2.1	2.4	2.8
12	2.5	2.2	2.1	2.75	3.6	2.6	2.1	7.0	2.5	2.1	2.4	2.7
13	2.45	2.2	2.1	2.75	3.3	2.5	2.0	6.0	2.5	2.1	2.35	2.65
14	2.45	2.15	2.1	2.75	3.2	2.35	2.0	6.0	2.5	2.0	2.35	2.6
15	2.45	2.15	2.1	4.15	3.0	2.2	2.1	6.0	2.5	2.0	2.3	2.55
16	2.45	2.1	2.1	5.2	2.8	4.2	2.1	4.5	2.5	2.0	2.3	2.5
17	2.45	2.1	2.25	4.5	2.8	3.4	2.25	4.2	2.5	2.0	2.25	2.5
18	2.45	2.1	2.8	4.0	2.7	3.0	2.5	4.0	2.5	2.0	2.2	2.4
19	2.55	2.1	2.95	3.5	2.6	3.0	2.4	4.0	2.5	9.5	2.15	2.3
20	2.55	2.1	2.85	3.2	2.6	3.0	2.3	3.6	2.5	5.0	2.6	2.3
21	2.55	2.1	2.75	3.0	2.6	3.0	2.3	3.3	2.5	5.0	2.6	2.3
22	2.55	2.1	2.75	2.9	3.35	2.9	2.3	3.2	2.5	10.0	2.6	2.3
23	2.7	2.1	2.75	2.75	3.3	2.8	2.3	3.1	2.75	6.5	2.6	4.0
24	2.8	2.1	2.75	2.75	3.2	2.65	3.0	3.1	2.75	5.0	2.6	4.3
25	2.8	2.1	2.85	2.75	3.0	2.5	2.8	3.0	2.65	3.8	2.6	3.6
26	2.8	2.1	2.9	2.75	2.9	2.5	2.7	2.9	2.65	3.65	2.6	3.3
27	2.8	2.1	3.0	2.75	2.75	2.5	3.5	2.8	2.6	3.5	2.55	3.0
28	2.7	2.1	3.0	2.7	2.65	2.4	4.75	2.7	2.6	3.3	2.5	2.8
29	2.7	.....	3.0	2.65	2.65	2.4	5.0	2.7	2.5	3.15	2.5	2.6
30	2.7	.....	3.3	2.65	2.5	2.4	5.0	2.6	2.4	3.15	2.5	2.6
31	2.7	.....	4.2	.....	2.4	.....	4.5	2.6	.....	3.15	.....	2.6
1899.												
1	2.75	2.3	7.1	3.0	.....	.....	.....	.....	.....	.....	.....	.....
2	2.75	2.3	5.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	2.7	2.3	5.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	2.65	2.3	7.4	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	2.65	2.3	14.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	5.4	2.3	8.9	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	6.7	2.3	7.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	5.0	2.4	5.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	4.0	2.4	4.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	3.6	2.5	5.3	.....	.....	.....	.....	.....	.....	.....	.....	.....
11	3.4	2.5	4.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
12	3.2	2.5	4.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	3.0	2.5	4.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	2.9	2.7	3.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	2.8	2.8	4.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
16	2.8	3.0	4.2	.....	.....	.....	.....	.....	.....	.....	.....	.....
17	2.7	3.0	4.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	2.7	3.0	3.7	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	2.6	3.4	4.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	2.6	4.0	4.3	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	2.6	5.5	3.9	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	2.6	7.0	3.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	2.6	7.6	3.4	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	2.6	6.0	3.2	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	2.6	4.9	3.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	2.6	4.9	3.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	2.6	6.0	3.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	2.6	9.0	3.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	2.5	.....	3.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	2.5	.....	3.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	2.4	.....	3.0	.....	.....	.....	.....	.....	.....	.....	.....	.....

Rating table for North River at Port Republic, Va., from August 5, 1895, to April 1, 1899.

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet*	*Feet.*	*Second-feet.*
1.6	165	3.2	1,050	4.8	3,410	8.5	9,145
1.8	215	3.4	1,290	5.0	3,720	9.0	9,920
2.0	275	3.6	1,550	5.5	4,495	9.5	10,695
2.2	350	3.8	1,860	6.0	5,270	10.0	11,470
2.4	445	4.0	2,170	6.5	6,045	10.5	12,245
2.6	555	4.2	2,480	7.0	6,820	11.0	13,020
2.8	700	4.4	2,790	7.5	7,595		
3.0	865	4.6	3,100	8.0	8,370		

This rating table is not well defined; therefore, the estimates made from it are only approximate.

Estimated monthly discharge of North River at Port Republic, Va.

(Drainage area, 804 square miles.)

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1895.					
August 6–31	445	292	319	.40	.39
September	2,635	245	346	.44	.49
October	245	202	219	.27	.31
[a]November	275	202	239	.30	.33
December	500	215	251	.31	.36
1896.					
January	5,502	275	799	.99	1.14
February	4,805	500	1,488	1.85	1.93
March	7,130	445	1,653	2.05	2.37
April 1–15, 28–30	4,340	350	1,594	1.98	1.33
May	4,960	395	824	1.02	1.18
June	2,945	350	642	.80	.89
July	7,595	472	1,085	1.35	1.56
August	1,550	310	458	.57	.66
September	23,870	177	1,224	1.52	1.70
October	7,595	420	931	1.16	1.34
November	5,270	420	1,088	1.35	1.51
December	2,790	420	699	.87	1.00

[a]Discharge interpolated Nov. 24 to 28, 1895.

Estimated monthly discharge of North River at Port Republic, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1897.					
January	420	372	388	.48	.55
February	11,240	420	3,138	3.90	4.06
March	2,015	625	1,250	1.55	1.79
April	865	445	642	.80	.89
May	13,790	445	2,212	2.75	3.17
June	865	420	489	.61	.68
July	1,420	330	463	.58	.67
August	330	275	292	.36	.41
September	275	215	234	.29	.32
October	310	215	250	.31	.35
November	555	215	256	.32	.36
December	590	230	319	.39	.45
The year	13,790	215	829	1.03	13.70
1898.					
January	700	275	491	.61	.70
February	625	310	414	.51	.53
March	2,480	310	581	.72	.80
April	4,030	555	1,110	1.38	1.54
May	7,207	445	1,430	1.78	2.05
June	2,480	275	585	.73	.81
July	3,720	275	822	1.02	1.18
August	9,920	555	3,030	3.77	4.35
September	662	445	520	.65	.72
October	11,470	275	1,814	2.26	2.61
November	865	330	507	.63	.70
December	6,820	395	1,089	1.35	1.56
The year	11,470	275	1,032	1.28	17.55

COOKS CREEK AT MOUNT CRAWFORD, VA.

This station was established July 1, 1905, by N. C. Grover in connection with the investigation of stream pollution in the Shenandoah River Valley. It is located on the upper highway bridge across Cooks Creek, three-fourths of a mile from Mount Crawford, Va. A standard chain gage is fastened to the outside of the downstream guard rail of the bridge. The length of the chain from the end of the weight to the outer edge of the ring is 14.38 feet. Discharge measurements are made from the side of the bridge to which the gage is attached. The channel is straight for 200 feet above and 100 feet below the station. The current is very sluggish at low water. Both banks are low and liable to overflow during high water, but all the water passes beneath the bridge. The bed of the stream is composed of mud and gravel. The stream is polluted by tanneries. Bench mark No. 1 is a nail driven vertically into a root on the downstream side of a large tree 150 feet below the gage, on the left bank. Its elevation is 4.24 feet above the gage datum. Bench mark No. 2 is a nail driven vertically into the top of a stump midway between the bridge and bench mark No. 1. Its elevation is 5.39 feet above the gage datum. During 1905 the gage was read once each day by S. H. Craun.

Discharge measurements of Cooks Creek at Mt. Crawford, Va.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
July 1	Follansbee and Biggi.	30	78	.26	2.10	20
[a]December 30	Robert Follansbee	24	18.6	1.21	2.08	22.6

[a]Made by wading.

Daily gage height, in feet, of Cooks Creek at Mt. Crawford, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1	.....	.....	.....	.....	.....	.....	2.1	2.2	1.8	1.8	1.7	1.8
2	.....	.....	.....	.....	.....	.....	2.1	2.2	1.9	1.8	1.7	1.8
3	.....	.....	.....	.....	.....	.....	2.0	2.1	1.9	1.8	1.7	2.0
4	.....	.....	.....	.....	.....	.....	2.0	2.1	1.8	1.8	1.7	1.8
5	.....	.....	.....	.....	.....	.....	5.5	2.1	1.8	1.8	1.7	1.8
6	.....	.....	.....	.....	.....	.....	3.3	2.1	1.8	1.8	1.7	1.8
7	.....	.....	.....	.....	.....	.....	2.9	2.0	1.7	1.7	1.7	1.8
8	.....	.....	.....	.....	.....	.....	2.4	2.0	1.8	1.7	1.7	1.8
9	.....	.....	.....	.....	.....	.....	2.2	2.0	1.8	1.7	1.7	1.8
10	.....	.....	.....	.....	.....	.....	2.1	2.0	1.8	1.7	1.7	1.8
11	.....	.....	.....	.....	.....	.....	2.5	2.0	1.8	1.7	1.7	1.8
12	.....	.....	.....	.....	.....	.....	2.1	2.1	1.8	1.7	1.8	1.8
13	.....	.....	.....	.....	.....	.....	2.3	2.1	1.8	1.7	1.8	1.7
14	.....	.....	.....	.....	.....	.....	2.2	2.1	1.8	1.7	1.7	1.7
15	.....	.....	.....	.....	.....	.....	2.8	2.0	1.8	1.7	1.7	1.7
16	.....	.....	.....	.....	.....	.....	2.4	2.0	1.8	1.7	1.7	1.7
17	.....	.....	.....	.....	.....	.....	2.3	1.9	1.8	1.7	1.7	1.7
18	.....	.....	.....	.....	.....	.....	2.2	2.0	1.8	1.7	1.7	1.7
19	.....	.....	.....	.....	.....	.....	2.2	1.9	1.8	1.8	1.8	1.7
20	.....	.....	.....	.....	.....	.....	2.4	2.0	1.8	1.7	1.8	1.7
21	.....	.....	.....	.....	.....	.....	2.1	2.0	1.8	1.7	1.8	2.9
22	.....	.....	.....	.....	.....	.....	2.2	1.9	1.8	1.7	1.8	2.6
23	.....	.....	.....	.....	.....	.....	2.4	1.9	1.8	1.7	1.8	2.4
24	.....	.....	.....	.....	.....	.....	2.3	1.8	1.8	1.7	1.8	2.3
25	.....	.....	.....	.....	.....	.....	2.2	1.9	1.7	1.8	1.8	2.1
26	.....	.....	.....	.....	.....	.....	2.2	2.1	1.7	2.0	1.8	2.0
27	.....	.....	.....	.....	.....	.....	2.2	2.0	1.8	1.8	1.8	2.0
28	.....	.....	.....	.....	.....	.....	2.0	2.0	1.7	1.8	1.8	2.0
29	.....	.....	.....	.....	.....	.....	2.0	2.0	1.7	1.8	1.8	2.3
30	.....	.....	.....	.....	.....	.....	3.1	1.9	1.8	1.7	1.8	2.1
31	.....	.....	.....	.....	.....	.....	2.4	1.9	.....	1.7	.....	2.2

ELK RUN AT ELKTON, VA.

This station was established June 28, 1905, by N. C. Grover in connection with the investigation of stream pollution in the Shenandoah River Valley. It is located at the highway bridge 500 feet south of the railroad station at Elkton, Va. A standard chain gage is fastened to a floor beam on the downstream side of the bridge near the right end. The length of the chain from the end of the weight to the marker is 8.76 feet. Discharge measurements are made at ordinary stages at a footbridge 1,000 feet downstream from the bridge to which the gage is fastened. During high water discharge measurements are made from the highway bridge to which the gage is attached. The channel is straight for 100 feet above and 200 feet below the station. The current is sluggish at the gage. Both banks are low and overflow during high water. All the water passes beneath the bridge except during extreme floods. The bed of the stream is composed of gravel and is permanent. The stream is highly polluted by tanneries along its banks. Bench mark No. 1 is a nail in a 12-inch tree, 5 feet upstream from the left end of the highway bridge, 1.5 feet above the ground on the stream side. Its elevation is 6.01 feet above the datum of the gage. Bench mark No. 2 is the under side of the coping at the southwest corner of the first railway bridge pier on the right bank of the creek, marked with red paint "U. S. G. S. B. M." Its elevation is 11.96 feet above the datum of the gage. Bench mark No. 3 is a nail, one foot above the ground, in a telegraph pole 40 feet east of the left end of the footbridge. Its elevation is 0.59 foot above the datum of the gage. During 1905 the gage was read once each day by C. L. Gooden.

Discharge measurements of Elk Run at Elkton, Va.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet*
May 22	N. C. Grover	13	4.7	1.04	.....	4.9
May 22	....do	17	8.0	.50	.....	4.0
June 28	Follansbee and Biggi	34	20.4	.85	2.80	17.4
July 20	N. C. Grover	19	6.8	.50	2.10	3.4
December 28	Robert Follansbee	24	14.4	.76	2.78	11.0

Daily gage height, in feet, of Elk Run at Elkton, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1	.....	.....	.....	.....	.....	.....	2.7	2.6	2.6	2.5	2.7	2.7
2	.....	.....	.....	.....	.....	.....	2.7	2.55	2.5	2.5	2.7	2.7
3	.....	.....	.....	.....	.....	.....	2.6	2.55	2.5	2.5	2.7	2.7
4	.....	.....	.....	.....	.....	.....	2.6	2.5	2.5	2.45	2.7	2.7
5	.....	.....	.....	.....	.....	.....	2.6	2.5	2.6	2.45	2.7	2.7
6	.....	.....	.....	.....	.....	.....	2.6	2.5	2.5	2.5	2.7	2.7
7	.....	.....	.....	.....	.....	.....	2.6	2.5	2.4	2.5	2.7	2.7
8	.....	.....	.....	.....	.....	.....	2.6	2.65	2.4	2.5	2.8	2.65
9	.....	.....	.....	.....	.....	.....	2.5	2.6	2.4	2.6	2.7	2.65
10	.....	.....	.....	.....	.....	.....	2.55	2.5	2.4	2.6	2.7	2.7
11	.....	.....	.....	.....	.....	.....	2.55	2.7	2.45	3.2	2.7	2.7
12	.....	.....	.....	.....	.....	.....	3.5	2.7	2.4	2.9	2.7	2.65
13	.....	.....	.....	.....	.....	.....	3.1	3.2	2.45	2.7	2.7	2.65
14	.....	.....	.....	.....	.....	.....	2.9	3.9	2.45	2.6	2.8	2.65
15	.....	.....	.....	.....	.....	.....	2.7	3.0	2.45	2.6	2.7	2.6
16	.....	.....	.....	.....	.....	.....	2.6	2.8	2.4	2.6	2.7	2.6
17	.....	.....	.....	.....	.....	.....	2.6	2.7	2.4	2.7	2.7	2.6
18	.....	.....	.....	.....	.....	.....	2.6	2.6	2.4	2.65	2.7	2.6
19	.....	.....	.....	.....	.....	.....	2.55	2.65	2.4	2.65	2.7	2.7
20	.....	.....	.....	.....	.....	.....	2.5	2.6	2.9	2.65	2.75	3.3
21	.....	.....	.....	.....	.....	.....	2.55	2.6	2.6	2.7	2.7	3.5
22	.....	.....	.....	.....	.....	.....	2.7	2.65	2.5	2.7	2.65	2.8
23	.....	.....	.....	.....	.....	.....	2.5	2.6	2.5	2.7	2.65	2.7
24	.....	.....	.....	.....	.....	.....	2.5	3.1	2.5	2.7	2.65	2.7
25	.....	.....	.....	.....	.....	.....	2.5	3.2	2.5	2.8	2.65	2.8
26	.....	.....	.....	.....	.....	.....	2.5	3.0	2.5	2.8	2.65	2.7
27	.....	.....	.....	.....	.....	.....	2.5	3.0	2.5	2.7	2.65	2.8
28	.....	.....	.....	.....	.....	2.75	2.6	2.8	2.5	2.7	2.65	2.8
29	.....	.....	.....	.....	.....	2.8	2.6	2.7	2.5	2.7	2.65	3.0
30	.....	.....	.....	.....	.....	2.65	2.6	2.7	2.5	2.7	2.65	2.95
31	.....	.....	.....	.....	.....	.....	2.6	2.6	.....	2.7	.....	2.9

HAWKSBILL CREEK NEAR LURAY, VA.

This station was established June 27, 1905, by N. C. Grover in connection with the investigation of stream pollution in the Shenandoah River Valley. It is located a short distance above the mouth of Dry Run, 1.5 miles north of Luray, Va. A staff gage in two sections, the lower one inclined and the upper vertical, graduated to read to feet and tenths, is fastened to the left bank 100 feet above the footbridge. The initial point for soundings is the edge of rock at the right end of the bridge. The channel is straight for 500 feet above, and 200 feet below the station. The current is moderate above and swift below the bridge. Rapids below the bridge prevent backwater influence from Dry Run except in case of extreme floods. From well-defined marks the highest stage known was found to be 19.55 feet above the zero of the gage. This stage occurred October 13, 1893.

The right bank is high, rocky, wooded, and does not overflow. The left bank is low and subject to overflow during high water. The bed of the stream is composed of gravel, is free from vegetation, and is permanent. There is but one channel at all stages. The approximate depth of the water at the bridge is 2 to 3 feet. Bench mark No. 1 is a small nail in the south side of an apple tree, half a foot above the ground, 45 feet west of the gage. Its elevation is 14.04 feet above the zero of the gage. Bench mark No. 2 is the top of the stone under the vertical post on the upstream side of door frame in the old dairy building, 200 feet from the left end of the foot bridge. Its elevation is 15.10 feet above the zero of the gage. During 1905 the gage was read once each day by J. S. Miller.

Discharge measurements of Hawksbill Creek near Luray, Va.

Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
May 21	N. C. Grover	43	35.8	1.02	1.44	34.7
June 27	Follansbee and Biggi	45	46.	1.38	1.74	64.
December 28	Robert Follansbee	40	45.	1.61	1.81	72.

Daily gage height, in feet, of Hawksbill Creek near Luray, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1	.....	.....	.....	.....	.....	.....	1.6	1.45	1.4	1.35	1.4	1.4
2	.....	.....	.....	.....	.....	.....	1.6	1.4	1.4	1.35	1.4	1.4
3	.....	.....	.....	.....	.....	.....	1.6	1.4	1.4	1.4	1.4	1.65
4	.....	.....	.....	.....	.....	.....	1.55	1.4	1.35	1.35	1.4	1.6
5	.....	.....	.....	.....	.....	.....	1.55	1.4	1.3	1.35	1.4	1.5
6	.....	.....	.....	.....	.....	.....	1.55	1.4	1.3	1.35	1.45	1.45
7	.....	.....	.....	.....	.....	.....	1.55	1.4	1.3	1.35	1.45	1.45
8	.....	.....	.....	.....	.....	.....	1.55	1.4	1.3	1.35	1.4	1.45
9	.....	.....	.....	.....	.....	.....	1.5	1.4	1.3	1.35	1.4	1.45
10	.....	.....	.....	.....	.....	.....	1.5	1.4	1.4	1.35	1.4	1.45
11	.....	.....	.....	.....	.....	.....	1.5	1.4	1.4	1.45	1.4	1.45
12	.....	.....	.....	.....	.....	.....	1.5	1.4	1.4	1.45	1.4	1.45
13	.....	.....	.....	.....	.....	.....	1.5	1.4	1.35	1.4	1.4	1.45
14	.....	.....	.....	.....	.....	.....	1.5	1.4	1.3	1.4	1.4	1.45
15	.....	.....	.....	.....	.....	.....	1.45	1.35	1.3	1.4	1.4	1.45
16	.....	.....	.....	.....	.....	.....	1.4	1.35	1.3	1.35	1.4	1.45
17	.....	.....	.....	.....	.....	.....	1.4	1.35	1.35	1.35	1.4	1.4
18	.....	.....	.....	.....	.....	.....	1.4	1.45	1.5	1.35	1.4	1.4
19	.....	.....	.....	.....	.....	.....	1.4	1.45	1.35	1.35	1.4	1.5
20	.....	.....	.....	.....	.....	.....	1.4	1.45	1.35	1.35	1.4	1.5
21	.....	.....	.....	.....	.....	.....	1.4	1.45	1.35	1.35	1.4	2.9
22	.....	.....	.....	.....	.....	.....	1.4	1.45	1.35	1.35	1.4	2.75
23	.....	.....	.....	.....	.....	.....	1.45	1.45	1.35	1.35	1.4	2.65
24	.....	.....	.....	.....	.....	.....	1.45	1.75	1.4	1.4	1.35	2.5
25	.....	.....	.....	.....	.....	.....	1.45	1.5	1.4	1.5	1.35	2.35
26	.....	.....	.....	.....	.....	.....	1.4	1.65	1.4	1.6	1.35	2.2
27	.....	.....	.....	.....	.....	1.75	1.4	1.4	1.4	1.5	1.35	2.0
28	.....	.....	.....	.....	.....	1.7	1.4	1.4	1.35	1.45	1.4	1.85
29	.....	.....	.....	.....	.....	1.65	1.4	1.4	1.35	1.45	1.45	1.75
30	.....	.....	.....	.....	.....	1.6	1.6	1.4	1.35	1.45	1.4	2.4
31	.....	.....	.....	.....	.....	.....	1.5	1.4	.....	1.4	.....	2.25

SHENANDOAH RIVER (NORTH BRANCH) NEAR RIVERTON, VA.

This station was established June 26, 1899, by A. P. Davis. It is located about 2 miles above Riverton, Va., on the farm owned by L. W. Burke. It is most easily reached by driving from Front Royal, Va. The vertical gage rod is spiked to timber and to a sycamore tree on the left bank about 100 feet above the cable station. Bench mark No. 1 is a wire nail driven into a pear tree; this tree is located near a fence and is 150 feet from the left bank of the river. Its elevation above the zero of the gage is 26.75 feet. Bench mark No. 2 is formed by three wire nails driven flush in the surface of a stump 50 feet downstream from the fence line of the road, at the edge of the field, on the side toward the river. Its elevation is 20.44 feet above the zero of the gage. The original gage was a vertical timber bolted to a large sycamore tree on the right bank. On September 10, 1900, the gage was moved to the left bank and its datum was lowered one foot, causing all readings to be increased by one foot. The gage at this station was washed out in the flood of February 22, 1902, and the station was temporarily abandoned until August 17, 1902, when it was re-established by Mr. Paul, the zero of the new gage being at the same elevation as the zero of the former gage. Discharge measurements are made by means of a cable, car, and tagged wire just above the ford. The cable has a span of 260 feet, is supported by timbers, and anchored in the ground at each end. The initial point for soundings is 0.5 foot from the timber which supports the tag wire on the left bank. The channel is straight for 600 feet above and below the station. The current has a moderate velocity. Both banks are low and liable to overflow, and are fringed with trees. The bed of the stream is composed of rock and mud and shifts somewhat, but the flow is controlled by a ledge 200 feet below the section. The flow at this station is affected by backwater from the dam at Riverton, 2 miles below. The height of this dam was increased from 8 feet to 10 feet during August, 1904. There is but one channel at all stages. The gage is read twice each day by L. W. Burke.

Discharge measurements of Shenandoah River (North Branch) near Riverton, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	*b*Gage height.	Discharge.
1899.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
September 2	E. G. Paul	285	.95	3.85	270
*a*September 2	do	262	1.10	3.85	287
1900.					
February 13	E. G. Paul	420	1.53	4.25	645
June 18	do	878	3.33	6.30	2,923
*a*September 10	C. R. Olberg	400	.36	3.60	146
1901.					
July 20	E. G. Paul	861	2.80	5.95	2,410
1902.					
August 16	E. G. Paul	318	.80	4.20	256
1903.					
August 21	W. C. Sawyer	381	1.02	4.40	388
1904.					
June 10	F. H. Brundage	417	1.39	4.81	578
July 1	Hoyt and Hall	425	1.13	4.71	480
September 27	E. C. Murphy	240	.39	3.95	93
October 19	do	292	.45	4.11	130
1905.					
April 3	Robert Follansbee	516	1.25	5.18	645
May 17	do	648	1.53	5.68	989
October 27	do	377	.72	4.48	273
December 27	do	626	1.53	5.60	961

*a*Measured by wading.
*b*All gage heights refer to 1905 datum.

Daily gage height (a), in feet, of Shenandoah River (North Branch) near Riverton, Va.

Day.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1899.												
1	.....	.....	.....	.....	.....	.....	3.8	3.68	3.88	3.7	4.2	3.68
2	.....	.....	.....	.....	.....	.....	3.8	3.68	3.88	3.68	3.95	3.7
3	.....	.....	.....	.....	.....	.....	3.78	3.68	3.95	3.6	3.95	3.65
4	.....	.....	.....	.....	.....	.....	3.8	3.7	3.85	3.65	3.95	3.65
5	.....	.....	.....	.....	.....	.....	3.73	3.65	3.72	3.7	3.85	3.62
6	.....	.....	.....	.....	.....	.....	3.78	4.0	3.72	3.68	3.8	3.6
7	.....	.....	.....	.....	.....	.....	3.8	3.95	3.72	3.65	3.8	3.62
8	.....	.....	.....	.....	.....	.....	3.8	3.95	3.7	3.65	3.8	3.65
9	.....	.....	.....	.....	.....	.....	3.8	3.82	3.7	3.68	3.8	3.6
10	.....	.....	.....	.....	.....	.....	3.8	3.8	3.7	3.7	3.8	3.62
11	.....	.....	.....	.....	.....	.....	3.8	3.72	3.7	3.7	3.78	3.65
12	.....	.....	.....	.....	.....	.....	3.78	3.7	3.72	3.7	3.75	3.68
13	.....	.....	.....	.....	.....	.....	3.75	3.7	3.72	3.7	3.73	3.8
14	.....	.....	.....	.....	.....	.....	3.75	3.72	3.7	3.7	3.7	3.85
15	.....	.....	.....	.....	.....	.....	3.7	3.7	3.7	3.7	3.7	3.9
16	.....	.....	.....	.....	.....	.....	3.68	3.78	3.68	3.65	3.7	3.9
17	.....	.....	.....	.....	.....	.....	3.68	3.78	3.7	3.65	3.7	3.9
18	.....	.....	.....	.....	.....	.....	3.78	3.78	3.68	3.7	3.7	3.9
19	.....	.....	.....	.....	.....	.....	3.75	3.7	3.6	3.68	3.7	3.88
20	.....	.....	.....	.....	.....	.....	3.7	3.65	3.8	3.7	3.7	3.8
21	.....	.....	.....	.....	.....	.....	3.68	3.62	3.8	3.65	3.7	3.8
22	.....	.....	.....	.....	.....	.....	3.68	3.62	3.8	3.65	3.7	3.8
23	.....	.....	.....	.....	.....	.....	3.65	3.68	3.8	3.65	3.7	3.8
24	.....	.....	.....	.....	.....	.....	3.58	3.65	3.8	3.65	3.7	3.8
25	.....	.....	.....	.....	.....	.....	3.62	3.62	3.8	3.7	3.7	3.82
26	.....	.....	.....	.....	.....	3.85	3.7	3.65	3.8	3.7	3.7	b3.88
27	.....	.....	.....	.....	.....	3.88	3.68	3.62	3.78	3.7	3.7	4.0
28	.....	.....	.....	.....	.....	3.88	3.85	3.7	3.75	3.7	3.7	4.0
29	.....	.....	.....	.....	.....	3.88	4.12	3.68	3.7	3.7	3.65	4.0
30	.....	.....	.....	.....	.....	3.8	3.8	3.95	3.7	3.68	3.68	4.0
31	.....	.....	.....	.....	.....	.....	3.7	3.9	.....	3.75	.....	4.0
1900.												
1	c4.0	c5.0	5.05	4.7	4.25	3.8	3.9	3.72	3.6	3.8	3.7	4.15
2	4.0	5.0	7.85	4.58	4.17	3.8	3.9	3.65	3.6	3.8	3.72	3.92
3	4.0	5.0	6.55	4.52	4.15	3.8	3.85	3.6	3.62	3.75	3.7	4.02
4	4.0	5.0	5.4	4.48	4.1	3.9	3.78	3.55	3.62	3.7	3.75	4.48
5	4.0	4.9	5.1	4.4	4.05	3.88	3.72	3.52	3.58	3.7	3.7	6.1
6	4.0	4.5	4.88	4.32	4.05	3.82	3.72	3.5	3.6	3.7	3.7	5.7
7	4.0	4.38	4.82	4.28	4.0	3.8	3.7	3.5	3.6	3.78	3.7	5.15
8	4.0	4.1	4.75	4.25	3.98	3.8	3.7	3.55	3.58	3.8	3.7	4.7
9	4.0	4.0	4.68	4.2	3.95	3.8	3.68	3.58	3.6	3.7	3.65	4.45
10	4.0	3.95	4.6	4.15	3.92	3.8	3.68	3.6	a3.6	3.7	3.62	4.45
11	4.0	4.0	4.5	4.15	3.9	3.75	3.62	3.6	3.6	3.68	3.7	4.35
12	4.0	3.98	4.42	4.15	3.9	3.72	3.62	3.58	3.6	3.65	3.6	4.0
13	4.0	4.12	4.38	4.15	3.9	3.7	3.62	3.5	3.58	3.7	3.6	3.95
14	3.98	5.1	4.35	4.15	3.9	3.72	3.65	3.5	3.6	3.7	3.68	3.95
15	3.92	5.2	4.35	4.1	3.9	3.75	3.62	3.5	3.6	3.7	3.65	4.0
16	3.9	4.87	4.35	4.1	3.82	3.78	3.6	3.55	3.7	3.7	3.6	3.95
17	3.8	4.62	4.3	4.1	3.8	4.45	3.68	3.6	3.68	3.78	3.6	4.05
18	3.8	4.42	4.25	4.1	3.8	5.75	3.62	3.6	3.65	3.8	3.62	3.9
19	3.92	4.35	4.5	4.2	3.8	5.75	3.6	3.55	3.68	3.75	3.62	3.9

*a*All gage heights January 1, 1899 to September 10, 1900 refer to 1905 datum. Datum lowered 1.00 foot to 1905 datum on September 10, 1900.

*b*River frozen December 26 to 31, 1899.

*c*River frozen January 1 to 14 and January 30 to February 6 1900.

Daily gage height, in feet, of Shenandoah River (North Branch) near Riverton, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1900.												
20	4.92	4.35	6.95	4.55	3.8	4.98	3.6	3.55	3.6	3.7	3.65	3.78
21	7.3	4.25	8.2	4.6	3.8	4.62	3.62	3.5	3.6	3.7	3.7	3.7
22	5.65	4.75	6.7	4.6	3.8	4.3	3.7	3.62	3.58	3.7	3.62	3.6
23	4.9	6.98	5.9	5.22	3.8	4.2	3.82	3.6	3.58	3.7	3.6	3.8
24	4.55	6.3	5.42	5.4	3.8	4.15	5.28	3.6	3.6	3.75	3.68	3.75
25	4.25	5.63	5.18	5.1	3.8	4.08	4.32	3.6	3.6	3.78	3.7	3.7
26	4.02	5.15	5.0	4.75	3.8	4.0	4.22	3.6	3.6	3.85	4.65	3.75
27	4.0	4.9	5.0	4.62	3.8	3.92	4.0	3.55	3.6	3.9	7.0	3.8
28	4.0	4.8	4.9	4.5	3.8	3.9	3.92	3.6	3.62	3.8	5.25	3.78
29	4.5	.....	4.9	4.42	3.8	3.9	3.82	3.62	3.72	3.75	5.35	3.78
30	*a*5.0	.....	4.85	4.32	3.8	3.9	4.08	3.6	3.95	3.72	4.45	3.72
31	5.0	.....	4.8	.....	3.75	.....	3.8	3.62	.....	3.7	.....	3.72
1901.												
1	*b*3.72	*b*3.95	3.7	4.38	4.98	6.1	4.95	4.2	5.25	5.02	3.8	3.95
2	3.75	3.9	3.7	4.4	4.9	5.65	4.75	4.28	5.55	4.65	3.8	3.82
3	3.8	3.85	3.7	6.0	4.8	5.15	4.7	4.1	5.2	4.4	3.8	3.98
4	3.78	3.78	3.8	7.65	4.72	5.48	4.7	4.05	4.92	4.35	3.8	4.42
5	3.8	3.8	3.78	6.6	4.65	4.85	4.5	4.05	4.75	4.3	3.8	4.45
6	3.85	3.9	3.8	6.25	4.6	5.95	4.8	4.3	4.4	4.22	3.8	4.52
7	3.75	3.95	3.85	6.25	4.5	6.6	5.5	5.8	4.25	4.1	3.8	4.35
8	3.8	3.88	3.85	5.9	4.42	7.1	4.3	5.5	4.22	4.15	3.8	4.2
9	3.72	3.82	3.8	5.4	5.15	5.9	4.45	4.8	4.1	4.1	3.8	4.38
10	3.7	3.82	3.85	5.1	6.25	5.4	4.35	4.45	4.05	3.95	3.8	4.35
11	4.15	3.82	11.25	4.85	6.62	5.0	4.4	4.3	4.2	3.95	3.7	4.4
12	5.3	3.8	9.05	4.7	6.25	4.78	4.7	5.2	4.1	4.0	3.6	4.4
13	5.75	3.9	6.5	4.6	5.65	5.1	4.7	5.55	4.02	3.95	3.6	4.35
14	5.1	4.0	5.68	7.45	5.3	5.3	6.4	4.7	4.0	3.9	3.7	4.4
15	4.85	3.95	5.35	12.6	4.85	4.95	6.9	4.4	4.0	3.9	3.7	10.6
16	4.68	3.88	4.98	8.3	4.68	12.15	6.82	4.6	4.15	3.82	3.8	9.1
17	4.45	3.8	4.75	6.9	4.6	11.1	7.1	4.58	4.15	3.8	3.8	6.2
18	4.3	3.8	4.62	6.25	4.72	7.5	6.48	4.35	4.15	3.8	3.8	5.5
19	4.3	3.82	4.52	5.85	4.55	6.25	6.95	4.55	4.1	3.8	3.7	5.1
20	5.55	3.78	4.2	7.4	4.52	5.9	6.1	4.4	4.05	3.82	3.7	4.9
21	4.95	3.8	4.9	16.5	4.65	6.95	5.3	4.15	3.95	3.78	3.7	*c*8.0
22	4.35	4.0	4.9	12.45	7.05	6.75	4.95	4.05	3.88	3.75	3.8	7.5
23	4.05	3.98	4.9	8.5	14.7	6.2	4.75	4.05	3.88	3.7	3.85	7.5
24	3.98	3.95	4.82	6.8	8.7	5.75	4.55	4.2	3.8	3.7	5.25	7.5
25	4.0	3.92	4.7	6.65	7.15	5.25	4.5	4.6	3.8	3.72	4.85	7.5
26	3.98	3.85	4.62	6.1	6.55	5.3	4.3	4.75	3.7	3.8	4.5	7.5
27	4.0	3.82	4.75	5.7	6.65	5.55	4.35	4.5	3.65	3.8	4.25	7.5
28	4.0	3.72	4.75	5.3	7.05	4.7	4.3	4.25	3.65	3.8	4.35	6.9
29	3.95	.....	4.55	5.1	7.2	5.4	4.15	4.3	5.15	3.82	4.05	8.2
30	3.92	.....	4.5	5.0	6.7	5.6	4.65	4.5	5.9	3.82	4.0	13.1
31	3.9	.....	4.45	.....	6.2	.....	4.35	4.9	.....	3.8	.....	8.25
1902.												
1	7.05	4.9	.....	.....	.....	.....	.....	.....	4.05	4.3	4.1	5.45
2	6.2	4.88	.....	.....	.....	.....	.....	.....	4.05	4.2	4.15	5.75
3	5.75	4.8	.....	.....	.....	.....	.....	.....	4.1	4.2	4.1	5.85
4	5.4	*d*5.2	.....	.....	.....	.....	.....	.....	4.35	4.2	4.15	5.9
5	5.0	5.5	.....	.....	.....	.....	.....	.....	4.1	4.2	4.05	5.85

*a*River frozen January 1 to 14 and January 30 to February 6, 1900.
*b*Ice conditions during part of January and February, 1901.
*c*River frozen December 21 to 28, 1901.
*d*River frozen February 4 to 24, 1902.

Daily gage height, in feet, of Shenandoah River (North Branch) near Riverton, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1902.												
6	4.9	5.5	.....	.....	.....	.....	.....	.....	4.05	4.2	4.2	5.8
7	4.85	5.5	.....	.....	.....	.....	.....	.....	4.0	4.3	4.2	5.55
8	4.8	5.5	.....	.....	.....	.....	.....	.....	4.05	4.2	4.1	5.5
9	4.7	5.5	.....	.....	.....	.....	.....	.....	4.05	4.15	4.1	5.3
10	4.68	5.5	.....	.....	.....	.....	.....	.....	4.1	4.1	4.1	5.15
11	4.55	5.5	.....	.....	.....	.....	.....	.....	4.05	4.15	4.0	5.05
12	4.5	5.5	.....	.....	.....	.....	.....	.....	4.1	4.25	4.1	5.35
13	4.6	5.5	.....	.....	.....	.....	.....	.....	4.05	4.3	4.1	6.25
14	4.55	5.5	.....	.....	.....	.....	.....	.....	4.0	4.6	4.1	6.6
15	4.6	5.5	.....	.....	.....	.....	.....	.....	4.0	4.35	4.1	6.3
16	4.55	5.5	.....	.....	.....	.....	.....	4.2	3.9	4.3	4.1	5.85
17	4.48	5.5	.....	.....	.....	.....	.....	4.2	4.0	4.2	4.1	8.15
18	4.35	5.5	.....	.....	.....	.....	.....	4.1	4.0	4.2	4.1	7.65
19	4.28	5.5	.....	.....	.....	.....	.....	4.15	4.0	4.2	4.2	7.1
20	4.2	5.5	.....	.....	.....	.....	.....	4.2	4.0	4.15	4.2	5.75
21	4.3	5.5	.....	.....	.....	.....	.....	4.2	4.0	4.1	4.2	5.5
22	5.4	5.5	.....	.....	.....	.....	.....	4.2	4.05	4.1	4.2	5.45
23	5.15	5.5	.....	.....	.....	.....	.....	4.25	4.05	4.1	4.2	5.3
24	4.75	5.5	.....	.....	.....	.....	.....	4.2	4.1	4.1	4.2	5.2
25	4.6	8.8	.....	.....	.....	.....	.....	4.2	4.1	4.1	4.35	5.0
26	4.75	*a*	.....	.....	.....	.....	.....	4.2	4.1	4.1	5.0	4.95
27	5.0	.....	.....	.....	.....	.....	.....	4.1	4.1	4.15	5.15	4.85
28	6.15	.....	.....	.....	.....	.....	.....	4.1	4.1	4.2	5.2	4.9
29	5.5	.....	.....	.....	.....	.....	.....	4.15	4.15	4.2	5.1	5.0
30	5.05	.....	.....	.....	.....	.....	.....	4.1	4.2	4.2	5.0	4.85
31	4.95	.....	.....	.....	.....	.....	.....	4.1	.....	4.2	.....	4.7
1903.												
1	4.7	.....	9.0	7.15	5.1	9.05	6.3	4.45	4.3	4.3	4.3	4.75
2	4.8	.....	7.15	6.8	5.0	6.75	5.75	4.5	4.6	4.3	4.25	4.4
3	10.9	.....	6.5	6.4	5.0	5.95	5.4	4.45	4.6	4.3	4.2	4.3
4	8.95	.....	6.1	6.25	4.95	5.45	5.25	4.6	4.4	4.4	4.3	4.3
5	7.15	.....	5.78	6.05	4.8	5.15	5.6	5.2	4.4	4.25	4.25	4.3
6	6.45	.....	5.6	5.75	4.85	6.2	6.45	4.85	4.4	4.3	4.2	4.3
7	6.05	.....	5.65	5.6	4.85	8.4	5.5	4.7	4.4	4.4	4.2	4.2
8	5.75	.....	5.95	5.6	4.8	9.95	5.15	4.55	4.35	4.9	4.2	4.25
9	5.4	5.4	5.95	5.8	4.75	7.5	4.95	4.5	4.3	4.95	4.2	4.2
10	5.3	5.25	5.75	5.65	4.8	12.0	4.85	4.4	4.4	4.9	4.2	4.2
11	5.25	5.2	5.7	5.6	4.75	7.5	4.8	4.45	4.65	4.8	4.25	4.2
12	*b*6.3	5.2	5.6	5.4	4.7	6.75	4.9	4.45	4.6	4.55	4.2	4.3
13	8.15	5.15	5.55	5.3	4.7	6.65	5.4	4.4	4.5	4.45	4.3	4.3
14	7.9	5.1	5.45	9.85	4.7	7.0	6.2	4.4	4.4	4.6	4.3	4.2
15	7.9	5.1	5.4	9.3	4.7	6.35	5.7	4.4	4.35	4.6	4.2	4.2
16	7.9	5.35	5.25	8.8	4.65	5.9	5.2	4.4	4.3	4.5	4.2	*b*4.2
17	7.9	5.7	5.2	8.0	4.6	5.55	5.0	4.5	5.0	4.5	4.25	4.2
18	7.35	5.75	5.15	7.1	4.6	5.45	4.85	4.55	6.25	4.5	4.2	4.2
19	5.65	5.35	5.1	6.6	4.6	5.2	4.8	4.55	5.65	4.5	4.2	4.2
20	6.35	5.5	5.1	6.25	4.55	5.1	4.7	4.5	5.1	4.5	4.3	4.2
21	7.0	5.7	5.0	6.0	4.55	5.05	4.7	4.4	4.75	4.4	4.25	4.2
22	*c*	5.5	5.75	5.75	4.5	4.9	4.6	4.3	4.7	4.4	4.2	4.2
23	5.6	5.4	7.7	5.65	4.5	4.9	4.6	4.3	4.6	4.4	4.2	4.5
24	5.4	5.55	10.0	5.5	4.7	4.9	4.5	4.3	4.6	4.35	4.2	4.4

a Gage washed out February 26, 1902 and replaced Aug. 16, 1902.

b River frozen January 12 to 28, 1903, December 16 to 23, 1903 and December 26 to 31, 1903.

c Freshet January 22, 1903. Gage pushed over by ice.

Daily gage height, in feet, of Shenandoah River (North Branch) near Riverton, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
25	5.25	5.95	7.8	5.45	4.95	4.85	4.5	4.3	4.6	4.3	4.2	4.35
26	5.1	6.05	6.75	5.4	4.75	5.4	4.4	4.3	4.55	4.3	4.2	*a*4.2
27	5.0	6.05	6.25	5.4	4.7	5.25	4.4	4.3	4.4	4.3	4.2	4.2
28	6.8	7.65	5.95	5.3	4.8	5.95	4.4	4.2	4.3	4.3	4.2	4.2
29	.....	.....	5.65	5.2	4.7	8.1	4.4	4.2	4.3	4.3	4.2	4.2
30	.....	.....	6.25	5.1	4.8	7.75	4.45	4.3	4.3	4.3	4.2	4.2
31	.....	.....	7.6	.....	5.9	.....	4.4	4.3	.....	4.3	.....	4.2
1904.												
1	*b*4.2	.....	.....	4.88	5.85	5.65	4.72	4.3	4.1	4.05	4.0	4.02
2	4.2	.....	.....	5.0	5.7	5.05	4.5	4.45	4.05	4.0	4.0	4.05
3	4.2	.....	.....	4.98	5.4	4.85	4.38	4.4	4.15	3.95	4.05	4.1
4	4.2	.....	.....	4.88	5.1	4.8	4.3	4.5	4.15	4.0	4.05	4.1
5	4.2	.....	4.7	4.8	5.05	4.85	4.35	4.5	4.1	4.1	4.0	4.1
6	4.2	.....	4.65	4.72	5.0	6.05	4.35	4.8	4.05	4.1	4.05	4.2
7	4.2	.....	4.7	4.72	4.9	6.7	4.32	4.5	4.05	4.0	4.05	4.2
8	4.2	.....	6.2	4.7	4.9	5.3	4.35	4.5	4.1	4.05	4.0	4.1
9	4.2	.....	6.2	4.75	4.9	4.95	4.4	4.45	4.05	4.0	4.0	4.1
10	4.2	.....	5.6	5.1	5.0	4.8	6.15	4.38	4.1	4.0	4.1	4.15
11	4.2	.....	5.15	5.38	4.95	4.72	6.82	4.4	4.1	4.0	4.1	4.2
12	4.2	.....	5.0	5.15	4.9	4.6	6.0	4.35	4.1	4.1	4.05	*b*4.5
13	4.2	.....	4.9	5.0	4.8	4.5	5.75	4.35	4.05	4.0	4.1	4.5
14	4.2	.....	4.8	4.9	4.8	4.5	5.1	4.3	4.2	4.05	4.1	4.5
15	4.2	.....	4.78	4.8	4.75	4.4	4.85	4.2	4.2	4.0	4.05	4.5
16	4.2	.....	4.7	4.72	4.8	4.45	4.7	4.3	4.15	4.05	4.1	4.5
17	4.2	.....	4.7	4.65	4.7	4.45	4.55	4.2	4.15	4.05	4.1	4.5
18	4.2	.....	4.68	4.55	4.7	4.42	4.55	4.22	4.1	4.05	4.02	4.5
19	4.2	.....	4.6	4.58	4.78	4.5	4.5	4.2	4.1	4.0	4.0	4.5
20	4.2	.....	4.52	4.5	6.45	4.75	4.7	4.22	4.05	4.05	4.0	4.5
21	4.2	.....	4.55	4.45	5.7	5.25	4.55	4.2	4.25	4.05	4.0	4.5
22	4.2	.....	4.52	4.48	5.35	5.3	4.4	4.2	4.1	4.0	4.1	4.5
23	4.2	.....	4.65	4.4	5.15	4.85	4.38	4.3	4.05	4.1	4.1	4.5
24	*c*	.....	4.75	4.4	4.95	4.62	4.35	4.35	4.1	4.1	4.1	4.5
25	.....	.....	4.8	4.35	4.78	4.45	4.5	4.2	4.0	4.0	4.02	4.5
26	.....	.....	4.8	4.5	5.15	4.4	4.5	4.25	4.0	4.1	4.0	4.55
27	.....	.....	4.8	4.6	4.95	4.35	4.4	4.2	3.98	4.05	4.05	4.6
28	.....	.....	4.78	6.0	4.8	4.4	4.4	4.2	4.05	4.05	4.0	4.65
29	.....	.....	4.7	7.05	4.7	4.38	4.65	4.1	4.05	4.1	4.05	4.45
30	.....	.....	4.7	6.4	4.6	4.75	4.55	4.1	4.1	4.02	4.1	4.45
31	.....	.....	4.78	.....	4.8	.....	4.45	4.15	.....	4.05	.....	4.35
1905.												
1	4.28	5.5	5.5	5.45	4.6	4.6	5.3	5.05	4.4	4.2	4.35	4.22
2	4.2	5.5	5.5	5.3	4.7	5.05	5.45	4.8	4.4	4.2	4.4	4.15
3	4.35	5.5	5.5	5.2	4.6	4.85	5.25	4.65	4.35	4.15	4.3	4.45
4	5.55	5.5	5.5	5.15	4.6	4.68	5.05	4.6	4.3	4.25	4.3	4.7
5	*d*5.9	5.5	.....	5.15	4.52	4.55	5.3	4.6	4.38	4.2	4.38	5.05
6	5.9	5.5	5.8	5.6	4.6	4.5	6.9	4.48	4.45	4.15	4.35	4.9
7	5.9	5.5	5.75	5.8	4.6	4.9	5.75	4.4	4.4	4.15	4.35	4.75
8	.....	5.5	6.0	5.65	4.52	4.95	5.5	4.35	4.4	4.15	4.3	4.7
9	.....	5.5	6.4	5.5	4.55	4.7	5.7	4.38	4.35	4.15	4.22	4.55

*a*River frozen January 12 to 28, 1903, December 16 to 23, 1903, and December 26 to 31, 1903.
*b*River frozen January 1 to 23, 1904 and December 12 to 26, 1904.
*c*Gage removed January 23, 1904 to protect from ice. Replaced March 5, 1904.
*d*River frozen January 5 to March 4, 1905.

Daily gage height, in feet, of Shenandoah River (North Branch) near Riverton, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
10	.....	5.5	7.65	5.4	4.5	4.5	5.3	4.4	4.3	4.05	4.32	4.5
11	.....	5.5	7.45	5.25	4.5	4.42	5.35	4.4	4.28	4.25	4.38	4.42
12	.....	5.5	6.75	5.3	4.5	4.25	6.15	4.4	4.3	4.35	4.32	4.42
13	.....	5.5	6.4	5.25	4.5	4.65	5.75	4.32	4.3	4.25	4.28	4.42
14	.....	5.5	5.95	5.15	4.55	4.4	6.9	5.1	4.3	4.2	4.15	4.48
15	.....	5.5	5.75	5.1	5.45	4.4	7.1	4.7	4.28	4.2	4.22	4.38
16	.....	5.5	5.6	5.05	6.15	4.3	6.1	5.48	4.32	4.25	4.2	4.4
17	.....	5.5	5.5	4.98	5.65	4.2	5.5	5.45	4.32	4.25	4.18	4.55
18	.....	5.5	5.4	4.92	5.35	4.2	5.2	5.0	4.4	4.25	4.1	4.7
19	.....	5.5	5.4	4.9	5.2	4.25	5.05	4.8	4.32	4.2	4.18	4.62
20	.....	5.5	5.4	4.9	4.55	4.2	4.92	4.7	4.32	4.25	4.2	4.6
21	.....	5.5	5.95	4.8	4.92	6.2	4.8	4.6	4.28	4.2	4.15	7.3
22	.....	5.5	6.4	4.8	4.8	6.95	4.8	4.4	4.25	4.2	4.18	9.55
23	4.75	5.5	6.5	4.75	4.7	7.5	5.55	4.4	4.3	4.15	4.2	7.75
24	5.5	5.5	6.05	4.7	4.62	10.75	5.95	4.35	4.2	4.1	4.2	6.95
25	5.5	5.5	7.45	4.7	4.6	9.05	5.4	5.0	4.2	4.2	4.22	6.5
26	5.5	5.5	6.95	4.7	4.55	7.0	5.15	6.1	4.15	4.5	4.22	5.95
27	5.5	5.5	6.5	4.7	4.4	6.2	4.92	5.45	4.2	4.48	4.18	5.55
28	5.5	5.5	6.2	4.8	4.5	6.2	4.78	4.9	4.2	4.35	4.12	5.4
29	5.5	.....	5.9	4.8	4.42	5.7	4.75	4.75	4.2	4.3	4.2	5.7
30	5.5	.....	5.7	4.7	4.4	5.4	5.6	4.6	4.2	4.32	4.2	6.28
31	5.5	.....	5.55	.....	4.45	.....	5.7	4.5	.....	4.42	.....	6.0

Rating table for Shenandoah River (North Branch) near Riverton, Va., from May 26, 1899, to February 25, 1902.

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.50	90	4.40	710	5.30	1,640	6.20	2,780
3.60	140	4.50	800	5.40	1,760	6.30	2,910
3.70	195	4.60	895	5.50	1,880	6.40	3,050
3.80	255	4.70	990	5.60	2,000	6.50	3,190
3.90	320	4.80	1,090	5.70	2,130	6.60	3,330
4.00	390	4.90	1,190	5.80	2,260	6.70	3,470
4.10	465	5.00	1,300	5.90	2,390	6.80	3,610
4.20	545	5.10	1,410	6.00	2,520	6.90	3,750
4.30	625	5.20	1,520	6.10	2,650	7.00	3,890

The above table is strictly applicable only for open channel conditions. It is based upon 6 discharge measurements made during 1899 to 1901, inclusive. It is fairly well defined between gage heights 3.5 feet and 6.5 feet. The table has been extended beyond these limits.

Rating table for Shenandoah River (North Branch) near Riverton, Va., from August 17, 1902 to August 15, 1904.

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.90	165	5.00	670	6.10	1,520	7.20	2,640
4.00	190	5.10	735	6.20	1,610	7.30	2,760
4.10	220	5.20	800	6.30	1,700	7.40	2,880
4.20	255	5.30	870	6.40	1,790	7.50	3,010
4.30	295	5.40	940	6.50	1,890	7.60	3,140
4.40	340	5.50	1,015	6.60	1,990	7.70	3,270
4.50	390	5.60	1,090	6.70	2,090	7.80	3,400
4.60	440	5.70	1,170	6.80	2,190	7.90	3,540
4.70	495	5.80	1,255	6.90	2,300	8.00	3,680
4.80	550	5.90	1,340	7.00	2,410		
4.90	610	6.00	1,430	7.10	2,520		

The above table is strictly applicable only for open channel conditions. It is based upon 4 discharge measurements made during 1902 to 1903, inclusive, and the first half of 1904. It is fairly well defined between gage heights 4.2 feet and 4.8 feet. The table has been extended beyond these limits. This rating curve is only a rough estimate, as the measurements were insufficient, the highest being at gage height 4.8 feet.

Rating table for Shenandoah River (North Branch) near Riverton, Va., from August 16 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.*
4.00	100	5.10	595	6.20	1,405	7.30	2,490
4.10	125	5.20	655	6.30	1,495	7.40	2,600
4.20	155	5.30	720	6.40	1,585	7.50	2,720
4.30	190	5.40	785	6.50	1,680	7.60	2,840
4.40	230	5.50	855	6.60	1,775	7.70	2,960
4.50	275	5.60	925	6.70	1,870	7.80	3,080
4.60	325	5.70	1,000	6.80	1,970	7.90	3,210
4.70	375	5.80	1,075	6.90	2,070	8.00	3,340
4.80	425	5.90	1,155	7.00	2,170		
4.90	480	6.00	1,235	7.10	2,270		
5.00	535	6.10	1,320	7.20	2,380		

The above table is strictly applicable only for open channel conditions. It is based upon 6 discharge measure ments made during the latter part of 1904 and 1905, after the dam had been raised. It is well defined between gage heights 4.0 feet and 5.5 feet. The table has been extended beyond these limits. During August, 1904, the dam below the station was raised 2 feet. The exact date is uncertain, so the table is assumed to apply from August 16, 1904.

Estimated Monthly Discharge of Shenandoah River (North Branch) near Riverton, Va.

(Drainage area, 1,037 square miles.)

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1899.								
January	.....	.....	.....	.....	.....	.....	2.52	.....
February	.....	.....	.....	.....	.....	.....	4.95	.....
March	.....	.....	.....	.....	.....	.....	5.12	.....
April	.....	.....	.....	.....	.....	.....	1.16	.....
May	.....	.....	.....	.....	.....	.....	4.95	.....
June 26-30	307	255	293	.282	.052	.....	*a*2.09	.....
July	481	130	228	.220	.254	10	2.51	2.26
August	390	151	220	.212	.244	6	3.94	3.70
September	355	140	227	.219	.244	6	3.78	3.54
October	225	140	185	.178	.205	9	2.34	2.14
November	545	168	238	.230	.257	32	.81	.55
*b*December	390	140	255	.246	.284	21	1.34	1.06
The year	.....	.....	.....	.....	.....	.....	35.51	.....
1900.								
*c*January	4,330	255	702	.677	.780	30	2.57	1.79
*c*February	3,862	355	1,128	1.09	1.14	31	3.73	2.59
March	5,700	585	1,620	1.56	1.80	48	3.72	1.92
April	1,760	465	765	.738	.823	43	1.89	1.07
May	585	225	324	.312	.360	15	2.42	2.06
June	2,195	195	504	.486	.542	9	5.98	5.44
July	1,616	140	294	.284	.327	9	3.76	3.43
August	207	90	128	.123	.142	7	1.93	1.79
September	355	130	155	.149	.166	5	3.14	2.97
October	320	168	219	.211	.243	8	3.19	2.95
November	3,890	140	441	.425	.474	16	2.94	2.46
December	2,650	140	548	.528	.609	33	1.83	1.22
The year	5,700	90	569	.549	7.41	20	37.10	29.69

*a*Precipitation for complete month, June, 1899.
*b*River frozen December 26 to 31, 1899. No correction made in estimates.
*c*River frozen January 1 to 14, 1900 and January 30 to February 6, 1900. No correction made in estimates.

Estimated monthly discharge of Shenandoah River (North Branch) near Riverton, Va. Continued.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1901.								
*a*January	2,195	195	627	.605	.698	30	2.31	1.61
*a*February	390	207	299	.288	.300	91	.33	.03
March	10,960	195	1,391	1.34	1.54	41	3.80	2.26
April	21,630	693	4,034	3.89	4.34	70	6.24	1.90
May	17,850	728	2,653	2.56	2.95	51	5.82	2.87
June	12,680	990	2,842	2.74	3.06	41	7.54	4.48
July	4,030	505	1,499	1.44	1.66	38	4.38	2.72
August	2,260	428	862	.831	.958	16	5.92	4.96
September	2,390	168	684	.660	.736	20	3.78	3.05
October	1,322	195	396	.382	.440	64	.69	.25
November	1,580	140	363	.350	.390	19	2.01	1.62
*b*December	14,580	268	3,091	2.98	3.44	56	6.12	2.68
The year	21,630	140	1,562	1.50	20.51	42	48.94	28.43
1902.								
January	3,960	545	1,304	1.26	1.45	54	2.69	1.24
*c*February 1–25	6,660	1,090	1,969	1.90	1.77	.....	*d*4.46	.....
March	.....	.....	.....	.....	.....	.....	3.61	.....
April	.....	.....	.....	.....	.....	.....	2.23	.....
May	.....	.....	.....	.....	.....	.....	2.64	.....
June	.....	.....	.....	.....	.....	.....	2.93	.....
July	.....	.....	.....	.....	.....	.....	2.17	.....
August 16–31	275	220	243	.234	.139	.....	*d*2.22	.....
September	318	165	211	.204	.228	9	2.59	2.36
October	440	220	259	.250	.288	8	3.65	3.36
November	800	190	317	.306	.341	11	3.21	2.87
December	3,890	495	1,228	1.18	1.36	40	3.38	2.02
The year	.....	.....	.....	.....	.....	.....	35.78	.....

*a*Ice conditions during part of January and February, 1901. No correction made in estimates.
*b*River frozen December 21 to 28, 1901. No correction made in estimates.
*c*River frozen February 4 to 24, 1902. No correction made in estimates.
*d*Precipitation for complete months, February and August, 1902.

Estimated monthly discharge of Shenandoah River (North Branch) near Riverton, Va.
Continued.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1903.								
*ab*January 1–28...	8,390	495	2,225	2.15	2.24	.....	*c*4.08	.....
February 9-28....	3,205	735	1,127	1.09	.811	.....	*c*3.49	.....
March.....	6,860	670	1,750	1.69	1.95	47	4.15	2.20
April.....	6,605	735	1,848	1.78	1.99	55	3.62	1.63
May.....	1,340	390	549	.529	.610	23	2.69	2.08
June.....	10,360	580	2,208	2.13	2.38	31	7.63	5.25
July.....	1,840	340	736	.710	.819	27	3.06	2.24
August.....	800	255	371	.358	.413	12	3.53	3.12
September.....	1,655	295	464	.447	.499	21	2.42	1.92
October.....	640	275	373	.360	.415	18	2.39	1.97
November.....	295	255	265	.256	.286	35	.82	.53
*a*December.....	522	255	284	.274	.316	33	.96	.64
The year.....	.....	.....	.....	.....	.....	.....	38.84	.....
1904.								
January 1–23....	255	255	255	.246	.210	.....	*e*1.80	.....
February.....	.....	.....	.....	.....	.....	.....	1.26	.....
March 5–31.....	1,610	400	620	.598	.600	.....	*e*2.08	.....
April.....	2,465	318	661	.637	.711	27	2.64	1.93
May.....	1,840	440	718	.692	.798	23	3.43	2.63
June.....	2,090	318	606	.584	.652	12	5.57	4.92
July.....	2,212	295	554	.534	.616	12	5.04	4.42
August.....	550	125	255	.246	.284	11	2.53	2.25
September.....	172	96	124	.120	.134	7	1.95	1.82
October.....	125	90	110	.106	.122	10	1.20	1.08
November.....	125	100	112	.108	.120	13	.95	.83
*d*December.....	350	105	225	.217	.250	10	2.46	2.21
The year.....	.....	.....	.....	.....	.....	.....	30.91	.....

*a*River frozen January 12 to 28, 1903, December 16 to 23 and 26 to 31, 1903. No correction made in estimates.
*b*Freshet January 22, 1903. Gage pushed over by ice; discharge estimated.
*c*Precipitation for complete months, January and February, 1903.
*d*River frozen January 1 to 23, 1904, and December 12 to 26, 1904. No correction made in estimates.
*e*Precipitation for complete months, January and March, 1904.

Estimated monthly discharge of Shenandoah River (North Branch) near Riverton, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1905.					
*a*January 1–7 and 23–31	1,155	155	759	.732	.436
*a*February	855	855	855	.824	.858
*ab*March	2,900	785	1,335	1.29	1.49
April	1,075	375	596	.575	.642
May	1,362	230	406	.392	.452
June	7,450	155	1,042	1.00	1.12
July	2,270	400	908	.876	1.01
August	1,320	198	417	.402	.464
September	252	140	192	.185	.206
October	275	112	170	.164	.189
November	230	125	172	.166	.185
December	5,575	140	889	.857	.988

*a*River frozen January 5 to March 4, 1905. No correction made in estimates.
*b*Estimate March 5, 1905, interpolated.

JAMES RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The headwaters of the James lie in the high mountains in the extreme western part of Virginia. The river is formed by the confluence of Jackson and Cowpasture Rivers in the extreme northern part of Botetourt County, Va.; thence it flows eastward across the State and empties into Chesapeake Bay through Hampton Roads.

The river with all its tributaries lies wholly within the State of Virginia. Its total length is about 335 miles and its drainage area about 9,700 square miles. The topography of the basin is varied in character, changing from the mountainous section in the upper part to low, flat, and often swampy areas as tide-water is approached. Jackson and Cowpasture rivers flow in narrow valleys between steep hills over beds of sand and gravel with rock ledges in places, and are bordered with fertile bottom lands. In this portion of the basin the water collects quickly, causing rapid rises in the river below.

Near Clifton Forge, and again near Balcony Falls, the James flows through ridges of the Alleghanies, with sharp falls over beds

PROFILE OF JAMES RIVER FROM RICHMOND, VA. TO CLIFTONFORGE, VA., AND NORTH RIVER BELOW LEXINGTON, VA.

PLATE VI

of solid rock. At other points similar, though less pronounced, falls and rapids occur, as the river cuts through the lesser foothills. Between these mountainous or hilly sections the flow is through broad and fertile valleys over sand and gravel beds with gentle slope. The fall-line is crossed at Richmond.

Many dams have been built in the James, generally for diverting water into the old James and Kanawha Canal, which followed the river from Richmond to Buchanan and was at one time utilized throughout that entire distance. It has now been abandoned, however, and its right of way is owned and for considerable distances occupied by the Chesapeake and Ohio Railroad. The use of the dams was abandoned with the canal, and although many of them are in good repair they have not been improved for power purposes. Fluctuations in stage are great. The record of the Cartersville station, which extends over a period of seven years, shows a range in gage height of nearly 25 feet. The estimated discharge has varied between 97,800 second-feet and 600 second-feet.

In 1897 a reconnaissance survey of James River was made under the direction of D. C. Humphreys, Professor of Civil Engineering of Washington and Lee University. This survey covered the portion of the river between Clifton Forge and Richmond, and a part of the North River and consisted in determining the profile, which was done by using the profile of the Chesapeake and Ohio Railroad as a base, and tying on to the water surface at each dam and at intermediate points not more than 5 miles apart. Notes were made in regard to the condition of the dams, and measurements of flow were made on all of the more important tributaries.

The results of the reconnaissance as given in the following pages is taken verbatim from Part IV of the nineteenth Annual Report of the U. S. Geological Survey (1897-1898), and hence should be accepted with reservations due to changes since 1897. In the portion of the descriptive matter relating to the James River the names of the dams are given; for that relating to North River the dams are numbered. The tables give statistics in regard to the dams and also the results of the discharge measurements. The profiles give the elevations and slope at the various points.

Dam No. 10, on North River, was formerly called Reid's dam, but is now known as the Lexington Light and Power Company's dam. The available head is 11.75 feet. The crest is 15 feet below the railway. The dam was built of dry rubble masonry, and the upper side and top was sheeted with plank to hold water. It was found necessary to replace this sheeting in 1896. At the time of the erection of the electric plant, in 1892, the dam was lowered 3 feet nearly all the way across to prevent the backing of water into the tail race of the mill at Lexington. The power at this dam is fully utilized and is very satisfactory. It has been noticed here that the river holds its own remarkably well in extremely dry weather.

Dam No. 9, South River dam, is located immediately above the mouth of South River; its crest is 9.55 feet below the railway and its height is 17.2 feet. This was a dry rubblestone dam, sheeted on the upper side and top. About two years ago the sheeting rotted and caused the dam to break. The break is in the middle of the dam and is as yet not very extensive. It could be easily repaired and the power utilized at the old mill site, which is on the left bank near the railway. On July 8, 1897, the discharge of the river, measured a short distance above this dam, was 160 second-feet, and in extreme low water it does not fall below about 90 second-feet.

Dam No. 8, located 13.7 miles from the mouth of North River, was built of logs and is broken all the way across. The fall in the water at the dam is now only 2.4 feet, and the water below the dam is 18.1 feet lower than the railway. The original height of this dam must have been at least 8 feet.

Dam No. 7, Buena Vista Electric Plant dam (B), Plate VII, is 13.1 miles above the mouth of North River, and the crest of the dam is 11.5 feet below the railway. The available height is 12 feet. This dam is of dry rubble masonry, sheeted on the upper side and on top. It needs resheeting for it leaks badly. This dam is below the mouth of South River, and the discharge of the river when measured was about 216 second-feet. In extreme dry weather the discharge is probably slightly more than half of this. The photogragh of the dam shows the method of passing the canoes down over the dam. The available power here in dry weather is fully used.

Dam No. 6, Buena Vista Paper Mill dam, is 12.2 miles from the mouth of North River; the crest is 10.8 feet below the railway and the height is 15 feet. This dam is built of dry rubblestone masonry, sheeted on the upper side and on top. It is in very good order and the low water power is fully utilized by the paper mill, for which it only furnishes about half the power needed, the rest being derived from a steam engine.

Dam No. 5 is 9.2 miles from the mouth of North River; the crest of the dam is about 14 feet below the railway and the height is 6.8 feet. The fall in the water at the dam now is 3.5 feet. This dam was built of logs, with stone filling, and is now washed out all the way across the river. The foundation and head walls are in good order.

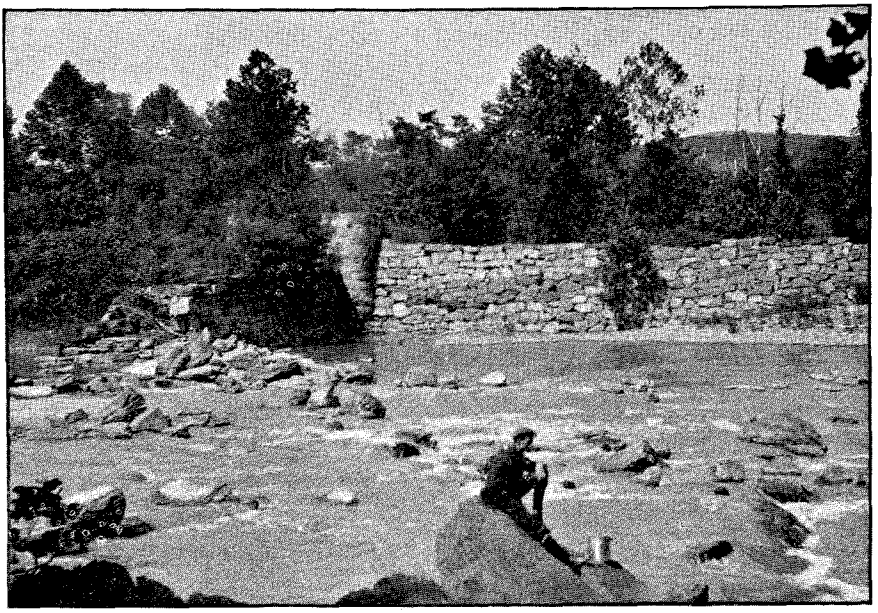
Dam No. 4 is 7.9 miles from the mouth of North River; the crest is about 14 feet below the railway and the height is 8 feet. The dam was built of dry rubble masonry, sheeted on the upper side and on top. It is in a good state of preservation, except that the sheeting has rotted and there is a small break in it. The river has cut a channel around the dam, between it and the Chesapeake and Ohio Railway, which is narrow and could be filled up without much difficulty. The Norfolk and Western Railway runs along the right bank of the river here and at all other dams below Buena Vista on North River, thus giving a mill located at any of these places the advantage of transportation over two railways.

Dam No. 3, Goose Neck dam, is 6.7 miles above the mouth of North River; the crest of the dam is 15.8 feet below the Chesapeake and Ohio Railway and the height of the dam is 15 feet. It is built of dry rubble masonry, sheeted on the upper side and on top; the sheeting, however, is rotten, allowing the entire river, except in high water, to run through the dam between the cracks in the dry masonry wall. It is a question of only a short time when this dam will break like the others. There is no place on either James or North Rivers where power, now unused, could be so cheaply developed. The low water-power that could be developed here is about 300 horse-power.

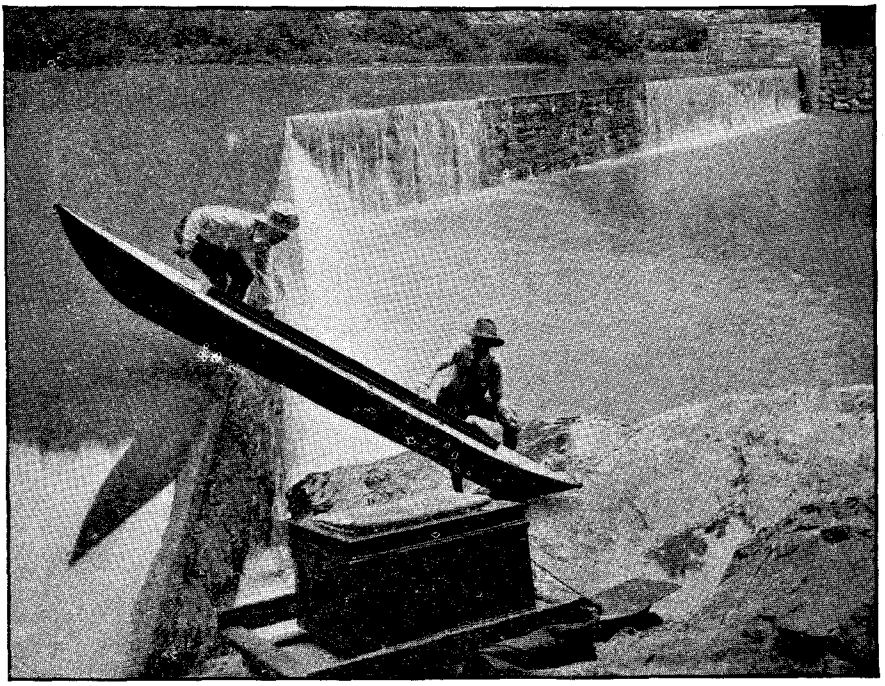
Dam No. 2, Devils Steps dam, (A), Plate VII, is 5.5 miles from the mouth of North River; the crest of the dam is about 10 feet below the Chesapeake and Ohio Railway, the height is 11 feet, and the present drop in the water surface is 2.4 feet. This was a stone dam, like most of the others on North River, and more than half is washed away. The head wall on the left bank is good, and on the right bank there is a solid rock ledge, which served as a head wall and which gave the dam its name.

Dam No. 1, Miller's dam, is 5.2 miles from the mouth of North River; the crest of the dam is about 10 feet below the Chesapeake and Ohio Railway and its height is 10 feet. This dam was built of logs, with stone filling, and is now nearly destroyed, except the head walls, which are good. This was the lowest dam on North River. Blue Ridge dam, on James River, just below the mouth of North River, ponds the water in North River for over a mile.

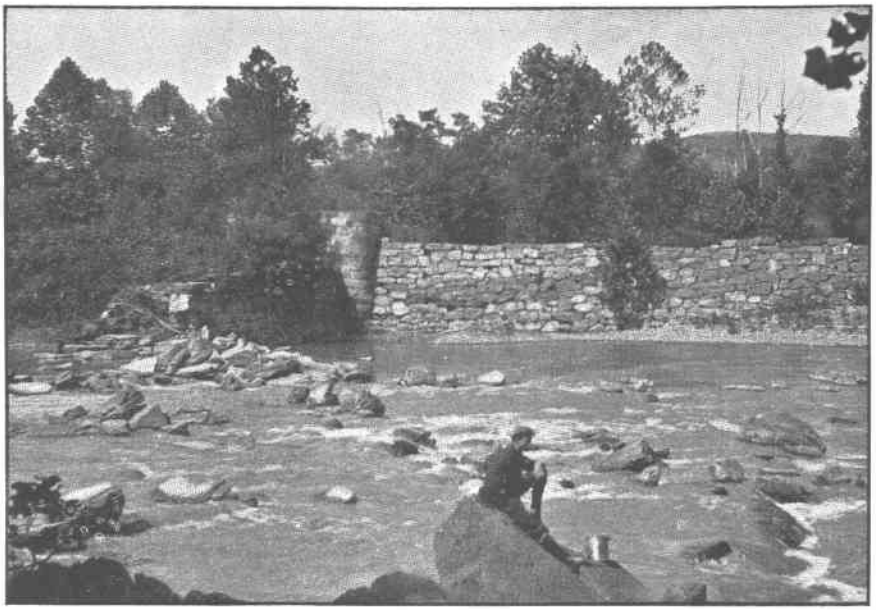
In the "Report on the water-power of the Middle Atlantic watershed," Tenth Census of the United States, Vol. XVI, Part I, pp. 531-551, valuable information is given concerning the James River and its tributaries. From that report the following table is reprinted:



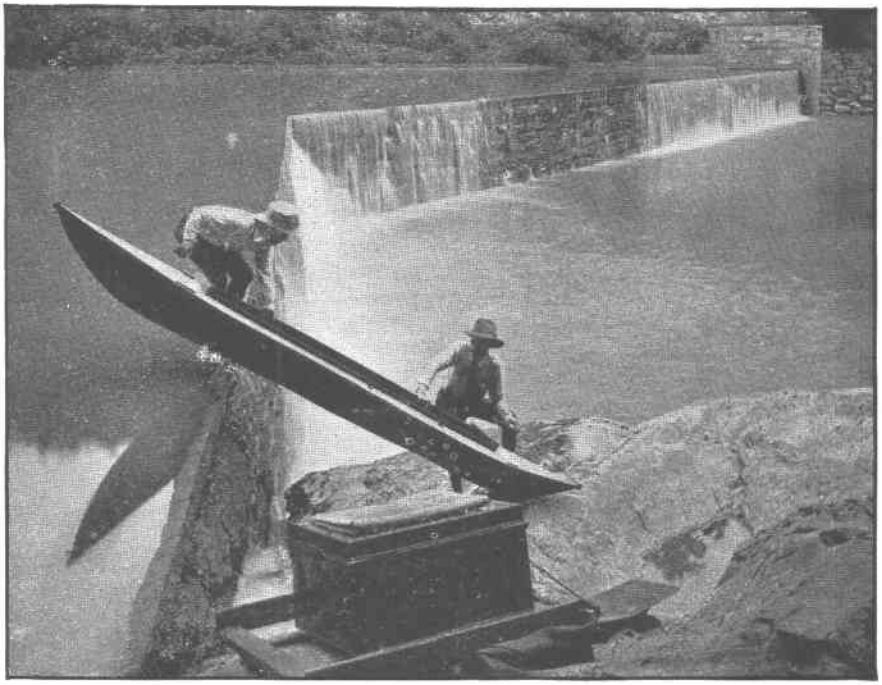
(A) DEVILS STEPS DAM ON NORTH (OF JAMES) RIVER.



(B) BUENA VISTA ELECTRIC PLANT ON NORTH (OF JAMES) RIVER.



(A) DEVILS STEPS DAM ON NORTH (OF JAMES) RIVER.



(B) BUENA VISTA ELECTRIC PLANT ON NORTH (OF JAMES) RIVER.

Name of dam.	Dam.							Pond.		
	Distance from Richmond.	Length.	Height.		Material.	Date of erection.	Cost.	Length.	Whether used for navigation.	Remarks.
			Above foundation.	Above surface.						
	Miles.	*Feet.*	*Feet.*	*Feet.*				*Miles.*		
Grant's	3.0	1,700	4	4	Wood	1855 (?)	$20,000	.....	Feeder only	Dam does not extend entirely across river. No water power.
Bosher's	9.0	902	12	9	Cut granite in cement	1857–1858	70,000	10	Navigated	
Maiden's Adventure	29.0	1,026	12	10	....do	1852–1853	80,000	5	Navigated 5 miles	
Seven Island	.....	.....	.....	.....	Wood	1840	.....	.....	Feeder only	Low dam. Enables boats to enter canal from opposite side of river. Does not extend entirely across. No water power.
Tye River	109.0	550	12	10	Cut granite in cement	1860	60,000	.....	Navigated 2½ miles	
Joshua Falls	135.5	600	12	9	....do	1870	50,000	3	....do	Rebuilt in 1870.
Lynchburg	148.5	.....	.....	.....	Partly stone, partly wood	1839	.....	2	Navigated 2 miles	Extends in a broken line from island to island.
Judith's	152.0	725	33	25	Cut stone in cement	1850–1851	100,000 or over.	4	Navigated 4 miles	
Bald Eagle	157.0	498	14	14	....do	1849–1851	35,000	2½	Navigated 2½ miles	
Pedlar	160.0	454	18	12	....do	1849–1851	35,000	2	Navigated 2 miles	
Coleman's Falls	162.5	572	18	14	218 ft. stone, 354 ft. wood	1849–1851	30,000	3	Navigated 3 miles	
Big Island	166.5	683	12	12	Stone	1849–1851	35,000	2	Navigated 2 miles	
Cushaw	170.5	843	10	10	Wood	1849–1851	20,000	1	.....	Boats cross river in pond.
Blue Ridge	176.0	455	13	13	150 ft. stone, 305 ft. wood	1849–1851	20,000	3 and 1½	3 miles on James; 1½ miles on North	At confluence of North River. Stone part in front of old wooden part.
Quarry Falls	178.5	582	13	13	136 ft. stone, 446 ft. wood	1849–1851	25,000	2½	Navigated 2½ miles	Not very favorable for power.
Varney's Falls	185.5	488	18	14	Wood	1849–1851	20,000	3	Navigated 3 miles	....do
Indian Rock	189.5	613	19	16	....do	1849–1851	30,000	3	....do	Easy to utilize for power.
Wasp Rock	194.0	384	20	15	....do	1849–1851	30,000	3	....do	....do

This table shows only the dams below Buchanan, or on the completed portion of the canal. It was the intention to extend the canal eventually to the Ohio River, and for this purpose surveys were made and two dams located and built above Buchanan, which have never been used. Beginning at Clifton Forge and coming down Jacksons and James Rivers, the dams, taken in order, are described below:

Old Forge dam is 210 miles from Richmond. The crest of the dam is 13.9 feet below the Chesapeake and Ohio Railway, and the height, as measured, was 18.6 feet. This dam, which was substantially built of stone laid in cement, was probably never entirely completed. The head walls, about half the dam, and the foundations, are in good order, and it would not be very expensive to restore the dam. The low water discharge of the river here is about 350 second-feet.

Cabell's dam is about 106 miles from Richmond, and was built of wood on a stone foundation, 5 feet high. It is almost entirely gone, except the head walls, which seemed to be in fairly good order, as they were built of stone. No levels were obtained here, connecting the dam with the railway, and there is no drop in the water surface at the site of the dam.

Wasp Rock dam has a crest 19 feet below the railway, its height being 15 feet. It is completely washed out except the head walls, which are in good order and well built, and the foundation, part of which remains. The river cut a channel around the dam on the left bank, next to the Chesapeake and Ohio Railway, which has been filled up by the railway company with a strong embankment protected by riprap.

The crest of Indian Rock dam is about 19 feet below the railway, and its height was 16 feet. Most of this dam has been washed away.

Varneys Falls dam has a crest 9.1 feet below the railway, its height being 14 feet, while at present the drop in the water surface at the dam is 4 feet. This dam is only partially gone, and there is excellent masonry on the left bank, where the old lock still stands. On the right bank, which is occupied by the Norfolk and Western Railway, there is a ledge of rock. On the left bank there is an excellent location for a mill to use the power.

At Quarry Falls the crest of the dam is 10 feet below the railway, and the height is 13 feet. This dam is mostly standing, the river running through a small break near the center. A part of the timber is rotten and will have to be replaced if the dam is repaired for use. There is a good mill site on the left bank at the lock for utilizing the power. This dam is about a mile below Natural Bridge station, where the Norfolk and Western Railway crosses James River and the Chesepeake and Ohio Railway.

Blue Ridge dam, at Balcony Falls station, has a crest about 14 feet below the railway; its height, which is 13 feet, may be increased by digging a tail race, for there is considerable fall below the dam. This is an admirable location for the development of water power. The plan of the dam was made in 1891; since that time the old cement mill has been removed and the wooden part of the dam has broken near the middle. The site is immediately below the mouth of North River, and the low water discharge is about 700 second-feet. On July 8, 1897, it was 1,489 second-feet.

Near Rope Ferry is Cushaw dam. The old crest of the dam was 15.75 feet below the railway and the height was 10 feet. No part of this dam is standing, and nothing but the foundation remains.

The crest of Big Island dam is 14.3 feet below the railway and the height, as measured, is 11 feet. This dam is intact and the power has been used by a paper mill, situated on the right bank beside the railway. The mill has not been operated for several years.

Colemans Falls dam has a crest 14.9 feet below the railway, with a height of 14 feet. It is in part broken; the stone portion is fairly good, while the wooden portion has been mostly washed away.

The crest of Pedlar dam is 15.5 feet below the railway and the height is 14 feet. This dam has been restored and the entire power of the river utilized within the last year by a very complete plant for the manufacture of calcium carbide, erected by the Wilson Aluminum Company, of Spray, North Carolina.*

Of Bald Eagle dam there is nothing left standing and no levels were obtained.

The crest of Judith dam is 14.5 feet below the railway and the height, as measured, is 24.3 feet. This dam is the highest on the river and is in excellent condition. A part of the power was used at the nail mills at Reusens, which is about half a mile below, but these works have not been operated for a number of years. At the time of visit no use seemed to be made of this power, but it is reported that an electric company in Lynchburg

*See article by Mr. Temple, the Engineer in charge of erection, published in Engineering News, April 14, 1898.

utilizes power from the canal that leads from this dam for street railway and other purposes.

The crest of the Lynchburg dam is 8.8 feet below the Chesapeake and Ohio Railway and the height, as measured, was 16 feet. Since the above table was compiled this dam has been improved, the conflicting interests of the city and of the railway have been adjusted, and the full power of the dam is now being utilized. The Chesapeake and Ohio Railway Company agrees to maintain the dam perpetually and to furnish water for a consideration to the pumping plant of the Lynchburg water works, and also to the various mills in Lynchburg.

Of the Joshua Falls dam nothing is standing except a part of the old wall on the railway side. Tye River dam is at Norwood station. The water below the dam was 35.6 feet below the railway at Tye River bridge, the dam was 10 feet high, and the drop in the water surface now is 1.8 feet.

The Middleton Mills dam does not seem to have been one of the canal dams. Its crest is 10.2 feet below the railway and its height is 3.2 feet.

At Maidens Adventure dam no abutments are now standing, the dam is broken about the middle, and the masonry is very much dilapidated.

The trip came to an end just above Bosher's dam, which stands at the head of the falls of the James at Richmond. Here, in a distance of 14 miles, the river has a fall of 124 feet, and in the last 3 miles the fall is 84 feet. On September 8, 1897, during a very dry season, Mr. Anschutz measured the discharge at Cartersville, 47 miles above Richmond, and found it to be 603 second-feet. This seems too small, for the combined discharges of James River at Buchanan and of North River at Glasgow were at that time about 600 second-feet. Taking the Cartersville measurement as the minimum flow, the 124 feet of fall would give about 8,500 gross horse-power. Not more than half the total power that could probably be made available has been developed.

Where the streams were sufficiently large the current meter was used in measuring the discharge, and when the water was not too deep the method of wading was used. A line was stretched across the river, and starting from the bank distances were measured with a tape. The rod to which the meter was attached was graduated and used for making soundings. The wading method gives the observer accurate knowledge of the bottom. Where the stream was too deep to wade, such as the James, at Glasgow, a tagged galvanized-wire clothesline was used and the meter was let down from one of the canoes, one man in the canoe keeping it in place by holding the line. This method worked well, but great difficulty was experienced in getting the line across and stretched close to the water. The pull on the line was so great that it was difficult to fasten the ends securely. The party was not equipped with an instrument for the indirect determination of distances, so that no measurements were made of the main river below Balcony Falls where North River empties into the James. The impracticability of measuring the main stream easily and quickly, when too deep to wade, was a weak point in the equipment. The measurement at Cartersville was made by letting the meter down from the bridge in the usual way. Following is a list of stream measurements made during the trip.

Stream measurements, made in 1897, of James River and its tributaries.

Distance from Richmond.	Name of Stream.	Discharge.	Bank (right or left).	Date.	Remarks.
Miles.		*Sec.-ft.*		1897.	
230.6	Smiths Creek	12.3	L.	July 14	At Clifton Forge
226.5	Cowpasture River	140.7	L.	July 15	Head of James River.
226.5	Jacksons River	288.7	R.	....do....	
226.5	James River	438.0	.....	....do....	
216.6	Mill Creek	10.4	L.	July 16	At Gala Water.
213.4	Craigs Creek	79.6	R.	....do....	
208.5	Catawba Creek	81.0	R.	July 19	Muddy, somewhat swollen
205.4	Saltpeter Creek	2.5	L.	....do....	At Allens Mill.
199.5	Lipses Run	3.0	R.	July 20	Or Spreading Spring Creek.
198.6	Davids Run	0.5	R.	....do....	
197.3	Back Creek	19.2	R.	July 21	Or Looney Creek.
189.7	Jennings Creek	20.1	R.	July 22	
188.6	Rocky Run	1.2	L.	....do....	
187.0	Sprouts Run	2.1	R.	July 23	
181.3	Cedar Creek	2.7	L.	....do....	
179.7	Back Run	2.2	R.	....do....	
178.7	.....	1.0	L.	....do....	At Natural Bridge station.
177.7	Arnolds Creek	12.3	R.	July 24	
176.4	James River	1,188.0	.....	July 28	At Glasgow.
174.7	North River	310.0	L.	July 27	At Glasgow River station.
170.0	Rocky Row Run	1.1	L.	July 30	
169.1	Snow Creek	0.6	R.	....do....	
167.5	Peters Creek	2.3	R.	July 31	
167.3	Otter Creek	2.9	L.	....do....	
167.0	Battery Creek	2.8	R.	....do....	
165.5	Hunting Creek	5.5	R.	....do....	At Big Island.
164.4	Reed Creek	13.8	R.	....do....	
159.4	Pedlar River	35.8	L.	Aug. 2	
156.0	Salt Creek	0.4	L.	Aug. 3	
153.0	Widemouth Creek	0.9	R.	....do....	
151.0	Judith Creek	5.3	R.	....do....	
148.0	Harris Creek	10.4	L.	Aug. 4	
146.0	Ivy Creek	30.0	R.	....do....	
144.5	Fishing Creek	2.0	R.	Aug. 5	
143.5	Rallings Run	2.8	L.	....do....	
141.7	Opossum Creek	3.0	R.	....do....	
140.5	Beaver Creek	13.7	R.	Aug. 6	
140.0	Archer Creek	1.4	R.	....do....	
136.0	Joshua Creek	1.0	R.	Aug. 7	
134.9	Stovalls Creek	11.4	L.	....do....	
133.3	Porridge Run	4.4	L.	....do....	
131.5	Stonewall Creek	3.1	R.	....do....	
127.4	Bells Creek	0.9	L.	Aug. 9	
124.0	Wreck Island Creek	15.2	R.	....do....	
120.3	Allen Creek	4.1	L.	....do....	
118.2	Bent Creek	10.2	R.	Aug. 10	
116.0	David Creek	6.6	R.	Aug. 10	
112.0	.....	1.3	R.	....do....	1 mile below Greenway
111.0	Owens Creek	6.5	L.	Aug. 11	
108.7	Tye River	168.1	L.	....do....	Swollen by rains.
106.5	Nigger Creek	1.7	R.	Aug. 12	
106.3	.....	0.9	L.	....do....	

Stream measurements, made in 1897, of James River and its tributaries.—Con.

Distance from Richmond.	Name of Stream.	Discharge.	Bank (right or left.)	Date.	Remarks.
Miles.		*Sec.-ft.*		1897.	
106.0	Mallorys Creek	0.9	R.	....do....	
96.0	Miller Run	0.6	R.	Aug. 13	Opposite Manteo.
93.9		0.3	R.	....do....	Opposite Highlands.
91.3	Rockfish River	36.5	L.	..do....	At Hardware.
88.5		0.5	L.	Aug. 14	
88.5		0.5	R.	....do....	
86.3	Ballinger Creek	1.9	L.	....do....	
85.3	Rock Island Run	3.3	R.	....do....	
81.5	Tooters Creek	0.7	L.	Aug. 16	
76.0	Georgia Creek	0.2	R.	....do....	
73.4	Hardware River	21.4	L.	Aug. 17	
67.6	Slate River	41.5	R.	Aug. 18	
65.6	Bear Garden Creek	8.6	R.	....do....	
59.0		4.1	L.	Aug. 19	
57.2	Rivanna River	48.0	L.	Aug. 20	
52.4	Byrd Creek	2.9	L.	....do....	
48.3	Willis River	29.6	R.	Aug. 21	
47.0	James River	603.0	.....	Sept. 8	At Cartersville.
45.9	Muddy Creek	1.9	R.	Aug. 23	Bed of a large creek.
44.4		1.2	L.	....do....	½ mile above Stokes.
40.0	Sally Creek	58.3	R.	Aug. 24	Much swollen.
34.0	Leckinghole Run	20.2	L.	Aug. 25	
29.0	Jule Creek	0.4	R.	Aug. 28	Very low.
26.6	Beaverdam Creek	2.9	L.	Aug. 30	
24.7	Fine Creek	1.6	R.	....do....	
22.5	Genito Creek	3.7	L.	....do....	
20.5	Dover Creek	3.0	L.	....do....	
17.6	Jones Creek	8.2	R.	Aug. 31	

NORTH RIVER AND ITS TRIBUTARIES.

*					
17.0	Burdens Run	1.0	R.	July 8	
17.0	North River	159.7	.....	....do....	Above South River Dam.
16.3	South River	56.2	L.	....do....	At mouth.
10.0	Mountain Branch	1.2	L.	July 9	
5.5	Buffalo Creek	49.6	R.	July 10	Slightly flush.

*Distance from mouth of North River.

JAMES RIVER AT BUCHANAN, VA.

This station was established August 18, 1895, by C. C. Babb. It is located at the iron highway bridge near the Chesapeake and Ohio Railway station, and one-half mile from the Norfolk and Western Railway station. It is about 20 miles above the mouth of North River and one-half mile above the mouth of Purgatory Creek. The United States Weather Bureau maintained a gage at this point for about two years before measurements were made by the Geological Survey. On April 3, 1897, the datum of the original wire gage was lowered two feet to avoid negative readings. On November 21, 1903, the wire gage was replaced by a standard chain gage. It is located on the upstream side of the bridge near the center of the left span. The length of the chain from the end of the weight to the marker is 35.08 feet. Bench mark No. 1 is the top of a stone post under the southwest corner of the porch of the Chesapeake and Ohio Railway station. Its elevation is 24.68 feet above gage datum. Bench mark No. 2 is a copper bolt in a ledge of rock on the left bank 500 feet above the station. Its elevation is 16.23 feet above gage datum. This bench mark was established November 21, 1903, at which time the old bench mark on this ledge could not be found. Bench mark No. 3 is a United States Geological Survey aluminum tablet set in the upstream side of the left abutment. Its elevation is 29.22 feet above gage datum. Bench mark No. 4 is the top of the upper end of the seventh floor beam from the left bank. Its elevation is 30.03 feet above gage datum. Discharge measurements are made from the lower side of the two-span iron highway bridge, which has a total span of 350 feet. The initial point for soundings is the end of pin on the lower side of bridge at the left bank. The channel is straight for 800 feet above and for about the same distance below the station. The current has a moderate velocity and is broken by the middle pier of the two-span bridge. Both banks are high, not liable to overflow, and without trees. The bed of the stream is rock and mud and shifts somewhat, but the flow at the measuring section is determined by a permanent rock control a few hundred yards downstream. The gage is read twice each day by U. H. Hyde.

Discharge measurements of James River at Buchanan, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	aGage height.	Discharge.
1895.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
July 31	C. C. Babb	686	.74	1.88	509
August 1	do	526	1.04	1.81	543
September 6	D. C. Humphreys	386	1.03	1.52	397
1896.					
January 25	D. C. Humphreys	2,526	2.11	5.32	5,337
May 22	do	915	2.44	3.09	2,235
July 9	do	4,033	6.74	13.51	27,140
July 24	do	822	1.38	2.56	1,142
1897.					
April 1	F. H. Anschutz	996	2.02	3.30	2,006
May 30	A. P. Davis	728	1.37	2.70	994
October 13	F. H. Anschutz	412	1.40	1.70	578
1898.					
February 12	D. C. Humphreys	800	1.16	2.40	932
June 27	do	662	.82	2.05	544
July 30	do	981	1.50	2.86	1,468
1899.					
March 30	D. C. Humphreys	2,119	3.21	5.54	6,804
July 6	do	803	.70	2.06	558
August 11	do	705	.52	1.80	364
December 23	do	1,473	2.49	4.32	3,664
1900.					
March 30	D. C. Humphreys	1,719	2.59	4.62	4,453
June 28	do	1,085	.96	2.80	1,043
August 4	do	812	.64	2.25	523
August 21	do	787	.48	1.85	374
December 20	do	1,085	1.10	2.93	1,197
1901.					
March 28	D. C. Humphreys	2,129	3.13	5.74	6,664
August 1	do	985	.92	2.63	907
August 15	do	2,993	4.93	8.50	14,750

aAll gage heights refer to 1905 datam.

Discharge measurements of James River at Buchanan, Va.—Con.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1902.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
July 19	D. C. Humphreys	754	.69	2.12	519
August 25	....do	768	.48	1.90	365
1903.					
March 20	E. C. Murphy	1,400	1.95	3.79	2,728
September 22	Paul and Sawyer	955	1.65	2.95	1,583
November 21	W. C. Sawyer	654	1.00	2.25	652
1904.					
June 17	R. H. Bolster	1,119	1.34	3.06	1,498
August 8	N. C. Grover	860	.90	2.40	775
September 17	R. H. Bolster	707	.56	1.89	393
September 30	....do	687	.53	1.82	364
October 19	....do	676	.46	1.78	314
1905.					
March 20	A. H. Horton	1,565	2.32	4.29	3,631
May 23	N. C. Grover	1,296	1.60	3.46	2,079
May 24	....do	1,232	1.53	3.33	1,889
September 12	M. W. Winter	920	.62	2.17	573

Daily gage height, (a) in feet, of James River at Buchanan, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
*a*1895.												
1	.....	.....	.....	.....	.....	.....	.....	.....	1.7	1.6	1.7	1.9
2	.....	.....	.....	.....	.....	.....	.....	.....	1.7	1.6	1.8	1.9
3	.....	.....	.....	.....	.....	.....	.....	.....	1.6	1.6	1.8	1.9
4	.....	.....	.....	.....	.....	.....	.....	.....	1.6	1.6	1.8	1.9
5	.....	.....	.....	.....	.....	.....	.....	.....	1.6	1.6	1.8	1.9
6	.....	.....	.....	.....	.....	.....	.....	.....	1.5	1.6	1.8	1.9
7	.....	.....	.....	.....	.....	.....	.....	.....	1.5	1.6	1.8	1.9
8	.....	.....	.....	.....	.....	.....	.....	.....	1.5	1.6	1.8	1.9
9	.....	.....	.....	.....	.....	.....	.....	.....	1.5	1.6	1.8	1.9
10	.....	.....	.....	.....	.....	.....	.....	.....	1.5	1.6	1.8	1.9
11	.....	.....	.....	.....	.....	.....	.....	.....	1.5	1.6	1.8	1.9
12	.....	.....	.....	.....	.....	.....	.....	.....	1.5	1.6	1.9	1.9
13	.....	.....	.....	.....	.....	.....	.....	.....	1.5	1.6	1.9	1.9
14	.....	.....	.....	.....	.....	.....	.....	.....	1.5	1.6	1.9	1.9
15	.....	.....	.....	.....	.....	.....	.....	.....	1.5	1.6	1.9	1.9
16	.....	.....	.....	.....	.....	.....	.....	.....	1.5	1.6	1.9	1.9
17	.....	.....	.....	.....	.....	.....	.....	.....	1.6	1.6	1.9	1.9
18	.....	.....	.....	.....	.....	.....	.....	.....	1.6	1.6	1.9	1.9
19	.....	.....	.....	.....	.....	.....	.....	.....	1.6	1.6	1.9	1.8
20	.....	.....	.....	.....	.....	.....	.....	.....	1.6	1.6	1.9	1.8
21	.....	.....	.....	.....	.....	.....	.....	.....	1.6	1.6	1.9	2.0
22	.....	.....	.....	.....	.....	.....	.....	.....	1.6	1.6	1.9	5.0
23	.....	.....	.....	.....	.....	.....	.....	.....	1.6	1.6	1.9	4.2
24	.....	.....	.....	.....	.....	.....	.....	.....	1.6	1.6	1.9	4.0
25	.....	.....	.....	.....	.....	.....	.....	1.8	1.6	1.6	1.9	3.8
26	.....	.....	.....	.....	.....	.....	.....	1.8	1.6	1.6	1.9	3.5
27	.....	.....	.....	.....	.....	.....	.....	1.8	1.6	1.6	1.9	3.3
28	.....	.....	.....	.....	.....	.....	.....	1.8	1.6	1.6	1.9	3.1
29	.....	.....	.....	.....	.....	.....	.....	1.7	1.6	1.6	1.9	.....
30	.....	.....	.....	.....	.....	.....	.....	1.7	1.6	1.6	1.9	.....
31	.....	.....	.....	.....	.....	.....	.....	1.7	.....	1.6	.....	.....
*a*1896.												
1	.....	2.5	2.5	9.05	1.4	2.6	2.6	3.0	2.1	7.3	1.8	6.4
2	.....	2.5	2.5	8.85	1.2	2.6	2.4	3.5	2.0	4.6	1.8	5.15
3	.....	4.45	2.5	6.25	2.9	2.5	2.3	3.3	1.9	3.65	1.8	4.4
4	.....	6.8	2.5	5.05	3.32	2.5	2.3	3.05	1.9	3.25	1.8	3.85
5	.....	5.1	2.5	4.1	3.05	2.35	2.3	2.9	1.8	2.85	6.1	3.65
6	.....	5.0	2.5	3.6	2.7	2.1	2.3	2.5	1.8	2.65	9.2	3.5
7	.....	7.25	2.5	3.35	2.7	2.1	2.85	2.35	1.8	2.5	5.2	3.4
8	.....	5.55	2.5	3.05	2.5	2.9	3.0	2.4	1.8	2.5	4.35	3.25
9	.....	4.8	2.5	2.85	2.5	3.3	12.25	2.25	1.7	2.4	3.7	3.2
10	.....	4.7	2.5	2.55	2.3	3.1	8.85	2.9	1.7	2.3	3.4	3.1
11	.....	4.15	2.5	2.5	2.3	3.05	5.55	2.55	1.7	2.3	3.15	3.0
12	.....	3.5	2.5	2.5	2.2	2.7	4.4	2.2	1.7	2.15	2.9	2.9
13	.....	3.25	2.8	2.4	2.2	2.45	4.45	2.0	1.7	2.1	2.8	2.9
14	.....	5.1	2.8	1.75	2.1	2.35	3.9	2.1	1.7	2.1	2.8	2.8
15	.....	5.5	2.8	1.3	2.1	2.3	3.4	2.45	1.7	2.1	2.8	2.7
16	.....	4.5	2.8	1.3	2.1	2.3	3.1	2.6	1.7	2.1	2.7	2.6
17	.....	4.1	7.15	1.2	1.3	2.3	3.0	2.25	1.7	2.1	2.7	2.5
18	.....	3.5	6.65	1.45	1.3	2.3	2.9	2.15	1.7	2.1	2.6	2.5
19	.....	3.2	5.7	1.8	1.3	2.35	2.8	2.1	1.7	2.0	2.6	2.5

*a*1895 and 1896 gage heights refer to 1905 datum.

Daily gage height, in feet, of James River at Buchanan, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1896.												
20	.....	3.2	7.45	2.05	1.3	2.7	2.55	2.1	1.7	2.0	2.5	2.5
21	.....	3.2	6.25	2.1	2.85	2.65	2.4	1.9	1.7	2.0	2.5	2.4
22	.....	3.2	5.0	2.1	3.15	2.45	2.4	2.5	1.7	1.9	2.4	2.4
23	.....	3.2	4.45	2.1	2.8	2.3	2.75	2.45	1.7	1.9	2.4	2.4
24	*a*3.6	2.8	4.95	2.1	2.9	2.2	2.55	2.2	1.7	1.8	2.4	2.4
25	6.0	2.55	5.1	2.1	2.9	2.2	2.4	2.2	1.7	1.8	2.4	2.4
26	4.6	2.5	4.75	1.7	2.75	3.8	2.3	2.35	1.7	1.8	2.4	2.3
27	3.8	2.5	4.6	1.4	2.65	4.05	2.2	2.2	1.7	1.8	2.4	2.3
28	3.2	2.5	4.6	1.4	2.75	3.45	2.2	2.2	1.7	1.8	2.3	2.2
29	2.85	2.5	4.75	1.4	2.7	3.15	2.2	2.2	1.7	1.8	3.3	2.2
30	2.7	.....	10.65	1.8	2.6	2.85	2.7	2.2	14.3	1.8	7.35	2.2
31	2.5	.....	10.0	.....	2.6	.....	2.7	2.1	.....	1.8	.....	2.2
1897.												
1	*b*2.1	2.7	4.25	3.3	2.6	2.5	2.1	2.2	1.8	1.3	1.6	1.7
2	2.1	2.8	4.1	3.3	6.4	2.5	2.2	2.1	1.8	1.3	1.8	1.8
3	2.1	2.8	3.85	*b*3.15	7.75	2.5	3.05	2.0	1.7	1.3	1.8	1.9
4	2.1	2.9	3.7	3.0	5.85	3.0	2.7	2.0	1.7	1.3	1.8	2.1
5	2.1	2.9	3.6	3.15	5.2	2.65	2.45	2.4	1.7	1.3	1.7	2.2
6	2.1	8.0	3.5	4.15	5.15	2.5	2.3	2.1	1.7	1.3	1.7	2.2
7	2.1	12.15	3.5	4.0	4.85	2.5	2.3	2.0	1.7	1.3	1.6	2.2
8	2.1	8.8	3.75	3.75	4.6	2.5	2.5	2.0	1.6	1.3	1.6	2.2
9	2.1	7.25	3.7	3.6	4.15	2.5	2.45	2.0	1.6	1.3	1.6	2.2
10	2.1	6.75	3.7	4.1	4.95	2.5	2.3	1.9	1.6	1.3	1.6	2.2
11	2.1	6.1	4.45	4.2	3.85	2.45	2.2	1.9	1.6	1.3	1.6	2.2
12	2.1	5.8	4.9	3.95	3.35	2.45	2.2	1.9	1.6	1.75	1.5	2.2
13	2.1	8.15	6.25	3.7	6.15	2.3	2.2	1.9	1.6	1.75	1.45	2.2
14	2.1	6.5	5.85	3.6	10.45	2.3	2.2	1.9	1.6	1.7	1.4	2.2
15	2.1	6.2	7.9	3.6	7.3	2.4	2.2	1.9	1.6	*c*1.7	1.35	2.55
16	2.1	6.25	6.45	3.5	5.9	2.4	2.2	1.8	1.6	1.7	1.3	2.85
17	2.1	6.5	5.6	3.35	5.0	2.4	2.2	1.8	1.5	1.7	1.3	2.95
18	2.1	5.55	5.1	3.2	4.55	2.4	2.1	1.8	1.5	1.6	1.3	2.7
19	2.1	5.3	6.0	3.1	4.1	2.4	2.2	1.8	1.5	1.6	1.3	2.7
20	2.1	5.3	6.75	3.0	3.8	3.1	2.2	1.8	1.5	1.5	1.3	2.7
21	2.3	6.05	6.35	3.0	3.55	2.5	2.3	1.8	1.5	1.5	1.3	2.7
22	2.3	11.5	5.65	2.9	3.35	2.5	3.35	1.8	1.5	1.5	1.3	2.7
23	2.3	14.0	5.0	2.8	3.15	2.5	3.3	1.8	1.55	1.7	1.3	2.6
24	2.7	11.65	4.65	2.8	3.15	2.4	3.05	2.25	1.9	1.7	1.3	2.85
25	2.9	7.5	4.45	2.7	3.2	2.3	3.05	2.1	1.6	1.7	1.3	2.9
26	2.8	6.1	4.3	2.7	3.1	2.2	2.75	2.0	1.5	1.7	1.3	2.9
27	2.6	5.35	3.95	2.7	3.0	2.4	2.55	2.0	1.5	1.7	1.3	2.9
28	2.9	4.7	3.8	2.6	2.9	2.3	2.5	1.9	1.5	1.6	1.3	2.85
29	2.8	.....	3.65	2.6	2.75	2.2	2.45	1.9	1.4	1.6	1.4	2.7
30	2.7	.....	3.5	2.6	2.7	2.1	2.4	1.9	1.4	1.6	1.5	2.6
31	2.7	.....	3.4	.....	2.55	.....	2.3	1.8	.....	1.6	.....	2.6
*c*1898.												
1	2.55	3.05	2.4	6.85	2.9	2.9	1.9	2.45	2.4	2.2	3.65	3.2
2	2.6	3.05	2.4	5.6	2.8	2.75	1.9	2.2	2.3	2.1	3.55	3.1
3	2.75	2.95	2.5	4.75	2.7	2.6	1.9	2.2	2.2	2.1	3.25	3.0
4	2.65	2.95	2.5	4.3	2.6	2.5	1.9	3.6	2.5	2.6	3.1	3.3

*a*Gage heights January 24 to July 9, 1896, subject to considerable error.
*b*Gage lowered 2.00 feet to 1905 datum April 3, 1897. Gage heights January 1 to April 3, 1897, refer to 1905 datum.
*c*Gage heights October 15 to December 31, 1897, and January 1 to February 13, 1898, subject to considerable error.

Daily gage height, in feet, of James River at Buchanan, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1898.												
5	2.55	2.85	2.4	4.1	2.5	2.5	1.8	7.3	2.25	2.75	3.0	5.45
6	2.55	2.85	2.4	4.25	4.25	2.5	1.85	5.55	2.2	4.35	3.0	4.75
7	2.45	2.85	2.4	4.05	11.0	2.4	1.9	4.2	2.2	3.95	2.9	4.1
8	2.45	2.85	2.5	3.8	8.7	2.3	1.9	3.95	2.1	3.2	2.9	3.7
9	2.45	2.75	2.5	3.7	6.9	2.3	1.9	4.5	2.1	2.95	2.8	3.7
10	2.45	2.75	2.5	3.7	5.6	2.2	1.9	8.3	2.0	2.7	2.7	3.6
11	3.55	2.6	2.5	4.6	4.85	2.2	1.9	11.55	2.0	2.5	2.7	3.5
12	4.0	2.45	2.5	6.55	4.35	2.2	1.9	6.9	2.0	2.6	2.7	3.4
13	3.6	2.3	2.6	5.4	3.95	2.2	1.8	5.05	1.9	2.5	2.7	3.3
14	3.25	2.3	2.6	5.3	3.65	2.2	1.8	6.0	1.9	2.5	2.9	3.2
15	3.2	2.3	2.6	7.1	3.5	2.2	1.8	4.7	1.9	2.4	2.9	3.1
16	4.25	2.4	2.6	6.25	3.5	2.2	1.8	4.1	1.8	2.4	2.9	3.0
17	4.85	2.3	2.6	5.4	3.4	2.3	1.8	3.6	1.8	2.45	2.9	3.0
18	4.35	2.3	3.35	4.8	3.2	2.3	2.35	3.35	1.8	2.7	2.9	2.9
19	3.75	2.3	4.4	4.4	3.2	2.45	2.5	3.35	1.8	6.45	4.25	2.9
20	3.6	2.3	4.2	4.15	3.4	2.6	2.2	3.05	1.8	4.85	6.3	2.9
21	3.85	2.3	3.75	3.75	3.2	2.5	2.1	2.8	1.8	6.85	5.25	2.8
22	3.9	2.75	3.45	3.55	3.0	2.4	2.3	2.7	2.25	14.1	4.4	2.8
23	3.6	3.3	3.25	3.35	4.9	2.3	2.35	2.55	5.5	8.6	4.25	4.35
24	3.55	3.05	3.1	3.3	5.8	2.3	2.3	2.4	3.7	6.05	4.2	5.6
25	3.75	2.9	4.0	3.3	5.05	2.2	2.5	2.65	3.0	5.0	4.05	4.7
26	3.85	2.8	5.25	3.3	4.7	2.2	2.3	2.5	2.5	4.55	3.75	4.25
27	4.5	2.7	4.45	3.3	4.25	2.05	2.25	2.5	2.4	4.1	3.55	3.85
28	3.15	2.6	4.05	3.25	3.8	2.05	3.4	2.5	2.3	4.0	3.4	3.6
29	3.75	.....	4.3	3.1	3.45	2.0	3.25	2.5	2.3	3.65	3.3	3.5
30	3.6	.....	8.5	3.0	3.3	2.0	2.75	2.5	2.2	3.7	3.2	3.5
31	3.3	.....	8.2	.....	3.2	.....	2.5	2.4	.....	3.9	.....	3.4
1899.												
1	3.45	3.1	7.45	a3.65	3.3	2.9	2.2	1.9	1.9	1.9	1.8	1.8
2	3.55	3.0	6.55	4.1	3.3	3.0	2.1	1.9	1.9	1.9	1.9	1.8
3	3.4	3.0	6.4	4.0	3.3	2.9	2.1	1.8	1.9	1.9	2.1	1.8
4	3.4	3.4	11.2	3.9	3.3	2.9	2.0	1.8	2.0	1.9	2.3	1.8
5	3.95	4.9	19.05	3.8	3.2	2.9	2.0	1.8	2.1	1.9	2.2	1.8
6	5.95	6.8	13.55	3.8	3.2	2.8	a2.05	1.8	2.0	1.8	2.2	1.8
7	10.25	8.4	8.15	3.7	3.55	2.7	2.1	1.8	1.9	1.8	2.1	1.8
8	7.7	7.3	6.7	4.7	4.85	2.6	2.35	1.9	1.8	1.8	2.1	1.8
9	5.95	6.0	5.9	5.45	7.2	2.6	2.35	1.9	2.0	1.8	2.1	1.8
10	5.2	4.5	5.55	5.1	6.15	2.6	2.15	1.9	2.1	1.8	2.0	1.8
11	4.6	4.05	5.35	4.7	5.35	2.6	2.0	1.9	2.2	1.8	2.0	1.8
12	4.2	4.0	5.15	4.55	5.15	2.6	2.0	1.9	2.1	1.8	1.9	2.3
13	4.0	4.0	4.95	4.4	5.1	3.75	2.0	1.9	2.1	1.8	1.9	3.5
14	3.85	3.95	4.65	4.3	5.7	3.8	2.0	2.0	2.0	1.8	1.9	3.55
15	4.15	3.5	4.75	4.2	5.2	3.55	1.9	2.6	2.0	1.8	1.9	2.95
16	4.3	3.6	5.55	4.15	4.7	3.25	1.9	2.45	1.9	1.8	1.9	2.6
17	4.2	3.75	5.3	4.0	4.35	3.0	1.9	2.2	1.9	1.8	1.8	2.45
18	4.2	4.15	5.05	3.75	4.15	2.85	1.9	2.0	1.8	1.8	1.8	2.3
19	4.05	4.85	7.15	3.7	4.0	2.7	1.9	1.9	2.45	1.8	1.8	2.2
20	3.75	5.7	7.8	3.6	3.85	2.6	1.9	1.9	3.6	1.8	1.8	2.2
21	3.6	8.2	6.35	3.6	3.55	2.5	1.9	1.8	3.4	1.7	1.8	2.1
22	3.5	10.2	5.65	3.5	3.5	2.4	1.8	1.8	2.65	1.7	1.8	2.1
23	3.5	9.35	5.2	3.5	3.4	2.4	1.8	1.8	2.35	1.7	1.8	2.1

a Gage heights April 1 to July 6, 1899 subject to considerable error.

Daily gage height, in feet, of James River at Buchanan, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1899.												
24	3.4	7.35	4.8	3.4	3.4	2.3	1.8	1.8	2.2	1.7	1.8	2.1
25	3.4	6.15	4.55	3.4	3.4	2.45	1.8	1.8	2.1	1.7	1.8	2.1
26	3.6	5.4	4.25	3.55	3.3	2.4	1.8	1.8	2.1	1.7	1.8	2.25
27	3.5	8.9	4.1	3.9	3.3	2.95	1.9	1.9	2.0	1.7	1.8	2.3
28	3.4	9.65	4.0	3.8	3.1	2.6	1.9	1.8	2.0	1.7	1.8	2.2
29	3.3	.....	4.8	3.7	3.0	2.5	2.0	2.0	2.0	1.7	1.8	2.2
30	3.2	.....	5.55	3.6	3.1	2.4	2.0	1.9	1.9	1.7	1.8	2.2
31	3.1	.....	4.95	.....	3.1	.....	1.9	1.9	.....	1.7	.....	2.2
1900.												
1	2.2	2.4	6.8	4.4	3.1	2.85	2.7	2.4	1.9	2.2	2.5	4.2
2	2.2	2.4	9.25	4.15	3.0	2.75	2.6	2.3	1.9	2.2	2.5	3.8
3	2.2	2.3	6.8	4.0	2.9	3.3	2.6	2.3	1.9	2.2	2.8	3.7
4	2.1	2.35	5.5	3.9	2.85	3.05	2.6	2.25	2.15	2.2	3.45	6.05
5	2.1	2.55	4.9	3.8	2.8	2.9	2.5	2.1	2.9	2.1	3.55	9.3
6	2.1	2.5	4.55	3.7	2.8	2.8	2.5	2.1	2.8	2.1	3.25	6.25
7	2.0	2.5	4.4	3.6	2.7	2.7	2.4	2.0	2.2	2.1	2.95	5.35
8	2.0	2.95	4.4	3.5	2.65	2.7	2.4	2.0	1.95	2.1	2.8	4.95
9	2.0	3.65	4.6	3.35	2.5	2.6	2.3	2.0	1.8	2.1	2.7	4.75
10	2.1	3.8	4.35	3.2	2.55	2.5	2.2	2.0	1.8	2.1	2.6	4.4
11	2.4	3.5	4.2	3.1	2.5	2.5	2.2	1.9	1.8	2.1	2.6	3.95
12	3.1	3.35	4.05	3.0	2.5	2.5	2.3	1.9	1.7	2.1	2.5	3.8
13	4.2	6.85	3.9	3.0	2.5	3.1	2.3	1.9	1.7	2.1	2.5	3.65
14	3.55	9.2	3.75	3.0	2.4	2.8	2.2	1.9	1.7	2.1	2.5	3.5
15	3.15	6.1	3.6	2.9	2.4	2.8	2.2	1.9	2.1	2.35	2.5	3.35
16	2.95	5.5	3.6	2.8	2.4	4.6	2.1	1.9	3.15	2.7	2.4	3.2
17	2.8	4.55	3.5	2.8	2.3	6.3	2.0	1.8	3.35	2.6	2.4	3.1
18	2.8	4.3	3.4	2.95	2.3	6.9	2.0	1.8	2.6	2.45	2.4	3.1
19	3.75	3.6	3.5	4.15	2.25	6.0	2.0	1.8	2.35	2.3	2.4	3.0
20	9.3	3.35	9.5	4.9	2.9	4.65	2.0	1.7	2.2	2.2	2.3	2.9
21	8.15	3.3	10.3	4.65	2.85	4.15	2.0	1.7	2.1	2.2	2.3	2.9
22	5.6	8.0	7.4	4.7	2.65	3.9	2.0	1.7	2.1	2.3	2.3	2.9
23	4.55	7.45	5.95	5.45	2.5	3.25	2.0	1.8	2.1	2.95	2.3	2.8
24	3.95	6.4	5.2	4.85	2.65	3.05	2.0	1.8	2.2	10.45	2.65	3.05
25	3.5	5.6	4.95	4.4	4.5	3.0	2.1	1.8	2.1	5.65	4.25	3.1
26	3.3	4.8	4.85	4.25	4.0	2.9	3.1	1.8	2.1	4.1	17.5	3.0
27	3.2	4.35	4.8	3.85	3.45	2.8	3.2	1.9	2.1	2.9	12.2	3.0
28	2.75	4.15	4.9	3.7	3.2	2.7	3.15	1.9	2.2	2.7	6.85	2.9
29	2.55	.....	4.75	3.25	3.1	2.7	3.3	1.9	2.2	2.6	5.5	2.9
30	2.4	.....	4.6	3.15	3.0	2.7	2.75	1.9	2.2	2.6	4.85	2.8
31	2.4	.....	4.6	.....	3.0	.....	2.55	1.9	.....	2.6	.....	2.8
1901.												
1	2.8	2.9	2.5	3.9	4.0	5.25	4.2	2.6	6.6	3.15	2.2	2.2
2	2.8	2.8	2.5	4.0	3.9	4.75	3.95	2.5	5.0	3.0	2.2	2.2
3	2.7	2.8	2.5	9.85	3.8	4.35	3.7	2.5	4.2	2.9	2.2	2.45
4	2.7	2.9	2.6	10.25	3.65	4.15	3.85	2.5	3.65	2.8	2.1	2.9
5	2.6	2.9	2.65	8.95	3.5	3.85	4.55	2.5	3.35	2.7	2.1	3.45
6	2.6	3.0	2.7	6.35	3.4	3.65	4.35	6.1	3.2	2.6	2.1	3.25
7	2.6	3.1	2.8	6.1	3.3	5.35	4.05	9.75	3.1	2.5	2.1	2.95
8	2.6	3.1	2.8	5.9	3.2	4.6	3.85	5.4	3.0	2.4	2.1	2.8
9	2.6	3.1	2.9	5.2	3.3	4.15	3.55	4.3	2.9	2.4	2.1	2.8
10	2.5	3.2	2.9	4.7	3.7	3.75	3.25	3.8	2.8	2.4	2.1	2.7
11	3.35	3.35	9.0	4.35	4.8	3.6	3.1	3.6	2.8	2.4	2.1	3.15

Daily gage height, in feet, of James River at Buchanan, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901.												
12	9.85	3.2	7.85	4.05	4.5	3.5	3.0	3.6	3.0	2.4	2.1	3.4
13	7.65	3.1	6.35	3.9	4.05	3.5	2.85	4.9	2.9	2.5	2.1	3.3
14	5.8	3.1	5.55	4.65	3.75	3.4	3.45	6.8	2.8	2.5	2.1	3.2
15	5.1	3.1	4.7	8.5	3.55	6.2	4.65	9.3	2.7	2.5	2.0	14.9
16	4.6	3.0	4.25	6.95	3.4	11.6	5.2	8.25	2.7	2.4	2.0	10.9
17	4.2	3.0	3.95	5.8	3.3	8.2	5.35	6.4	2.7	2.4	2.0	6.45
18	3.85	2.9	3.65	5.45	3.2	7.1	5.05	5.8	2.7	2.3	2.0	5.25
19	3.65	2.9	3.55	5.15	3.2	6.05	4.85	5.15	2.7	2.3	2.0	4.5
20	3.35	2.9	3.4	9.75	3.2	5.3	4.4	4.6	2.6	2.3	2.0	4.05
21	3.2	2.8	3.7	12.2	3.3	5.2	3.95	4.15	2.6	2.3	2.0	3.65
22	3.2	2.8	3.9	9.3	8.65	6.0	3.55	3.9	2.6	2.3	2.0	3.4
23	3.2	2.7	4.0	7.8	13.6	6.1	3.25	3.75	2.6	2.3	2.05	3.4
24	3.1	2.7	3.85	6.9	8.25	6.35	3.1	3.75	2.5	2.2	2.5	3.4
25	3.2	2.6	3.8	6.35	6.75	5.6	3.0	3.9	2.5	2.2	2.6	3.45
26	3.35	2.6	4.55	5.7	5.85	4.75	2.9	3.8	2.4	2.2	2.5	4.1
27	3.3	2.6	7.1	5.25	8.6	4.35	2.8	4.25	2.4	2.2	2.4	5.25
28	3.2	2.5	5.8	4.8	9.6	4.2	2.7	4.1	3.05	2.2	2.3	5.75
29	3.2	.....	5.25	4.45	8.35	4.2	2.7	3.8	3.2	2.2	2.3	15.05
30	3.1	.....	4.7	4.15	6.7	4.55	2.6	3.55	3.3	2.2	2.2	19.25
31	3.0	.....	4.1	.....	5.85	.....	2.6	3.55	.....	2.2	.....	10.3
1902.												
1	7.35	6.15	19.05	5.4	3.0	2.6	3.15	2.2	2.0	2.2	2.1	3.8
2	6.2	5.8	9.05	4.95	3.0	2.6	2.85	2.45	2.0	2.2	2.1	4.55
3	5.4	5.7	7.5	4.65	3.0	2.6	2.65	2.4	2.0	2.2	2.1	5.25
4	4.95	5.45	6.25	4.5	3.0	2.6	2.5	2.4	2.0	2.2	2.1	5.35
5	4.55	5.0	5.6	4.6	3.0	2.5	2.5	2.3	2.0	2.65	2.1	5.0
6	4.25	4.5	5.25	4.5	2.9	2.5	2.4	2.3	2.0	2.55	2.1	5.1
7	4.05	4.2	5.0	4.5	2.9	2.5	2.4	2.3	2.0	2.35	2.0	4.4
8	3.9	4.05	5.2	5.0	2.9	2.5	2.3	2.3	1.9	2.2	2.0	3.95
9	3.8	3.85	6.3	5.9	2.9	2.4	2.4	2.2	1.9	2.1	2.0	3.65
10	3.65	3.7	7.1	5.8	2.9	2.4	2.5	2.2	1.9	2.1	2.0	3.45
11	3.5	3.6	6.6	5.75	2.9	2.4	2.5	2.2	1.9	2.25	2.0	3.3
12	3.4	3.5	6.55	5.55	2.8	2.5	2.4	2.1	1.9	2.45	2.0	3.2
13	3.3	3.4	6.7	5.25	2.8	2.8	2.4	2.1	1.9	2.5	2.0	3.2
14	3.15	3.3	8.0	4.9	2.8	3.1	2.3	2.1	1.9	2.5	2.0	4.25
15	3.0	3.2	7.5	4.45	2.8	2.95	2.3	2.2	1.9	2.4	2.0	4.45
16	3.0	3.2	7.05	4.25	2.7	2.8	2.3	2.3	1.9	2.4	2.0	4.45
17	3.0	3.2	8.65	4.05	2.7	2.7	2.2	2.2	1.9	2.3	2.0	6.35
18	3.0	3.1	7.4	3.9	2.7	2.6	2.1	2.2	1.9	2.2	2.65	6.1
19	3.0	3.1	5.95	3.8	2.7	2.5	2.1	2.1	1.9	2.2	3.3	4.95
20	2.9	3.2	5.35	3.7	2.7	2.4	2.1	2.1	1.9	2.1	2.85	4.3
21	2.9	3.3	4.9	3.6	2.7	2.4	2.1	2.1	1.9	2.1	2.55	3.95
22	2.9	3.5	4.55	3.5	2.6	2.4	2.1	2.0	1.9	2.1	2.4	4.05
23	2.9	3.75	4.25	3.4	2.6	2.4	2.1	2.0	1.9	2.1	2.3	4.25
24	2.9	4.2	4.1	3.4	2.7	2.4	2.1	2.0	1.9	2.1	2.2	3.95
25	2.9	10.1	4.0	3.3	2.7	2.4	2.1	2.0	1.9	2.0	2.45	3.75
26	3.3	14.4	3.85	3.3	2.8	3.0	2.1	2.0	2.05	2.0	3.8	3.55
27	5.05	9.55	3.7	3.2	2.9	2.9	2.1	2.0	2.1	2.0	4.55	3.25
28	8.4	15.35	3.7	3.1	2.9	2.8	2.1	2.0	2.15	2.25	4.1	3.0
29	6.15	.....	5.6	3.1	2.8	2.8	2.1	2.0	2.3	2.3	3.5	3.25
30	5.7	.....	8.05	3.1	2.8	2.9	2.1	2.0	2.3	2.2	3.15	3.15
31	6.55	.....	6.2	.....	2.7	.....	2.2	2.0	.....	2.2	.....	3.0

Daily gage height, in feet, of James River at Buchanan, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
1	2.8	5.1	11.25	6.45	4.55	2.7	4.6	3.15	3.4	2.2	2.1	2.18
2	2.85	4.75	7.25	5.6	4.25	2.6	4.05	3.25	3.1	2.2	2.1	2.18
3	10.75	4.7	6.0	5.15	4.05	2.6	3.6	3.1	2.75	2.2	2.1	2.18
4	8.75	6.35	5.2	5.15	4.0	2.6	3.45	3.0	2.6	2.2	2.1	2.15
5	6.85	8.6	4.75	5.5	3.9	2.85	3.45	3.45	2.5	2.2	2.0	2.15
6	5.65	6.6	4.45	4.95	3.8	3.65	4.0	3.05	2.4	2.2	2.0	2.15
7	5.1	5.25	4.25	4.7	3.7	7.05	3.55	2.95	2.3	2.3	2.0	2.15
8	4.7	4.9	4.35	4.95	3.7	7.1	3.25	2.75	2.2	3.7	2.0	2.15
9	4.2	4.6	5.25	5.65	3.6	5.1	3.05	2.6	2.95	2.8	2.0	2.15
10	3.75	4.15	5.75	5.7	3.5	4.3	2.9	2.5	3.1	2.8	2.0	2.15
11	3.7	4.3	5.45	5.2	3.35	4.8	3.15	2.5	2.75	2.7	2.0	2.15
12	3.65	6.1	5.85	4.8	3.2	4.75	3.05	2.4	2.55	2.6	2.0	2.15
13	3.4	5.55	5.85	4.55	3.2	4.1	4.05	2.4	2.4	2.5	2.0	2.1
14	3.2	5.1	5.4	5.25	3.1	3.75	5.9	2.4	2.4	2.4	2.0	2.1
15	3.4	4.7	5.05	5.5	3.0	3.45	4.5	2.4	2.3	2.3	2.0	2.1
16	3.5	5.7	4.7	5.2	3.0	3.3	3.95	2.5	2.3	2.3	2.0	2.1
17	3.2	14.8	4.35	5.05	2.9	3.15	3.55	2.5	7.7	2.2	2.0	2.05
18	3.3	9.0	4.25	4.85	2.9	3.0	3.25	2.5	6.5	2.2	2.1	2.05
19	3.3	6.5	3.95	4.45	2.9	2.9	3.05	2.5	4.35	2.2	2.1	2.05
20	3.2	5.7	3.8	4.2	2.8	2.8	2.9	2.5	3.8	2.2	2.1	2.15
21	3.3	5.15	3.85	4.2	2.8	2.8	2.8	2.5	3.3	2.2	2.2	2.3
22	3.5	4.75	4.25	4.3	2.8	2.7	2.7	2.4	2.95	2.2	2.2	2.3
23	3.6	4.55	11.15	4.2	2.7	3.45	2.6	2.4	2.8	2.2	2.2	2.28
24	3.65	4.35	15.1	4.05	2.7	3.7	2.6	2.4	2.65	2.2	2.2	2.28
25	3.5	4.2	8.25	3.9	2.7	3.2	2.5	2.4	2.5	2.2	2.2	2.25
26	3.45	4.25	6.5	4.35	2.7	3.35	2.5	2.3	2.4	2.2	2.2	2.25
27	3.45	4.2	5.6	9.1	2.7	6.95	2.4	2.3	2.3	2.2	2.18	2.28
28	4.8	7.85	5.1	6.45	2.7	5.55	2.4	2.3	2.3	2.2	2.18	2.3
29	6.85	.....	4.75	5.4	2.7	5.6	2.4	2.2	2.3	2.1	2.18	2.32
30	6.6	.....	5.95	4.9	2.7	5.05	3.6	2.3	2.3	2.1	2.18	2.32
31	6.2	.....	8.05	.....	2.7	.....	3.35	2.4	.....	2.1	.....	2.35
1904.												
1	2.47	2.84	4.85	3.5	4.82	4.99	3.2	2.52	1.92	1.82	1.85	1.9
2	2.47	2.97	5.57	3.81	4.4	8.11	2.95	2.39	1.9	1.82	1.85	1.9
3	2.4	2.86	4.88	3.82	4.0	8.84	2.81	2.29	2.0	1.82	1.85	1.9
4	2.5	2.55	4.24	3.68	3.9	6.49	2.65	2.2	2.0	1.82	1.85	1.9
5	2.59	2.55	3.44	3.53	3.7	5.48	2.57	2.5	2.0	1.8	1.87	1.9
6	2.55	2.48	4.08	3.38	3.57	4.66	2.55	2.47	1.99	1.8	1.87	1.92
7	2.5	2.75	8.39	3.3	3.5	4.21	2.47	2.39	1.95	1.8	1.87	1.95
8	2.5	4.32	7.32	3.36	3.65	4.14	2.56	2.48	1.9	1.8	1.85	1.95
9	2.45	4.52	6.38	4.58	3.8	3.71	2.41	2.3	1.92	1.8	1.85	2.0
10	2.42	3.81	5.23	4.38	3.7	3.53	2.36	2.3	1.94	1.8	1.85	2.02
11	2.42	3.45	4.6	4.06	3.6	3.44	2.35	2.74	1.95	1.8	1.82	2.02
12	2.4	3.15	4.2	3.87	3.42	3.33	2.59	2.54	2.02	1.8	1.82	2.02
13	2.34	2.95	4.22	3.68	3.27	3.19	2.44	2.35	2.0	1.8	1.85	2.0
14	2.3	2.77	3.98	3.58	3.25	3.02	2.34	2.26	1.95	1.8	1.95	2.0
15	2.2	2.69	3.9	3.43	3.32	2.86	2.3	2.2	1.92	1.8	2.05	1.97
16	2.1	2.6	3.88	3.36	3.45	2.93	2.2	2.1	1.9	1.8	2.0	1.97
17	2.1	2.42	3.66	3.28	3.35	3.1	2.17	2.35	1.9	1.8	1.97	1.95
18	2.1	2.41	3.5	3.16	4.97	3.25	2.12	2.2	1.9	1.8	1.95	1.95
19	2.1	2.67	3.44	3.06	10.2	3.14	2.1	2.3	1.9	1.8	1.93	1.95
20	2.15	2.82	3.34	3.0	7.3	3.26	2.0	2.2	1.9	1.8	1.93	1.95
21	2.25	2.65	3.24	2.9	5.82	3.57	2.0	2.2	1.9	1.85	1.9	1.92
22	2.57	3.35	3.15	2.86	4.97	3.42	2.0	2.2	1.9	1.85	1.9	1.92

Daily gage height, in feet, of James River at Buchanan, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
23	5.3	6.05	3.44	2.81	4.5	3.11	2.14	2.2	1.87	1.85	1.97	1.92
24	4.9	4.8	4.68	2.76	4.15	2.86	2.29	2.1	1.87	1.85	1.95	1.9
25	3.85	4.45	4.35	2.73	4.15	2.72	2.32	2.07	1.87	1.85	1.93	2.02
26	3.47	3.52	4.15	3.04	4.21	2.64	2.32	2.05	1.87	1.85	1.93	2.22
27	3.22	3.68	4.07	6.51	4.45	2.59	2.3	2.0	1.85	1.85	1.93	2.39
28	2.82	3.46	3.86	8.18	4.42	2.84	2.31	2.0	1.85	1.85	1.93	2.46
29	2.52	3.73	3.69	6.41	3.89	3.52	2.3	1.95	1.85	1.85	1.9	2.52
30	2.51	.....	3.54	5.46	3.65	3.32	2.26	1.95	1.85	1.85	1.9	2.39
31	2.67	.....	3.4	.....	3.75	.....	2.18	1.92	.....	1.85	.....	2.32
1905.												
1	*a*2.19	2.17	3.60	3.36	2.45	3.64	2.81	3.04	2.14	1.88	2.10	2.05
2	2.17	2.09	4.38	3.25	2.45	3.34	2.85	2.84	2.47	1.91	2.06	2.05
3	2.17	2.02	4.59	3.09	2.42	3.13	3.05	2.71	3.55	1.98	2.02	3.06
4	2.14	1.98	4.32	3.05	2.38	2.84	2.88	2.91	3.33	1.95	2.00	5.90
5	2.14	1.98	5.10	3.05	2.38	2.70	3.22	2.64	3.02	1.95	2.00	4.35
6	2.28	2.01	5.00	3.41	2.44	2.67	3.22	2.87	2.70	1.92	2.00	3.86
7	2.69	2.06	4.76	4.42	2.58	2.58	5.00	2.80	2.48	1.90	2.00	3.18
8	2.81	2.08	5.48	4.08	2.74	2.52	5.08	2.70	2.33	1.88	2.00	2.86
9	2.55	2.08	6.01	3.91	2.86	2.47	4.48	2.64	2.27	1.88	2.00	2.75
10	2.43	2.10	11.22	3.71	2.80	2.38	3.83	2.58	2.24	1.85	2.00	2.65
11	2.39	2.14	8.49	3.56	2.78	2.34	3.48	2.55	2.22	2.09	2.00	2.55
12	2.64	2.24	6.66	3.51	7.62	2.33	5.03	2.55	2.20	2.21	2.00	2.44
13	4.57	2.34	5.83	3.38	9.25	2.30	14.82	2.55	2.21	2.19	2.00	2.40
14	5.11	2.52	5.32	3.28	6.54	2.28	11.39	2.55	2.22	2.14	2.00	2.40
15	3.73	2.67	4.90	3.20	6.49	2.26	8.45	2.78	2.19	2.10	2.00	2.32
16	3.17	2.46	4.56	3.03	8.28	2.23	6.17	3.13	2.13	2.05	2.00	2.36
17	2.83	2.31	4.30	3.49	7.20	2.23	5.19	3.00	2.10	2.05	2.00	2.39
18	2.97	2.28	4.36	2.93	5.95	2.38	4.45	2.95	2.10	2.04	2.00	2.32
19	2.85	2.26	4.30	2.88	5.05	2.41	4.03	2.88	2.10	2.02	2.00	2.30
20	2.71	2.27	4.26	2.79	4.48	2.47	3.70	2.77	2.08	2.02	2.00	2.51
21	2.61	2.30	4.32	2.75	4.02	3.02	3.52	2.66	2.05	2.08	2.00	6.26
22	2.51	2.69	6.30	2.64	3.75	3.79	3.76	2.49	2.02	2.08	2.00	6.91
23	2.49	3.20	5.38	2.60	3.54	3.59	4.78	2.31	2.00	2.05	2.00	5.55
24	2.44	3.63	4.64	2.60	3.36	4.44	4.55	2.30	1.95	2.05	2.00	4.91
25	2.44	3.66	4.29	2.60	3.16	6.23	3.99	2.30	1.92	2.05	2.00	4.51
26	2.39	3.82	4.14	2.52	3.06	4.98	3.60	2.77	1.92	2.08	2.00	4.08
27	2.39	4.06	4.00	2.52	3.31	3.90	3.32	2.57	1.92	2.14	2.00	3.78
28	2.34	3.79	3.96	2.55	3.43	3.58	3.18	2.43	1.90	2.30	2.00	3.60
29	2.31	.....	3.69	2.55	3.22	3.19	3.42	2.36	1.90	2.29	2.00	4.28
30	2.29	.....	3.60	2.50	3.24	3.00	3.45	2.26	1.88	2.22	2.02	4.16
31	2.24	.....	3.49	.....	3.72	.....	3.17	2.24	.....	2.14	.....	3.92

*a*Ice conditions during part of January, 1905.

Rating table for James River at Buchanan, Va., from August, 1895, to August 31, 1898.

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	260	2.60	1,150	4.00	3,215	5.80	7,110
1.30	295	2.70	1,260	4.10	3,405	6.00	7,600
1.40	335	2.80	1,375	4.20	3,600	6.20	8,100
1.50	380	2.90	1,495	4.30	3,800	6.40	8,620
1.60	425	3.00	1,620	4.40	4,000	6.60	9,140
1.70	475	3.10	1,750	4.50	4,200	6.80	9,680
1.80	530	3.20	1,890	4.60	4,400	7.00	10,220
1.90	585	3.30	2,035	4.70	4,610	7.20	10,780
2.00	645	3.40	2,185	4.80	4,820	7.40	11,340
2.10	710	3.50	2,340	4.90	5,040	7.60	11,920
2.20	785	3.60	2,505	5.00	5,260	7.80	12,520
2.30	865	3.70	2,675	5.20	5,700	8.00	13,140
2.40	955	3.80	2,850	5.40	6,160		
2.50	1,050	3.90	3,030	5.60	6,630		

The above table is strictly applicable only for open channel conditions. It is based upon 8 discharge measurements made during 1895 to 1898. It is not well defined. Above 8.0 feet this table is the same as the table for 1898 to 1905.

Rating table for James River at Buchanan, Va., from September 1, 1898, 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*
1.70	275	3.20	1,670	4.70	4,450	7.20	10,700
1.80	325	3.30	1,815	4.80	4,665	7.40	11,290
1.90	380	3.40	1,965	4.90	4,885	7.60	11,900
2.00	440	3.50	2,125	5.00	5,105	7.80	12,520
2.10	505	3.60	2,290	5.10	5,330	8.00	13,140
2.20	575	3.70	2,460	5.20	5,555	8.20	13,780
2.30	655	3.80	2,640	5.40	6,015	8.40	14,420
2.40	740	3.90	2,825	5.60	6,485	8.60	15,080
2.50	835	4.00	3,015	5.80	6,965	8.80	15,760
2.60	935	4.10	3,210	6.00	7,460	9.00	16,470
2.70	1,040	4.20	3,410	6.20	7,970	9.20	17,200
2.80	1,155	4.30	3,610	6.40	8,495	9.40	17,950
2.90	1,275	4.40	3,815	6.60	9,030	9.60	18,720
3.00	1,400	4.50	4,025	6.80	9,575	9.80	19,500
3.10	1,530	4.60	4,235	7.00	10,130	10.00	20,300

The above table is strictly applicable only for open channel conditions. It is based upon 16 discharge measurements made during 1901 to 1905. It is well defined between gage heights 1.8 feet and 4.5 feet. From 4.5 to 8.5 it is determined by two measurements made during 1901. Above gage height 8.5 feet it is determined by the product of the area and velocity curves but these are somewhat uncertain owing to the continual changes of the river bed at the gaging section. A rock control below the station causes the discharge measurements to plot on a fairly permanent curve.

Estimated monthly discharge of James River at Buchanan, Va.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1895.								
August 25 to 31..	530	475	506	.246	.064	.....	.....	.....
September.....	475	380	412	.200	.223	24	.91	.69
October.....	425	425	425	.207	.239	27	.88	.64
November.....	585	475	563	.274	.306	17	1.85	1.54
December 1 to 28.	5,260	530	1,189	.578	.602	.....	*a*3.76	.....
*b*1896.								
January 24 to 31..	7,600	1,050	2,874	1.40	.417	.....	*a*2.20	.....
February.....	10,920	1,050	3,422	1.66	1.79	44	4.06	2.27
March.....	22,950	1,050	4,712	2.29	2.64	50	5.26	2.62
April.....	16,650	260	2,332	1.13	1.26	80	1.57	.31
May.....	2,065	260	1,035	.503	.580	19	3.03	2.45
June.....	3,310	710	1,294	.629	.702	14	5.19	4.49
July.....	30,000	785	2,990	1.42	1.64	25	6.60	4.96
August.....	2,340	585	1,025	.498	.574	16	3.52	2.95
September.....	40,160	475	1,826	.887	.990	16	6.20	5.21
October.....	11,060	530	1,284	.624	.719	14	.51	—.20
November.....	17,200	530	2,527	1.23	1.37	26	5.20	3.83
December.....	8,620	785	1,810	.879	1.01	34	.30	—.71
The year.....	.....	.....	.....	.....	.....	.....	43.64	.....

*a*Precipitation for complete months December, 1895 and January, 1896.

*b*Estimates January 24 to July 9, 1896 liable to considerable error, owing to inaccuracy of the gage.

Estimated monthly discharge of James River at Buchanan, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1897.								
January	1,495	710	886	.431	.497	28	1.77	1.27
February	38,600	1,260	10,560	5.13	5.34	92	5.80	.46
March	12,830	2,185	4,821	2.34	2.70	80	3.39	.69
April	3,600	1,150	2,064	1.00	1.12	67	1.63	.53
May	22,120	1,100	4,730	2.30	2.65	50	5.30	2.65
June	1,750	710	1,018	.495	.552	17	3.34	2.79
July	2,110	710	1,049	.510	.588	16	3.74	3.15
August	955	530	621	.302	.348	16	2.21	1.86
September	585	335	425	.207	.231	22	1.06	.83
[a]October	502	295	394	.191	.220	92	2.39	2.17
[a]November	530	295	368	.179	.200	75	2.65	2.45
[a]December	1,558	475	1,052	.511	.589	16	3.70	3.11
The year	38,600	295	2,332	1.13	15.04	41	36.98	21.96
1898.								
[b]January	4,930	1,002	2,280	1.11	1.28	40	3.18	1.90
[b]February	2,035	865	1,226	.596	.621	72	.86	.24
March	14,750	955	2,745	1.33	1.53	40	3.79	2.26
April	10,500	1,620	4,235	2.06	2.30	78	2.94	.64
May	24,420	1,050	4,264	2.07	2.39	41	5.76	3.37
June	1,495	645	904	.439	.490	14	3.50	3.01
July	2,185	530	804	.391	.451	9	4.81	4.36
August	26,820	785	4,064	1.97	2.27	39	5.83	3.56
September	6,250	325	806	.392	.437	13	3.28	2.84
October	39,120	505	4,163	2.02	2.33	29	8.07	5.74
November	8,230	1,040	2,212	1.07	1.19	53	2.25	1.06
December	6,485	1,155	2,384	1.16	1.34	44	3.06	1.72
The year	39,120	325	2,507	1.22	16.63	35	47.33	30.70

[a]Estimates October 15 to December 31, 1897, liable to considerable error owing to inaccuracy of gage.
[b]Estimates January 1 to February 13, 1898, liable to error owing to inaccuracy of gage.

Estimated monthly discharge of James River at Buchanan, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1899.								
January	21,300	1,530	3,850	1.87	2.16	75	2.88	.72
February	21,100	1,400	7,291	3.54	3.69	76	4.86	1.17
March	66,290	3,015	10,130	4.92	5.67	102	5.56	—.11
*a*April	6,132	1,965	3,034	1.47	1.64	92	1.78	.14
*a*May	10,700	1,400	3,295	1.60	1.84	40	4.62	2.78
*a*June	2,640	655	1,181	.574	.640	18	3.46	2.82
*a*July	697	325	434	.211	.243	8	2.90	2.66
August	935	325	402	.195	.225	5	4.25	4.02
September	2,290	325	591	.287	.320	9	3.65	3.33
October	380	275	316	.154	.178	9	1.98	1.80
November	655	325	395	.192	.214	30	.71	.50
December	2,207	325	630	.306	.353	16	2.16	1.81
The year	66,290	275	2,629	1.28	17.17	44	38.81	21.64
1900.								
January	17,570	440	2,405	1.17	1.35	50	2.70	1.35
February	17,200	655	4,343	2.11	2.20	48	4.61	2.41
March	21,510	1,965	6,014	2.92	3.37	96	3.52	.15
April	6,132	1,155	2,682	1.30	1.45	61	2.37	.92
May	4,025	615	1,244	.604	.696	22	3.10	2.40
June	9,850	835	2,260	1.10	1.23	24	5.14	3.91
July	1,815	440	787	.382	.440	12	3.69	3.25
August	740	275	410	.199	.229	13	1.71	1.48
September	1,890	275	614	.298	.333	8	4.09	3.76
October	22,120	505	1,667	.810	.934	25	3.78	2.85
November	57,500	655	4,522	2.20	2.46	59	4.17	1.71
December	17,570	1,155	3,056	1.48	1.71	67	2.57	.86
The year	57,500	275	2,500	1.21	16.40	40	41.45	25.05

*a*Estimates April 1 to July 6, 1899, liable to considerable error owing to inaccuracy of gage.

Estimated monthly discharge of James River at Buchanan, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1901.								
January	19,700	835	2,860	1.39	1.60	64	2.51	.91
February	1,890	835	1,307	.635	.661	105	0.63	—.03
March	16,470	835	3,875	1.88	2.17	58	3.71	1.54
April	29,770	2,825	9,179	4.46	4.98	76	6.52	1.54
May	36,600	1,670	6,346	3.08	3.55	56	6.31	2.76
June	27,040	1,965	5,807	2.82	3.15	52	6.07	2.92
July	5,900	935	2,617	1.27	1.46	31	4.77	3.31
August	19,300	835	4,830	2.35	2.71	31	8.71	6.00
September	9,030	740	1,696	.824	.919	26	3.56	2.64
October	1,600	575	789	.383	.442	69	0.64	0.20
November	935	440	550	.267	.298	22	1.37	1.07
December	67,450	575	8,597	4.18	4.82	63	7.63	2.81
The year	67,450	440	4,038	1.96	26.76	51	52.43	25.67
1902.								
January	14,420	1,275	3,735	1.81	2.09	69	3.03	.94
February	45,690	1,530	7,212	3.50	3.64	69	5.26	1.62
March	66,290	2,460	9,685	4.71	5.43	172	3.16	—2.27
April	7,210	1,530	3,714	1.80	2.01	123	1.64	— .37
May	1,400	935	1,178	.572	.660	26	2.53	1.87
June	1,530	740	961	.467	.521	14	3.69	3.17
July	1,600	505	683	.332	.383	17	2.27	1.89
August	787	440	548	.266	.307	19	1.61	1.30
September	655	380	425	.207	.231	80	2.89	2.66
October	987	440	615	.299	.345	8	4.56	4.22
November	4,130	440	974	.473	.528	14	3.74	3.21
December	8,362	1,400	3,426	1.66	1.91	63	3.04	1.13
The year	66,290	380	2,762	1.46	18.06	48	37.42	19.36

Estimated monthly discharge of James River at Buchanan, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1903.								
January	23,370	1,155	4,488	2.18	2.51	55	4.56	2.05
February	42,760	3,310	7,667	3.73	3.88	72	5.41	1.53
March	44,340	2,640	8,442	4.10	4.73	84	5.66	.93
April	16,830	2,825	5,520	2.68	2.99	83	3.62	.63
May	4,130	1,040	1,767	.859	.990	79	1.25	.26
June	10,410	935	3,322	1.61	1.80	24	7.57	5.77
July	7,210	740	2,019	.981	1.13	38	3.00	1.87
August	2,045	575	958	.466	.537	15	3.47	2.93
September	12,210	575	1,759	.855	.954	33	2.93	1.98
October	2,460	505	715	.347	.400	21	1.95	1.55
November	575	440	498	.242	.270	23	1.16	0.89
December	697	472	570	.277	.319	23	1.36	1.04
The year	44,340	440	3,144	1.53	20.51	49	41.94	21.43
1904.								
January	5,785	505	1,186	.576	.664	28	2.34	1.68
February	7,587	749	1,994	.969	1.04	54	1.94	.90
March	14,390	1,600	3,923	1.91	2.20	92	2.39	.19
April	13,720	1,074	3,032	1.47	1.64	71	2.31	.67
May	21,100	1,742	3,904	1.90	2.19	57	3.81	1.62
June	15,900	925	3,232	1.57	1.75	32	5.40	3.65
July	1,670	440	742	.361	.416	11	3.96	3.54
August	1,086	392	627	.305	.352	15	2.33	1.98
September	453	352	391	.190	.212	14	1.50	1.29
October	353	325	336	.163	.188	41	.46	.27
November	472	336	382	.186	.208	19	1.07	.86
December	855	380	473	.230	.265	11	2.38	2.12
The year	21,100	325	1,685	.819	11.12	37	29.89	18.77

Estimated monthly discharge of James River at Buchanan, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1905.					
*a*January	5,352	533	1,154	.561	.647
February	3,132	428	1,012	.492	.512
March	25,370	2,109	5,488	2.67	3.08
April	3,857	835	1,619	.787	.878
May	17,380	723	3,898	1.89	2.18
June	8,048	599	1,720	.836	.933
July	42,860	1,167	5,393	2.62	3.02
August	1,572	607	1,006	.489	.564
September	2,207	369	671	.326	.364
October	655	352	475	.231	.266
November	505	440	444	.216	.241
December	9,878	472	2,641	1.28	1.48
The year	42,860	352	2,127	1.03	14.16

*a*Ice conditions during part of January, 1905. No correction made in estimates.

NORTH (OF JAMES) RIVER NEAR GLASGOW, VA.

This river rises on the western slope of the Shenandoah Mountains and flows in a southeasterly direction across the valley between the Shenandoah and Blue Ridge ranges, emptying into James River about 17 miles south of Lexington, Va. Its drainage basin is largely under cultivation except in the upper part, where it is mountainous and covered with forest growth.

The gaging station was established August 21, 1895, by C. C. Babb, assisted by D. C. Humphreys. It is located at the county bridge, three-fourths of a mile from the post-office at Glasgow, Va., and one mile above the mouth of North River. The original gage was of the wire type. On July 22, 1903, a vertical rod gage was placed in position. This consists of a 2 x 6 inch rod nailed to a 3 x 6 inch oak timber, which is sunk to a firm foundation and securely nailed and braced to an overhanging tree on the right bank below the bridge. This gage is established on the same datum as the original wire gage and was read from the bridge. On November 24, 1903, a standard chain gage was established on the lower side of

the bridge in the right span. Its datum is the same as that of the wire gage and rod gage which it replaces. The length of the chain from the marker to the end of the weight is 28.00 feet. Bench mark No. 1 is a standard copper plug set in the downstream end of the capstone of the right abutment. It is inclosed in a ring of white paint and is marked by the letters "B. M. U. S. G. S. Hydro." Its elevation is 23.89 feet above gage datum. Bench mark No. 2 is the upper surface of the upper chord over the pulley of the chain gage. Its elevation is 32.29 feet above gage datum. Discharge measurements are made from the lower side of the bridge to which the gage is attached. The initial point for soundings is the center of the end pin of the downstream truss on the left bank. Originally measurements were made from the sidewalk on the upstream side of the bridge. Beginning with 1902, measurements were made from the lower side of the bridge, owing to the removal of the sidewalk. The section of this side of the bridge is not as favorable for accurate measurements as that on the upper side, as it is obstructed by sunken logs and by the bridge piers. The channel is straight for 600 feet above and below the station and has a width of 240 feet, broken by two iron piers. Both banks are high, fringed with trees, and not liable to overflow except at very high water. The bed of the stream is rocky near the right bank, and is composed of rocks and mud near the left. The ten years' record at this station indicates a steady wearing away of the stream bed and increase in the slope, due to erosion at the controlling point below. The gage was read once each day by B. G. Baldwin. This station was discontinued December 31, 1905.

Discharge measurements of North (of James) River near Glasgow, Va.

Date.	Hydrographer.	Area of section.	Mean velocity	Gage height.	Discharge
1895.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet*
August 24	D. C. Humphreys	129	1.55	.93	201
1896.					
January 25	D. C. Humphreys	1,080	2.76	3.80	2,975
May 16	do	672	.75	1.88	504
May 23	do	631	.96	1.70	603
July 9	do	1,818	5.57	7.58	10,140
July 24	do	623	1.02	1.75	634
September 8	R. E. Hutton	566	.45	1.40	257
December 17	D. C. Humphreys	698	.69	1.80	480

NOTE.—Measurements 1895 to 1901, made from upper side of bridge.

Discharge measurements of North (of James) River near Glasgow, Va.—Con.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height	Discharge.
1897.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
May 29	D. C. Humphreys	705	.77	1.91	546
July 27	F. H. Anschutz	627	.50	1.25	310
August 14	D. C. Humphreys	557	.37	1.17	208
[a]October 14	do	92	2.42	1.30	223
1898.					
May 7	D. C. Humphreys	1,564	4.04	6.00	6,316
July 19	do	638	.68	1.60	436
December 23	do	1,095	2.63	3.68	2,869
1899.					
March 30	D. C. Humphreys	1,010	2.01	2.82	2,039
June 27	do	544	.42	.95	227
August 7	do	558	.39	.92	218
1900.					
March 29	D. C. Humphreys	841	1.47	2.18	1,234
June 26	do	652	.92	1.45	600
August 4	do	516	.48	.71	252
December 19	do	566	.70	1.08	398
1901.					
April 23	D. C. Humphreys	1,295	3.35	4.25	4,342
July 16	do	963	2.10	2.74	2,028
August 7	do	1,502	4.74	5.14	7,121
1902.					
June 26	D. C. Humphreys	795	1.14	1.90	907
July 10	do	593	0.34	0.83	201
August 20	do	504	0.26	0.61	132
1903.					
July 22	B. S. Drane	575	0.68	0.86	394
March 20	E. C. Murphy	804	1.39	1.88	1,118
September 19	Paul and Sawyer	727	1.86	2.00	1,355
November 25	W. C. Sawyer	432	0.63	0.64	274

[a]Measurement October 14, 1897, made at rapid above the bridge.

NOTE.—Measurements 1895 to 1901 made from upper side of bridge, and beginning 1902 made from lower side of bridge.

Discharge Measurements of North (of James) River near Glasgow, Va.—Con.

Date.	Hydrographer.	Area of section.	Mean velocity	Gage height.	Discharge.
1904.		*Sq feet.*	*Ft. per sec.*	*Feet.*	*Sec-feet.*
June 14	F. H. Brundage	648	0 81	1.13	523
September 19	R. H. Bolster	504	0.34	0.45	170
September 30	....do	512	0.35	0.49	179
October 19	....do	506	0.31	0.46	157
1905.					
March 21	A. H. Horton	828	1.61	1.96	1,329
May 23	N. C. Grover	657	1.28	1.36	844
July 20	....do	724	1.49	1.69	1,080

Daily gage height, in feet, of North (of James) River near Glasgow, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1895.												
1									.8	.81	1.05	1.0
2									.88	.8	.95	1.0
3									.88	.83	.98	1.02
4									.91	.77	.98	1.0
5									.91	.77	.95	1.0
6									.93	.77	.95	.96
7									.92	.78	.98	.94
8									.9	.8	1.03	.95
9									.92	.83	1.05	.95
10									.92	.87	1.05	.94
11									.9	.85	1.05	.95
12									.9	.83	1.05	.95
13									.9	.83	1.05	1.0
14										.83	1.05	.95
15									.9	.8	1.08	.9
16									.88	.85	1.05	.92
17										.86	1.05	.87
18										.87	1.03	.9
19										.88	1.0	.97
20										.85	1.0	.98
21								1.0	.7	.87	1.02	1.55
22								.95	.7	.84	1.0	2.15
23								.9	.72	.86	.98	1.85
24								.94	.82	.86	.95	1.65
25								.81	.83	.87	.95	
26									.88	.89	1.0	1.6
27								.91	.9	.88	1.07	2.0
28								.92	.83	.87	1.12	1.98
29								.96	.82	.9	1.07	1.75
30								.82	.82	.95	1.03	1.73
31								.87		.95		

Daily gage height, in feet, of North (of James) River near Glasgow, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1896.												
1	2.5	1.8	1.9	5.25	.....	1.4	1.5	1.55	1.42	5.03	1.59	4.13
2	2.05	1.5	1.8	.....	.....	1.33	1.36	3.35	1.38	3.7	1.6	3.42
3	1.85	3.5	1.8	3.0	.....	1.25	1.32	2.24	1.4	2.9	1.6	2.5
4	.....	2.8	1.76	.....	.....	1.3	1.5	1.9	1.46	2.7	1.6	2.5
5	1.33	.....	1.72	.....	2.33	1.28	1.6	1.76	1.35	2.6	4.75	.....
6	1.35	4.2	1.68	2.76	2.12	1.23	1.4	1.54	1.35	2.4	4.85	2.4
7	.....	4.15	1.63	2.6	1.97	1.23	3.22	1.62	1.38	2.3	3.35	2.3
8	1.37	4.35	1.62	2.4	1.86	1.24	.....	1.5	1.35	2.15	2.9	2.2
9	1.4	.....	1.62	2.37	1.84	2.2	8.45	1.44	1.33	2.08	2.65	2.15
10	1.3	3.85	1.6	.....	1.84	1.95	4.45	1.36	1.3	2.0	2.42	2.11
11	1.25	2.6	.....	.....	.....	1.6	3.5	1.32	1.28	1.96	2.3	2.01
12	1.22	2.5	1.66	.....	.....	1.42	.....	1.3	1.26	1.9	2.21	1.94
13	1.2	2.4	1.6	.....	3.4	1.35	2.78	1.5	.....	1.9	2.22	.....
14	1.2	4.4	1.58	2.02	2.5	1.96	2.4	.....	.....	1.88	2.11	1.9
15	1.18	4.0	1.6	.....	2.25	1.55	2.26	2.0	.....	1.82	2.02	1.9
16	1.15	3.05	2.85	1.94	1.82	1.5	2.2	1.72	.....	1.82	2.05	1.84
17	1.12	2.5	4.93	.....	.....	1.4	2.52	.....	1.0	1.8	2.01	1.8
18	1.12	2.25	3.65	1.9	.....	1.5	2.0	1.72	1.0	1.75	2.02	1.8
19	1.15	2.24	4.2	1.87	.....	1.62	1.82	1.6	1.0	1.71	2.0	1.78
20	1.19	2.14	5.25	.....	2.08	1.96	1.75	1.52	.98	1.7	2.01	1.75
21	1.17	2.05	4.0	.....	2.0	.....	1.72	1.48	.95	1.71	1.95	1.7
22	1.12	1.95	3.12	1.8	1.74	1.46	1.65	1.4	.95	1.68	.....	1.7
23	.....	1.9	.....	.....	1.82	2.08	2.25	2.37	.96	1.7	.....	1.65
24	4.95	1.86	2.9	1.77	1.61	1.47	1.83	1.54	.9	1.7	.....	1.6
25	3.76	1.8	2.8	.....	1.6	1.47	1.8	2.25	.9	1.63	1.67	1.58
26	2.88	1.75	2.77	1.75	1.61	2.26	1.67	1.82	.93	1.67	.....	1.56
27	2.42	1.7	2.61	.....	1.59	2.58	1.6	1.7	.91	1.6	.....	1.56
28	2.2	1.7	2.51	.....	1.63	2.0	1.5	1.6	.9	1.63	.....	1.6
29	2.0	1.9	3.05	.....	1.61	1.74	1.5	1.5	4.04	1.63	.....	1.6
30	1.9	.....	6.72	.....	1.56	1.61	1.6	.....	16.09	1.62	5.6	1.5
31	1.8	.....	5.41	.....	1.45	.....	1.9	1.42	.....	1.62	.....	1.55
1897.												
1	1.52	1.7	2.85	2.22	1.78	1.85	1.35	.....	1.17	1.08	1.4	1.4
2	1.51	1.74	2.68	2.21	5.8	1.78	2.65	1.2	1.14	1.05	1.65	1.42
3	.....	1.76	2.58	2.22	4.7	1.75	1.95	1.2	1.1	1.05	1.6	1.38
4	1.55	1.8	2.5	2.27	3.52	1.75	a1.88	1.14	1.1	1.02	1.5	1.41
5	1.6	1.92	2.46	2.38	3.05	1.85	1.8	1.52	1.08	1.02	1.41	1.6
6	1.75	4.7	2.4	2.58	2.76	.....	1.73	1.32	1.05	1.03	1.3	1.8
7	1.65	6.05	2.4	2.55	2.58	1.87	1.66	1.25	1.08	1.03	1.2	1.75
8	1.6	4.86	2.42	2.5	2.4	1.85	1.6	1.18	1.07	1.02	1.41	1.68
9	1.65	4.5	2.4	2.52	.....	1.8	1.52	1.18	1.05	1.02	1.25	1.6
10	1.65	3.62	2.48	2.62	2.2	1.75	1.45	1.15	1.0	1.0	1.23	1.52
11	1.6	3.51	2.48	.....	2.2	1.7	1.38	1.18	1.0	1.1	1.2	1.5
12	1.6	3.32	2.58	2.52	2.22	1.63	1.3	1.15	.....	1.2	1.18	1.45
13	1.58	4.4	3.0	2.38	4.7	.....	1.25	1.12	1.05	1.18	1.18	1.45
14	1.58	4.05	.....	2.3	7.3	1.65	1.2	1.17	1.1	1.15	1.18	1.56
15	1.55	3.81	4.26	2.27	4.42	1.72	1.2	.....	1.08	1.2	1.2	2.62
16	1.52	4.0	3.7	2.25	.....	1.66	1.18	1.2	1.1	1.18	1.18	2.65
17	1.53	3.9	3.27	2.14	3.2	1.67	1.12	1.2	1.08	1.2	1.2	2.15
18	1.55	3.5	3.33	2.08	2.93	1.66	1.4	1.16	1.1	1.18	1.15	2.0
19	1.55	3.4	.....	2.0	2.77	1.65	1.3	1.1	1.1	1.2	1.21	1.85
20	1.52	3.4	3.72	2.0	2.56	.....	1.3	1.1	1.05	1.2	1.15	1.7
21	1.7	.....	3.46	1.9	2.5	1.9	1.35	1.08	1.08	1.2	1.16	1.65
22	1.9	5.1	3.2	1.88	2.35	1.7	1.7	.....	1.1	1.25	1.15	1.8

a Interpolated July 4, to 14, 1897.

Daily gage height, in feet, of North (of James) River near Glasgow, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1897.												
23	2.02	7.72	3.0	1.88	.....	1.62	.....	1.14	1.1	1.2	1.15	1.75
24	1.98	5.35	3.0	1.87	2.23	1.6	.....	1.4	1.12	1.18	1.2	1.7
25	1.9	4.75	2.9	1.86	2.2	1.6	.....	1.3	1.11	1.2	1.12	1.68
26	1.85	3.36	2.7	1.86	2.1	1.5	1.25	1.3	1.1	1.2	1.15	1.75
27	1.75	3.15	2.6	1.8	2.02	1.45	1.25	1.42	1.1	1.18	1.2	1.8
28	1.7	2.95	2.54	1.75	2.0	1.4	1.26	1.27	1.09	1.22	1.2	1.8
29	1.6	.....	2.42	1.75	1.95	1.4	1.23	.....	1.1	1.15	1.4	1.75
30	1.6	.....	2.31	1.75	.....	1.38	1.23	1.2	1.1	1.25	1.42	1.68
31	1.65	.....	2.3	.....	1.9	.....	1.24	1.18	.....	1.28	.....	1.6
1898.												
1	1.28	2.0	1.55	3.09	2.0	2.0	1.45	1.3	1.28	1.19	2.8	1.86
2	1.3	1.6	1.55	3.04	1.9	1.9	1.45	1.3	1.25	1.2	2.6	1.75
3	1.32	1.75	1.55	2.92	1.88	1.8	1.46	1.28	1.2	1.21	2.5	1.72
4	1.5	1.7	1.65	2.75	1.88	1.76	1.45	1.74	1.45	1.3	2.3	1.82
5	1.5	1.7	1.75	2.7	1.89	1.68	1.45	6.25	1.7	1.8	2.2	4.3
6	1.45	1.7	1.75	2.68	5.9	1.65	1.5	3.6	1.48	2.4	2.05	3.5
7	1.52	1.65	1.8	2.55	5.88	1.62	1.4	2.88	1.25	2.0	2.02	2.9
8	1.6	1.6	1.8	2.45	4.5	1.58	1.4	2.76	1.15	1.8	1.9	2.5
9	1.5	1.5	1.82	2.4	3.9	1.6	1.4	2.55	1.14	1.65	1.8	2.3
10	1.85	1.5	1.81	2.35	3.8	1.62	1.35	5.75	1.11	1.52	1.82	2.1
11	2.15	1.5	1.8	2.35	3.3	1.62	1.32	8.95	1.08	1.48	1.85	2.15
12	1.65	1.45	1.81	2.35	3.1	1.63	1.32	4.45	1.04	1.6	1.88	2.2
13	1.5	1.55	1.83	2.35	2.77	1.8	1.33	3.4	1.0	1.5	1.85	1.93
14	1.4	1.45	1.85	2.75	2.6	1.92	1.35	3.0	1.0	1.4	1.82	1.7
15	1.55	1.5	1.89	4.48	2.48	1.95	1.35	2.8	1.05	1.4	1.84	1.62
16	3.6	1.3	1.82	4.1	2.38	2.0	1.35	2.4	1.0	1.4	1.86	1.62
17	2.9	1.2	1.86	3.75	2.32	2.05	1.35	2.25	1.0	1.4	1.88	1.72
18	2.52	1.35	1.95	3.15	2.21	2.05	3.0	2.15	1.02	1.38	1.9	1.7
19	2.3	1.5	2.0	3.0	2.1	2.4	2.5	2.0	1.0	5.8	2.4	1.65
20	2.15	1.5	1.95	2.85	2.01	2.55	2.15	1.9	.95	3.65	3.2	1.75
21	2.45	1.7	1.8	2.65	2.27	2.25	1.9	1.7	.98	3.0	2.8	1.7
22	1.4	1.8	1.75	2.32	2.55	2.0	1.7	1.64	1.0	10.75	2.52	1.68
23	1.45	1.9	1.75	2.3	2.85	1.9	2.52	1.52	3.0	5.6	2.5	3.05
24	1.42	1.75	2.14	2.25	2.77	1.8	1.9	1.7	1.9	3.9	4.41	3.4
25	2.0	1.75	2.85	2.28	3.1	1.7	1.9	1.5	1.48	3.6	2.3	2.8
26	2.5	1.7	2.8	2.25	2.7	1.65	1.9	1.48	1.3	2.95	2.18	2.6
27	2.5	1.65	2.58	2.25	2.9	1.6	1.9	1.45	1.25	2.15	2.1	2.42
28	2.45	1.55	2.5	2.12	2.55	1.6	2.0	1.42	1.2	2.5	2.0	2.3
29	2.2	.....	2.08	2.1	2.32	1.58	2.0	1.38	1.2	2.6	1.9	2.12
30	2.2	.....	4.85	2.05	2.25	1.5	1.8	1.3	1.2	2.8	1.92	2.02
31	2.1	.....	4.5	.....	2.1	.....	1.6	1.3	.....	2.9	.....	2.0
1899.												
1	2.05	1.8	.....	2.6	1.42	1.38	.9	.72	.85	.95	2.5	.73
2	2.1	1.72	.....	2.43	1.42	1.48	.8	.72	.82	.9	1.5	.75
3	2.0	1.8	.....	2.35	1.43	1.4	.82	.73	.82	.85	1.35	.78
4	2.3	2.3	.....	2.2	1.42	1.3	.8	.75	.82	.85	1.25	.76
5	2.52	a2.8	13.05	2.15	1.42	1.25	.8	.75	.8	.85	1.2	.76
6	4.01	3.3	.....	2.1	1.48	1.21	.78	.75	.71	.85	1.1	.78
7	7.0	3.15	.....	2.1	1.52	1.15	.8	.9	.71	.84	1.05	.75
8	a5.38	2.8	.....	2.8	1.62	1.12	.8	.8	.7	.87	1.0	.78
9	3.75	2.3	.....	2.55	3.75	1.1	.8	.73	1.1	.98	.95	.78
10	3.3	2.3	.....	2.42	2.85	1.1	.95	.73	1.0	.9	.93	.75

*a*Interporated.

Daily gage height, in feet, of North (of James) River near Glasgow, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1899.												
11	2.95	2.28	.....	2.35	2.45	1.08	.88	.72	.9	.85	.92	.73
12	2.6	*a*2.27	.....	2.3	1.85	1.3	.8	.72	1.0	.82	.92	1.25
13	2.45	2.26	.....	2.22	2.3	1.4	.8	.73	.95	.8	.92	2.1
14	2.45	2.25	.....	2.12	2.25	1.3	.8	.77	.9	.75	.84	1.85
15	2.38	2.25	.....	2.1	2.15	1.2	.8	1.92	.8	.7	.8	1.5
16	2.35	2.26	.....	2.0	2.0	1.2	.8	1.1	.75	.65	.8	1.42
17	2.28	2.3	.....	1.94	1.9	1.18	.8	.88	.73	.68	.83	1.25
18	2.25	2.45	.....	1.9	1.8	1.1	.8	.8	.72	.68	.8	1.12
19	2.2	2.75	.....	1.82	1.8	1.02	.75	.72	.72	.7	.65	1.12
20	2.1	3.3	.....	1.8	1.62	1.0	.72	.72	2.62	.7	.8	1.08
21	2.05	4.8	.....	1.77	1.58	.95	.72	.72	1.32	.72	.79	1.05
22	2.02	6.85	.....	1.72	1.55	.92	.72	.7	1.22	.7	.78	1.0
23	2.0	5.45	.....	1.68	1.52	.9	.7	.7	1.15	.73	.78	1.1
24	1.9	5.35	.....	1.65	1.46	.9	.7	.63	1.0	.73	.74	1.12
25	2.0	5.15	.....	1.62	1.38	.95	.71	.62	1.0	.72	.74	1.2
26	2.05	.....	.....	1.65	1.3	1.0	.72	.62	.98	.72	.72	1.3
27	2.0	6.15	.....	1.62	1.28	.95	.75	*a*1.0	1.1	.72	.7	1.1
28	2.0	.....	.....	1.6	1.25	.95	.75	1.62	1.08	.72	.65	1.15
29	1.95	.....	.....	1.53	1.22	1.0	.74	1.35	1.0	.71	.7	1.2
30	1.9	.....	2.9	1.48	1.48	.97	.72	1.02	.98	.7	.75	1.21
31	1.85	.....	2.72	.....	1.46	.....	.72	.92	.....	.85	.....	1.0
1900.												
1	.98	1.2	6.35	2.04	1.4	1.3	1.25	.78	.41	.95	.9	1.6
2	.92	1.05	4.1	1.98	1.4	1.3	1.15	.75	.4	.6	.85	1.55
3	.92	1.2	3.75	1.87	1.4	1.4	1.12	.7	.4	.55	.9	1.48
4	.95	1.25	3.25	1.82	1.35	1.3	1.1	.68	.41	.53	.95	*a*2.89
5	.92	1.4	2.9	1.72	1.32	1.1	1.1	.6	.4	.5	.92	4.3
6	.9	1.4	2.65	1.65	1.3	1.0	1.05	.55	.4	.5	.9	3.85
7	.9	1.3	2.5	1.6	1.22	1.0	1.0	.52	.4	.5	.86	3.45
8	.89	2.2	2.3	1.52	1.2	1.0	.96	.51	.38	.5	.85	3.1
9	.9	2.0	2.28	1.5	1.2	1.0	.9	.51	.34	.5	.86	2.0
10	.9	1.9	2.5	1.45	1.2	1.0	.88	.5	.3	.5	.85	1.7
11	.98	1.78	2.1	1.45	1.15	.96	.85	.5	.3	.5	.85	1.58
12	1.45	1.62	2.06	1.42	1.1	1.0	.8	.5	.3	.5	.82	1.5
13	1.75	5.5	1.95	1.4	1.1	2.0	.75	.5	.4	.5	.8	1.4
14	1.52	4.45	1.75	1.35	1.1	1.45	.75	.5	.4	.48	.8	1.32
15	1.45	3.25	1.65	1.32	1.0	1.4	.72	.5	.5	.48	.78	1.28
16	1.35	2.85	1.85	1.28	1.0	4.4	.7	.5	2.4	.45	.8	1.2
17	1.35	2.4	2.03	1.25	1.0	4.0	.7	.5	1.1	.43	.78	1.1
18	1.36	*a*2.2	1.9	1.3	.95	4.2	.72	.5	.6	.4	.8	1.08
19	2.5	2.0	1.9	2.6	2.52	3.3	.7	.48	.5	.48	.72	1.05
20	6.02	1.92	4.45	2.52	1.48	2.6	.75	.48	.4	.46	.7	1.02
21	4.35	1.95	5.6	*a*2.0	1.45	2.3	.95	.5	.45	.45	.75	1.0
22	3.21	6.4	3.85	1.45	1.35	1.95	1.3	.5	.52	.46	.75	1.0
23	2.75	4.8	3.1	3.0	1.25	1.75	1.5	.48	.64	1.15	.76	1.0
24	2.15	3.45	2.82	2.65	1.28	1.5	1.1	.48	.6	3.6	.76	1.0
25	1.95	2.95	2.72	2.35	2.5	1.45	.85	.5	.6	2.55	.78	.98
26	1.76	2.8	2.5	2.15	2.0	1.4	1.15	.5	.6	1.45	6.35	.98
27	1.6	2.6	2.5	2.15	1.65	1.35	1.3	.52	.6	1.2	4.1	.95
28	1.5	2.35	2.38	2.1	1.5	1.25	1.05	.5	.52	1.15	2.9	.95
29	1.55	.....	2.28	2.0	1.52	1.22	.95	.5	.5	1.0	2.25	.93
30	1.35	.....	2.2	1.75	1.4	1.18	.88	.48	1.25	.95	1.84	.93
31	1.45	.....	2.12	.....	1.3	.....	.88	.45	.....	.9	.....	.9

*a*Interporated.

Daily gage height, in feet, of North (of James) River near Glasgow, Va., for 1898.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901.												
1	.93	1.1	.81	1.68	2.0	2.25	2.4	1.05	3.35	1.75	.83	.8
2	.9	1.12	.8	1.6	1.9	2.15	2.0	1.0	2.65	1.6	.82	.78
3	.88	1.1	.8	5.8	1.8	2.1	2.0	1.02	2.3	1.48	.8	.82
4	.85	1.08	.8	3.9	1.7	2.0	2.05	1.0	2.0	1.4	.8	1.6
5	.83	1.06	.9	3.55	1.6	1.9	1.9	.95	1.65	1.35	.82	1.5
6	.8	1.05	.9	3.2	1.55	1.55	1.8	5.5	1.62	1.3	.8	1.4
7	.8	1.08	.8	2.9	1.5	2.45	1.75	5.5	1.5	1.25	.78	1.15
8	.8	1.08	.8	2.85	1.5	2.65	1.6	3.05	1.42	1.2	.8	1.0
9	.8	1.05	.8	2.5	1.65	2.25	1.5	2.35	1.35	1.18	.8	1.0
10	1.8	1.05	1.0	2.25	1.75	2.1	1.35	1.9	1.25	1.15	.75	1.35
11	1.8	1.04	5.5	2.0	3.5	1.85	1.3	1.55	1.25	1.1	.7	1.75
12	a2.75	.98	5.4	1.9	2.35	2.05	1.25	1.7	1.25	1.05	.72	1.55
13	3.7	.96	3.9	1.8	2.15	1.75	1.25	2.5	1.2	1.05	.76	1.4
14	2.9	.95	3.5	2.6	1.95	2.25	1.68	2.65	1.2	1.0	.78	a6.35
15	2.35	.94	3.1	5.5	1.9	4.25	2.45	4.1	1.2	1.0	.8	11.3
16	2.15	.92	2.75	4.6	1.85	8.9	2.6	4.0	1.3	.95	.78	5.3
17	1.96	.91	2.5	3.75	1.8	4.9	2.8	3.35	1.3	.9	.78	3.3
18	1.62	.92	2.4	3.25	1.76	4.0	2.25	3.35	1.25	.9	.8	2.3
19	1.55	.92	2.3	3.25	1.6	3.4	1.8	2.9	1.25	.88	.75	2.3
20	1.5	.9	2.16	4.6	1.6	3.85	1.8	2.55	1.22	.85	.73	2.1
21	1.45	.9	3.0	8.0	1.52	2.6	1.75	2.15	1.2	.82	.75	1.7
22	1.4	.88	2.6	5.75	2.3	2.6	1.65	1.98	1.2	.8	.73	1.7
23	1.3	.85	2.2	4.4	8.0	2.4	1.48	1.75	1.3	.82	.73	1.7
24	1.25	.8	2.0	3.35	4.6	2.35	1.4	1.75	1.25	.82	1.2	1.65
25	1.22	.8	1.9	2.32	4.1	2.0	1.3	1.8	1.2	.85	1.1	1.6
26	1.2	.8	1.83	2.22	a4.26	1.85	1.25	1.9	1.18	.88	1.0	1.7
27	1.18	.8	4.5	2.2	4.42	2.7	1.2	2.15	1.28	.85	.9	3.6
28	1.15	.8	3.2	2.2	3.15	2.4	1.15	2.3	1.5	.82	.85	2.6
29	1.12	.....	2.5	2.18	2.95	2.1	1.1	1.9	1.9	.83	.8	13.8
30	1.1	.....	2.0	2.1	2.6	2.6	1.08	1.8	1.85	.85	.8	7.4
31	1.1	.....	1.8	.....	2.5	.....	1.1	1.8	.....	.85	.....	5.8
1902.												
1	5.2	3.0	9.0	2.85	1.4	1.0	1.3	1.05	.5	0.65	0.6	1.9
2	4.6	2.7	4.85	2.55	1.35	1.0	1.15	b1.0	.51	.6	.55	2.2
3	3.3	2.7	4.15	2.2	1.5	.98	.95	1.0	.5	a.6	.7	2.4
4	2.65	2.6	3.6	2.1	1.5	.98	.85	.95	.51	a.65	.7	2.8
5	2.55	2.45	3.45	2.0	1.48	.95	.82	.95	.51	1.12	.65	2.75
6	2.45	2.25	3.0	2.0	1.48	.95	.8	.9	.5	1.35	.55	2.15
7	2.2	2.15	2.8	2.5	1.45	.9	.8	.9	.5	.95	.6	1.9
8	2.1	2.0	2.8	2.85	1.45	.9	.8	.85	.5	.75	.7	1.85
9	2.0	1.85	3.85	3.75	1.5	.9	.8	.85	.52	.7	.72	1.8
10	1.9	1.65	4.9	3.85	1.4	.9	.78	.8	.5	.7	.72	1.6
11	1.82	1.6	4.0	3.5	1.35	.9	.75	.8	.5	.7	.7	1.5
12	1.7	1.58	3.6	3.3	1.3	1.0	.75	.75	.5	1.4	.7	1.5
13	1.65	1.52	4.0	3.8	1.28	2.25	.72	.75	.5	1.2	.65	1.6
14	1.6	1.5	3.5	3.0	1.25	1.3	.7	.7	.5	1.0	.65	1.6
15	1.55	1.5	3.15	2.35	1.25	1.15	.68	.7	.51	.9	.65	2.0
16	1.52	1.45	3.0	2.25	1.2	1.12	.65	.7	.5	.85	.7	2.6
17	1.5	1.42	3.5	2.2	1.15	1.1	.65	.7	.5	.8	1.1	4.3
18	1.45	1.5	3.0	2.1	1.12	1.05	.62	.7	.5	.75	1.0	3.1
19	1.42	1.45	2.65	2.0	1.1	1.0	.62	.7	.5	.72	.95	2.6

*a*Interpolated.
*b*Interpolated August 2 to 19, 1902 inclusive.

Daily gage height, in feet, of North (of James) River near Glasgow, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1902.												
20	1.4	1.4	2.45	1.9	1.25	1.0	.6	.61	.5	.7	.9	2.2
21	1.45	2.3	2.4	1.8	1.15	.95	.6	.55	.5	.62	.85	2.0
22	1.5	2.1	2.35	1.75	1.1	.95	.58	.5	.52	.58	.8	2.0
23	1.45	1.49	2.3	1.7	1.1	.92	.58	.5	.55	.65	.8	1.85
24	1.48	2.5	2.25	1.65	1.1	.92	.55	.51	.5	.58	.8	1.75
25	1.42	10.2	2.2	1.6	1.1	1.9	.58	.5	.56	.55	.8	1.6
26	2.6	7.5	2.1	1.55	1.15	1.15	.6	.52	.6	.52	1.8	1.6
27	3.9	5.6	2.0	1.5	1.1	1.15	.6	.52	.6	.62	2.2	1.5
28	4.1	8.6	1.9	1.48	1.08	1.1	.6	.51	.6	.72	1.8	1.45
29	3.5	.....	1.85	1.45	1.08	1.1	.62	.5	.57	.75	1.9	1.4
30	3.25	.....	2.15	1.4	1.05	1.1	.7	.5	.56	.8	2.1	1.4
31	3.0	.....	3.3	.....	1.05	.....	1.18	.51	.....	.79	.....	1.3
1903.												
1	1.3	2.65	3.85	3.5	1.8	1.02	2.4	1.1	2.0	.75	.7	.6
2	1.3	2.5	3.45	2.09	1.75	1.0	1.9	1.0	1.5	.75	.7	.6
3	7.25	2.3	3.15	2.08	1.7	1.0	1.4	.9	1.4	.75	.7	.6
4	4.2	3.55	2.75	3.04	1.65	.98	1.4	.9	1.1	.78	.7	.6
5	3.35	4.8	2.65	3.0	1.58	1.1	.....	.85	1.05	.75	.9	.6
6	3.2	3.3	2.45	2.75	1.5	2.5	2.7	.9	1.0	.75	.85	.6
7	2.3	2.9	2.35	2.5	1.45	4.1	2.0	.85	1.0	.72	.8	.65
8	2.12	2.55	2.35	2.5	1.4	4.0	1.5	.8	.9	1.75	.75	.6
9	2.08	2.4	3.3	3.2	1.38	3.0	1.4	.75	.85	1.72	.75	.6
10	1.9	2.2	3.3	2.9	1.35	2.2	1.22	.75	.8	1.5	.72	.6
11	1.85	2.1	3.0	2.65	1.32	2.45	1.5	.72	.75	1.1	.72	.6
12	1.7	3.3	3.3	2.55	1.25	2.3	1.45	.7	.7	.9	.72	.6
13	1.68	3.0	3.1	2.65	1.2	2.0	1.4	.7	.7	.85	.72	.62
14	1.65	2.65	2.75	3.65	1.18	1.9	2.0	.68	.65	.8	.72	.7
15	1.6	2.5	2.65	3.5	1.16	1.75	1.72	.65	.6	.78	.72	.7
16	1.55	3.5	2.5	3.25	1.15	1.62	1.5	.8	.6	.75	.72	.65
17	1.5	10.0	2.3	3.0	1.15	1.55	1.35	.95	5.0	.75	.72	.65
18	1.45	4.5	2.2	2.75	1.12	1.2	1.25	.85	3.5	1.0	.8	.65
19	1.4	3.5	2.1	2.5	1.1	1.18	1.2	.8	2.35	.88	.75	.65
20	1.42	3.05	2.0	2.42	1.08	1.15	1.15	.75	1.65	.8	.75	.65
21	2.1	2.8	2.5	2.4	1.06	1.12	1.1	.7	1.5	.8	.72	1.5
22	2.4	2.6	3.6	2.35	1.05	1.1	1.05	.65	1.25	.8	.7	1.0
23	2.2	2.45	4.7	2.1	1.02	1.3	.9	.6	1.1	.8	.7	.95
24	2.0	2.4	6.4	2.05	1.02	1.12	.85	.6	1.0	.8	.8	.9
25	1.95	2.35	4.25	2.0	1.0	1.1	.85	.58	.95	.8	.6	.9
26	1.95	2.3	3.3	2.1	1.2	1.1	.8	.55	.9	.8	.6	.9
27	1.9	2.2	3.0	2.3	1.12	2.12	.8	.55	.85	.75	.6	.85
28	4.8	5.65	3.32	2.15	1.1	.....	.75	.5	.8	.72	.6	.85
29	4.0	.....	2.0	2.0	1.05	3.7	.7	.5	.8	.7	.55	.85
30	3.5	.....	3.2	1.9	1.03	3.2	.75	2.5	.78	.7	.6	.85
31	3.0	.....	4.2	.....	1.02	.....	.9	1.5	.....	.7	.....	.9
1904.												
1	.9	1.15	1.85	1.55	1.95	2.95	1.0	.7	.4	.5	.4	.6
2	.9	1.1	2.05	1.55	1.7	2.75	1.0	.65	.45	.5	.4	.6
3	.9	1.1	1.95	1.45	1.45	3.45	1.85	.7	.5	.35	.4	.6
4	1.2	.9	1.75	1.45	1.35	2.95	1.8	.9	.5	.45	.4	.6
5	1.0	1.0	1.65	1.4	1.3	2.45	1.05	.85	.5	.45	.4	.6
6	.9	1.0	1.65	1.4	1.3	1.95	.9	2.0	.5	.45	.45	.6
7	.85	1.2	1.95	1.35	1.25	1.75	.85	1.15	.5	.45	.5	.7

Daily gage height, in feet, of North (of James) River near Glasgow, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
8	.8	2.6	4.9	1.35	1.8	1.7	.8	.95	.5	.45	.5	.7
9	.75	2.0	3.1	1.95	1.85	1.6	.8	.9	.5	.45	.5	.65
10	.7	1.75	2.55	1.95	1.95	1.45	.85	.9	.5	.4	.5	.6
11	.7	1.65	2.2	1.75	1.85	1.4	1.85	1.9	.5	.45	.5	.6
12	.65	1.6	2.05	1.65	1.75	1.35	1.0	1.15	.5	.45	.5	.6
13	.68	1.5	1.95	1.55	1.7	1.3	.9	1.0	.5	.45	.6	.6
14	.7	1.25	1.85	1.45	1.6	1.15	.85	.95	.5	.45	.7	.55
15	.95	1.25	1.75	1.35	1.55	1.15	.8	.9	.8	.45	.6	.5
16	.85	1.3	1.65	1.25	1.55	1.15	.7	.8	.65	.45	.6	.5
17	.5	1.3	1.55	1.2	1.45	1.45	.65	.7	.55	.4	.5	.5
18	.65	1.5	1.5	1.15	1.45	1.35	.65	.7	.5	.45	.5	.45
19	.6	1.75	1.45	1.15	4.9	1.3	.7	.75	.45	.45	.55	.4
20	.6	5.3	1.35	1.15	3.3	1.15	.65	.7	.4	.45	.55	.5
21	1.65	6.0	1.35	1.05	2.4	1.05	.65	.7	.4	.45	.6	.5
22	.9	7.5	1.35	1.0	2.1	2.05	.7	.75	.4	.45	.5	.5
23	3.8	7.2	1.35	.95	1.9	1.45	.8	.85	.4	.45	.5	.5
24	2.6	6.4	1.75	.95	1.8	1.05	.8	.75	.4	.4	.5	.5
25	2.1	1.95	1.7	.95	1.7	1.0	.9	.7	.4	.45	.5	.6
26	1.85	1.7	1.55	.95	1.7	1.0	.85	.7	.4	.45	.5	.6
27	1.65	1.55	1.6	2.15	1.6	1.0	.9	.6	.35	.45	.5	.8
28	1.58	1.55	1.6	3.5	1.55	1.35	.8	.55	.35	.45	.5	.9
29	1.5	1.35	1.45	2.9	1.45	1.15	.75	.5	.45	.45	.45	.8
30	1.5	.....	1.6	2.3	1.35	1.05	.75	.5	.4	.45	.6	.75
31	1.25	.....	1.55	.....	1.3	.....	.7	.5	.....	.4	.....	.6
1905.												
1	.6	.85	1.6	1.4	.85	1.1	1.4	1.0	.7	.35	.5	.5
2	.6	.9	2.25	1.35	.85	1.0	1.25	1.0	.9	.4	.5	.5
3	.6	.8	2.45	1.3	.85	1.0	1.2	.95	.85	.4	.5	1.2
4	.7	.8	2.1	1.3	.8	.95	1.1	.9	.8	.4	.5	2.0
5	.7	.7	2.55	1.3	.8	.9	1.2	.9	.8	.4	.5	1.65
6	.9	.65	2.3	1.4	.8	.85	1.2	.9	.75	.4	.5	1.5
7	1.7	.6	2.05	1.5	.8	.8	2.6	.9	.7	.4	.5	1.1
8	1.5	.7	2.25	1.25	.8	.8	2.5	.9	.7	.4	.5	1.0
9	1.1	.75	2.8	1.2	.75	.75	2.4	.9	.65	.4	.5	.9
10	.9	.75	5.4	1.1	.75	.7	2.0	.85	.65	.4	.5	.8
11	.9	.75	3.9	1.05	.75	.7	2.1	.8	.7	.45	.5	.75
12	1.2	.75	3.0	1.05	4.6	.7	5.2	.75	.6	.5	.5	.75
13	3.2	.75	2.8	1.1	3.6	.7	7.8	.75	.6	.5	.5	.7
14	2.5	1.8	2.4	1.0	2.5	.65	4.8	.7	.6	.5	.5	.7
15	2.0	1.0	2.15	.95	2.4	.65	3.6	.75	.6	.5	.5	.7
16	1.75	.9	2.1	1.0	2.25	.6	2.75	.8	.5	.5	.5	.7
17	1.5	.85	2.0	.95	2.0	.6	2.75	.9	.6	.5	.5	.7
18	1.3	1.25	1.8	1.0	1.9	.6	2.5	.9	.5	.5	.5	.7
19	1.2	1.0	1.75	1.0	1.85	.65	1.85	.9	.5	.5	.5	.7
20	1.2	.8	1.6	1.0	1.8	.8	1.7	.9	.5	.5	.5	.7
21	1.1	.8	1.8	1.0	1.65	1.0	1.6	.9	.5	.5	.5	1.25
22	1.0	.75	3.8	1.0	1.5	1.5	1.5	.9	.5	.5	.5	3.5
23	.9	.8	2.4	.95	1.4	2.5	1.7	.8	.5	.5	.5	2.5
24	.9	.95	2.2	.95	1.3	4.0	1.6	.8	.45	.5	.5	2.25
25	.85	1.5	2.1	.95	1.2	3.5	1.5	.75	.4	.5	.5	2.0
26	.8	1.6	2.0	.9	1.1	1.9	1.35	.75	.4	.5	.5	1.9
27	.8	2.05	1.9	.9	1.2	1.7	1.25	.8	.4	.6	.5	2.0
28	.8	1.5	1.75	.9	1.1	1.7	1.1	.8	.4	.7	.5	2.7
29	.8	.....	1.75	.9	1.0	1.6	1.0	.75	.4	.6	.5	2.7
30	.8	.....	1.6	.85	1.0	1.6	1.05	.75	.35	.55	.5	2.2
31	.8	.....	1.5	.....	1.1	.....	1.0	.7	.....	.5	.....	1.7

Rating table for North (of James) River near Glasgow, Va., from August 21, 1895 to December 31, 1896.

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	170	1.80	550	3.80	2,980	6.00	7,160
0.80	180	1.90	620	4.00	3,360	6.20	7,540
0.90	190	2.00	700	4.20	3,740	6.40	7,920
1.00	200	2.20	870	4.40	4,120	6.60	8,300
1.10	220	2.40	1,050	4.60	4,500	6.80	8,680
1.20	250	2.60	1,260	4.80	4,880	7.00	9,060
1.30	290	2.80	1,480	5.00	5,260	7.20	9,440
1.40	330	3.00	1,720	5.20	5,640	7.40	9,820
1.50	370	3.20	2,000	5.40	6,020	7.60	10,200
1.60	420	3.40	2,300	5.60	6,400	7.80	10,700
1.70	480	3.60	2,610	5.80	6,780	8.00	11,200

The above table is strictly applicable only for open channel conditions. It is not well defined.

Rating table for North (of James) River near Glasgow, Va., from January 1 to December 31 1897.

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.0	150	1.9	630	3.6	2,675	5.4	5,650
1.1	180	2.0	720	3.8	2,975	5.6	6,000
1.2	215	2.2	930	4.0	3,275	5.8	6,350
1.3	250	2.4	1,150	4.2	3,575	6.0	6,750
1.4	300	2.6	1,370	4.4	3,900	6.2	7,150
1.5	350	2.8	1,600	4.6	4,250	6.4	7,550
1.6	410	3.0	1,850	4.8	4,600	6.6	7,950
1.7	475	3.2	2,110	5.0	4,950	6.8	8,350
1.8	540	3.4	2,390	5.2	5,300	7.0	8,750

The above table is strictly applicable only for open channel conditions. It is not well defined.

Rating table for North (of James) River near Glasgow, Va., from January 1, 1898 to December 31, 1899.

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	155	1.70	480	3.60	2,610	5.80	6,020
0.70	170	1.80	560	3.80	2,890	6.00	6,400
0.80	180	1.90	640	4.00	3,190	6.50	7,420
0.90	190	2.00	730	4.20	3,490	7.00	8,540
1.00	200	2.20	920	4.40	3,790	7.50	9,910
1.10	210	2.40	1,120	4.60	4,090	8.00	11,400
1.20	220	2.60	1,340	4.80	4,390	8.50	12,900
1.30	250	2.80	1,570	5.00	4,690	9.00	14,430
1.40	290	3.00	1,810	5.20	5,010	10.00	17,430
1.50	340	3.20	2,070	5.40	5,330		
1.60	410	3.40	2,330	5.60	5,660		

The above table is strictly applicable only for open channel conditions. It is not well defined.

Rating table for North (of James) River near Glasgow, Va., from January 1, to December 31, 1900.

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	200	1.20	450	2.80	1,990	4.40	4,190
0.40	210	1.40	580	3.00	2,240	4.60	4,490
0.50	220	1.60	720	3.20	2,500	4.80	4,810
0.60	235	1.80	890	3.40	2,760	5.00	5,130
0.70	250	2.00	1,090	3.60	3,020	5.50	6,010
0.80	280	2.20	1,300	3.80	3,300	6.00	6,910
0.90	310	2.40	1,520	4.00	3,590		
1.00	350	2.60	1,750	4.20	3,890		

The above table is applicable only for open channel conditions. It is based upon 4 discharge measurements made during 1900. It is well defined between gage heights .7 feet and 2.2 feet.

Rating table for North (of James) River near Glasgow, Va., from January 1, to December 31, 1901.

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	250	1.90	990	4.20	4,492	7.50	11,145
0.80	280	2.00	1,090	4.40	4,862	8.00	12,170
0.90	310	2.20	1,296	4.60	5,239	8.50	13,195
1.00	350	2.40	1,525	4.80	5,628	9.00	14,220
1.10	400	2.60	1,795	5.00	6,030	10.00	16,270
1.20	450	2.80	2,100	5.20	6,438	11.00	18,320
1.30	510	3.00	2,425	5.40	6,846	12.00	20,370
1.40	580	3.20	2,757	5.60	7,254	13.00	22,420
1.50	650	3.40	3,092	5.80	7,662	14.00	24,470
1.60	720	3.60	3,430	6.00	8,070		
1.70	800	3.80	3,776	6.50	9,095		
1.80	890	4.00	4,130	7.00	10,120		

The above table is strictly applicable only for open channel conditions. It is not well defined.

(a) *Rating table for North (of James) River near Glasgow, Va., from January 1, to December 31, 1902.*

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.5	125	2.0	1,020	3.6	3,430	5.2	6,438
0.6	150	2.2	1,260	3.8	3,770	5.4	6,846
0.8	200	2.4	1,500	4.0	4,130	5.6	7,254
1.0	270	2.6	1,770	4.2	4,490	5.8	7,662
1.2	380	2.8	2,050	4.4	4,860	6.0	8,070
1.4	500	3.0	2,350	4.6	5,239		
1.6	660	3.2	2,760	4.8	5,628		
1.8	840	3.4	3,090	5.0	6,030		

The above table is strictly applicable only for open channel conditions. It is fairly well defined between gage heights 6 feet and 2.0 feet.

*a*Above 6.0 feet this table is the same as the 1901 table.

Rating table for North (of James) River near Glasgow, Va., from January 1 to December 31, 1903.

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet*	*Second-feet.*	*Feet.*	*Second-feet.*
0.5	200	1.2	615	1.9	1,200	3.2	2,800
0.6	250	1.3	685	2.0	1,295	3.4	3,110
0.7	300	1.4	760	2.2	1,500	3.6	3,430
0.8	355	1.5	840	2.4	1,725	3.8	3,780
0.9	415	1.6	925	2.6	1,970	4.0	4,150
1.0	480	1.7	1,015	2.8	2,230		
1.1	545	1.8	1,105	3.0	2,505		

The above table is strictly applicable only for open channel conditions. It is fairly well defined between gage heights .6 feet and 2.0 feet.

Above gage height 4.00 feet the rating curve is a tangent, the difference being 200 per tenth.

Rating table for North (of James) River near Glasgow, Va., from January 1 to December 31, 1904.

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.35	125	1.10	510	2.00	1,240	3.80	3,920
0.40	142	1.20	580	2.20	1,450	4.00	4,320
0.45	160	1.30	650	2.40	1,680	4.20	4,740
0.50	179	1.40	720	2.60	1,940	4.40	5,180
0.60	220	1.50	800	2.80	2,220	4.60	5,640
0.70	265	1.60	880	3.00	2,520	4.80	6,120
0.80	320	1.70	970	3.20	2,840	5.00	6,620
0.90	380	1.80	1,060	3.40	3,180		
1.00	440	1.90	1,150	3.60	3,540		

The above table is strictly applicable only for open channel conditions. It is based upon 6 discharge measurements made during 1903 and 1904. It is well defined between gage heights 0.45 feet and 2.00 feet.

Rating table for North (of James) River near Glasgow, Va., 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	165	1.20	675	2.20	1,620	4.00	4,530
0.40	205	1.30	755	2.40	1,860	4.20	4,950
0.50	250	1.40	840	2.60	2,120	4.40	5,390
0.60	300	1.50	925	2.80	2,410	4.60	5,850
0.70	350	1.60	1,015	3.00	2,720	4.80	6,330
0.80	405	1.70	1,105	3.20	3,050	5.00	6,830
0.90	465	1.80	1,200	3.40	3,390		
1.00	530	1.90	1,300	3.60	3,750		
1.10	600	2.00	1,400	3.80	4,130		

The above table is strictly applicable only for open channel conditions. It is based upon 3 discharge measurements made during 1905 and on the direction of the curve of 1904. It is not well defined.

Estimated monthly discharge of North (of James) River near Glasgow, Va.

(Drainage area, 831 square miles.)

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
*a*1895.								
January	.....	.....	.....	.....	.....	.....	5.70	.....
February	.....	.....	.....	.....	.....	.....	1.64	.....
March	.....	.....	.....	.....	.....	.....	2.45	.....
April	.....	.....	.....	.....	.....	.....	5.37	.....
May	.....	.....	.....	.....	.....	.....	4.03	.....
June	.....	.....	.....	.....	.....	.....	3.88	.....
July	.....	.....	.....	.....	.....	.....	3.66	.....
August 21–31	200	181	190	.23	.09	.....	*b*1.84	.....
September	193	170	185	.22	.25	44	.57	.32
October	195	177	185	.22	.26	28	.92	.66
November	226	195	205	.25	.28	15	1.88	1.60
December	825	187	334	.40	.46	13	3.54	3.08
The year	.....	.....	.....	.....	.....	.....	35.48	.....

*a*Discharge interpolated on days when gage was not read, 1895.

*b*Precipitation for complete month August, 1895.

Estimated monthly discharge of North (of James) River near Glasgow, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
*a*1896.								
January	5,262	220	701	.85	.98	34	2.86	1.88
February	4,120	370	1,653	1.99	2.15	52	4.17	2.02
March	8,490	420	1,889	2.28	2.63	51	5.18	2.55
April	5,830	550	1,080	1.30	1.45	122	1.19	—.26
May	.....	370	*b*704	.85	.98	32	3.10	2.12
June	1,260	250	480	.58	.64	13	4.89	4.25
July	12,450	330	1,470	1.77	2.04	33	6.22	4.18
August	2,300	290	541	.65	.75	16	4.57	3.82
September	37,250	190	1,595	1.92	2.14	32	6.70	4.56
October	5,260	420	880	1.06	1.22	381	.32	—.90
November	6,400	420	1,240	1.50	1.67	32	5.27	3.60
December	3,550	370	797	.96	1.11	653	.17	—.94
The year	37,250	190	1,086	1.31	17.76	40	44.64	26.88
*c*1897.								
January (30 da.)	720	350	454	.55	.63	35	1.80	1.17
February (27 da.)	10,450	475	3,181	3.83	3.99	73	5.48	1.49
March (29 da.)	3,650	1,040	1,672	2.01	2.32	76	3.06	.74
April (29 da.)	1,370	507	889	1.07	1.19	87	1.37	.18
May (27 da.)	9,450	507	2,035	2.45	2.83	55	5.14	2.31
June (27 da.)	630	300	463	.56	.62	19	3.22	2.60
July (28 da.)	1,425	180	362	.44	.51	14	3.68	3.17
August (27 da.)	350	180	222	.27	.31	12	2.68	2.37
Septemb'r (29 da.)	197	150	177	.21	.23	32	.73	.50
October	250	150	197	.24	.28	11	2.60	2.32
November	442	180	245	.29	.32	14	2.31	1.99
December	1,425	300	521	.63	.72	20	3.56	2.84
The year	10,450	150	866	1.05	13.95	39	35.62	21.67

*a*Discharge interpolated on days when gage was not read, 1896, except May 1 to 4, 1896.

*b*Mean for 27 days May, 1896.

*c*Run-off and precipitation computed for full months, 1897.

Estimated monthly discharge of North (of James) River near Glasgow, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1898.								
January	2,610	250	718	.86	.99	39	2.53	1.54
February	730	220	420	.51	.53	80	.66	.13
March	4,465	375	920	1.11	1.28	37	3.48	2.20
April	3,940	775	1,487	1.79	2.00	74	2.71	.71
May	6,210	640	1,711	2.06	2.38	48	4.92	2.54
June	1,285	340	595	.72	.80	29	2.72	1.92
July	1,810	250	521	.63	.72	16	4.41	3.69
August	14,280	250	1,716	2.06	2.38	43	5.54	3.16
September	1,810	197	302	.36	.41	12	3.34	2.93
October	17,880	220	1,786	2.15	2.48	28	8.70	6.22
November	2,070	560	911	1.10	1.23	64	1.92	.69
December	3,640	410	1,007	1.21	1.39	51	2.74	1.35
The year	17,880	197	1,008	1.21	16.59	38	43.67	27.08
1899.								
January	8,540	600	1,477	1.78	2.05	67	3.07	1.02
*a*February (26 da.)	8,170	480	2,257	2.72	2.83	55	5.13	2.30
March	.....	.....	*b*3,200	*b*3.85	*b*4.44	70	6.36	1.92
April	1,570	340	771	.93	1.03	64	1.60	.57
May	2,820	220	577	.69	.77	18	4.24	3.47
June	340	190	223	.27	.30	9	3.44	3.14
July	195	170	178	.21	.24	10	2.40	2.16
August	640	155	202	.24	.28	6	4.77	4.49
September	1,340	170	231	.28	.31	9	3.58	3.27
October	200	160	178	.21	.24	10	2.34	2.10
November	1,230	160	229	.28	.31	42	.73	.42
December	820	175	240	.29	.33	18	1.83	1.50
The year	.....	.....	*b*814	*b*.979	*b*13.13	33	39.48	26.35

*a*Run-off and precipitation for 28 days.
*b*Approximate.

Estimated monthly discharge of North (of James) River near Glasgow, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1900.								
January	6,910	310	1,010	1.22	1.41	48	2.95	1.54
February	7,670	375	1,854	2.23	2.32	51	4.59	2.27
March	7,570	760	2,093	2.52	2.91	92	3.17	.26
April	2,240	480	960	1.16	1.29	47	2.74	1.45
May	1,630	330	594	.71	.82	23	3.54	2.72
June	4,190	330	1,011	1.22	1.36	24	5.67	4.31
July	650	250	350	.42	.48	16	3.08	2.60
August	280	215	226	.27	.31	21	1.46	1.15
September	1,520	200	275	.33	.37	8	4.39	4.02
October	3,020	210	405	.49	.56	14	4.12	3.56
November	7,570	250	762	.92	1.03	34	3.00	1.97
December	4,040	310	882	1.06	1.22	53	2.28	1.06
The year	7,670	200	869	1.05	14.08	34	40.99	26.91
1901.								
January	3,602	280	751	.90	1.04	41	2.55	1.51
February	400	280	339	.41	.43	88	.49	.06
March	7,050	280	1,757	2.11	2.44	62	3.93	1.49
April	12,170	720	3,124	3.76	4.20	59	7.08	2.88
May	12,170	650	1,996	2.40	2.77	45	6.18	3.41
June	14,020	685	2,246	2.69	3.00	52	5.72	2.72
July	2,100	400	847	1.02	1.18	22	5.36	4.18
August	7,050	330	1,793	2.16	2.49	33	7.47	4.98
September	3,008	450	724	.87	.97	29	3.30	2.33
October	845	280	395	.48	.55	92	.60	.05
November	450	250	289	.35	.39	27	1.46	1.07
December	24,060	280	3,240	3.90	4.50	59	7.60	3.10
The year	24,060	250	1,418	1.75	23.96	46	51.74	27.78

Estimated monthly discharge of North (of James) River near Glasgow, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1902.								
January	6,438	500	1,666	2.00	2.31	73	3.17	.86
February	16,680	500	2,628	3.16	3.29	68	4.81	1.52
March	14,220	885	2,881	3.47	4.00	127	3.14	—.86
April	3,860	500	1,519	1.83	2.04	128	1.59	—.45
May	580	297	419	.50	.58	18	3.20	2.62
June	1,320	235	340	.41	.46	15	3.15	2.69
July	440	137	194	.23	.27	12	2.18	1.91
August	297	125	181	.22	.25	16	1.60	1.35
September	150	125	129	.15	.17	6	3.04	2.87
October	500	125	210	.25	.29	8	3.54	3.25
November	1,260	137	324	.39	.44	11	3.84	3.40
December	4,680	440	1,140	1.37	1.58	51	3.10	1.52
The year	16,680	125	969	1.16	15.68	43	36.36	20.68
1903.								
January	10,650	685	2,013	2.42	2.79	62	4.49	1.70
February	16,150	1,395	3,076	3.70	3.85	71	5.46	1.61
March	8,950	1,295	2,788	3.35	3.86	75	5.14	1.28
April	3,515	1,200	2,014	2.42	2.70	75	3.63	.93
May	1,105	480	664	.80	.92	69	1.33	.41
June	4,350	467	1,371	1.65	1.84	21	8.71	6.87
July	2,100	300	770	.93	1.07	27	4.02	2.95
August	1,845	200	395	.48	.55	14	4.03	3.48
September	6,150	250	821	.99	1.10	32	3.48	2.38
October	1,060	300	413	.50	.58	24	2.38	1.80
November	415	225	308	.37	.41	31	1.33	.92
December	840	250	330	.40	.46	34	1.36	.90
The year	16,150	200	1,247	1.50	20.13	44	45.36	25.23

Estimated monthly discharge of North (of James) River near Glasgow, Va.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1904.								
January	3,920	179	646	0.777	0.896	43	2.07	1.17
February	14,310	380	2,555	3.07	3.31	168	1.97	—1.34
March	6,370	685	1,218	1.47	1.69	60	2.81	1.12
April	3,360	410	890	1.07	1.19	37	3.22	2.03
May	6,370	615	1,175	1.41	1.63	38	4.24	2.61
June	3,270	440	974	1.17	1.31	24	5.36	4.05
July	1,105	242	404	.486	.560	16	3.40	2.84
August	1,240	179	370	.445	.513	20	2.52	2.01
September	320	125	170	.205	.229	13	1.82	1.59
October	179	125	158	.190	.219	36	.61	.39
November	265	142	183	.220	.245	21	1.16	.92
December	380	142	222	.267	.308	12	2.56	2.25
The year	14,310	125	747	.898	12.10	38	31.75	19.65

Estimated monthly discharge of North (of James) River near Glasgow, Va.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1905.					
January	3,050	300	705	.848	.978
February	1,455	300	547	.658	.685
March	7,870	925	1,928	2.32	2.68
April	925	435	596	.717	.800
May	5,850	378	1,049	1.26	1.45
June	4,530	300	834	1.00	1.12
July	14,760	530	2,032	2.45	2.82
August	530	350	431	.519	.598
September	465	185	294	.354	.395
October	350	185	240	.289	.333
November	250	250	250	.301	.336
December	3,570	250	949	1.14	1.31
The year	14,760	185	821	.988	13.50

JAMES RIVER AT HOLCOMB ROCK, VA.

This station was established by the Willson Aluminum Company, of Holcomb Rock, Va., in 1899, in connection with measurements to determine the horse-power available at that point. During 1899 the records were fragmentary, but at the commencement of 1900 daily records were taken, which have been furnished to the United States Geological Survey through the courtesy of George O. Seward, general manager of the company. The gage consists of a copper float, 8 x 8 x 8 inches, with a vertical rod 1½ inches square attached to it. The rod, which extends up through the power-house floor, is graduated to tenths of a foot. The copper float is enclosed in a 12-inch box which rests solidly on the bottom of the river. The box is perforated, so that the water in it will always stand at the same level as the water in the river, while the float, being inclosed, is not in danger of being broken by floating timber. The fluctuations of the river are read directly from the rod, which moves up or down with the float as it responds to the variations in the height of the river.

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

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1900.												
1	1.4	1.7	7.9	3.6	2.3	1.9	1.65	1.0	.6	.6	1.35	2.4
2	1.4	1.5	9.85	3.45	2.2	1.8	1.7	1.0	.6	.6	1.3	2.25
3	1.3	1.5	7.7	3.15	2.2	3.5	1.55	.95	.6	.6	1.3	2.15
4	1.3	1.6	5.65	3.05	2.0	2.1	1.6	.95	.6	.65	1.3	4.6
5	1.1	1.8	4.75	2.75	2.0	1.8	1.45	.95	.6	.6	2.2	9.3
6	1.28	1.6	4.1	2.6	2.0	1.7	1.4	1.05	.6	.6	1.8	5.7
7	1.3	1.5	3.85	2.5	1.95	1.7	1.4	.9	.6	.7	1.6	.....
8	1.25	1.85	3.95	2.4	1.8	1.6	1.3	.9	.6	.75	1.4	.....
9	1.28	2.43	3.85	2.35	1.8	1.6	1.3	.9	.6	.7	1.4	3.35
10	1.23	2.5	3.6	2.2	1.8	1.65	1.2	.8	.6	.9	1.3	3.1
11	1.28	2.5	3.5	2.1	1.7	1.6	1.15	.8	.6	.8	1.35	2.75
12	1.75	5.3	3.3	2.1	1.7	1.4	1.15	.8	.6	.8	1.5	2.45
13	2.58	10.45	2.95	2.05	1.7	2.35	1.2	.85	.5	.8	1.2	2.25
14	2.65	8.6	2.8	2.0	1.75	2.4	1.1	.8	.3	1.0	1.2	2.15
15	2.3	6.45	2.6	1.8	1.6	2.05	1.1	.7	.3	1.0	1.1	2.0
16	2.03	4.85	2.65	1.8	1.6	4.5	1.0	.55	2.15	1.3	1.1	1.85
17	1.83	4.1	2.6	1.8	1.6	6.1	.9	.5	1.9	1.15	1.1	1.8
18	1.7	3.3	2.55	3.55	1.6	6.9	.9	.45	1.3	1.05	1.1	1.7
19	3.5	2.8	2.6	4.35	1.85	6.15	.9	.4	.95	1.0	1.1	1.6
20	9.85	2.55	7.95	4.7	1.9	5.35	.9	.7	.6	1.0	1.1	1.6
21	9.3	2.4	11.0	4.8	2.25	3.4	.9	.45	.5	1.0	1.0	1.5
22	6.0	8.1	8.0	5.85	1.8	2.75	.9	.6	.5	1.0	1.0	1.5
23	4.33	9.35	5.95	5.45	1.65	2.45	1.1	.75	.6	1.0	.95	1.5
24	3.45	7.05	4.9	4.6	1.8	2.4	1.1	.6	.7	10.1	.9	1.5
25	2.95	5.65	4.45	4.0	2.95	2.3	1.35	.7	.55	5.55	.9	1.5
26	2.5	4.65	4.4	3.55	3.45	1.95	1.9	.7	.6	3.05	8.25	1.5
27	2.25	3.9	4.15	3.2	2.95	1.8	1.6	.85	.6	2.35	13.0	1.55
28	2.0	3.55	4.1	2.85	2.35	1.75	1.8	.65	.6	2.0	7.3	1.6
29	1.9	.....	4.1	2.5	2.2	1.7	1.6	.6	.5	1.9	4.2	1.5
30	1.55	.....	3.9	2.5	2.2	1.55	1.5	.6	.5	1.55	3.25	1.5
31	1.6	.....	3.7	.....	1.95	.....	1.35	.6	.....	1.5	.....	1.5

Daily gage height, in feet, of James River at Holcomb Rock, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901.												
1	1.5	1.6	1.2	2.85	3.0	4.6	2.9	1.4	5.5	2.2	1.0	1.0
2	1.5	1.6	1.2	2.65	2.8	3.75	2.1	1.4	4.8	1.8	1.0	1.15
3	1.5	1.65	1.2	8.6	2.55	3.5	2.75	1.4	3.4	1.6	1.0	1.6
4	1.5	1.9	1.2	11.6	2.4	3.2	2.7	1.4	2.7	1.5	1.0	1.7
5	1.5	1.7	1.2	7.9	2.2	2.75	2.6	1.5	2.25	1.45	1.0	1.8
6	1.4	1.7	1.2	6.1	2.2	2.55	2.5	6.3	2.05	1.5	1.0	1.8
7	1.4	1.7	1.4	5.9	2.05	4.56	2.4	11.0	1.9	1.45	1.0	1.8
8	1.4	1.7	1.4	5.5	2.0	4.0	2.35	5.65	1.7	1.35	1.0	1.95
9	1.35	1.7	1.3	4.4	2.0	3.25	2.15	3.7	1.7	1.3	1.0	2.1
10	1.25	1.75	1.3	3.7	2.35	2.9	2.0	2.75	1.5	1.3	1.0	2.05
11	1.6	1.8	8.2	3.25	4.1	2.45	1.9	2.65	1.9	1.3	1.0	2.0
12	9.0	1.8	9.7	2.95	3.8	2.3	1.65	2.85	1.7	1.3	1.0	1.9
13	8.7	1.75	5.75	2.65	3.3	2.6	1.6	2.8	1.7	1.3	1.0	1.8
14	5.6	1.6	4.35	3.95	2.55	2.4	1.5	6.55	1.65	1.4	1.0	1.8
15	4.3	1.55	3.6	9.15	2.3	4.85	4.3	9.75	1.4	1.3	1.0	13.0
16	3.6	1.6	3.15	6.9	2.2	12.1	4.6	8.95	1.55	1.25	1.0	10.0
17	3.15	1.75	2.6	5.5	2.1	9.25	4.65	6.5	1.45	1.3	1.0	6.0
18	2.7	1.8	2.4	4.9	2.0	7.55	4.15	5.8	1.65	1.3	1.0	4.0
19	2.35	1.55	2.3	4.3	2.0	6.0	4.05	4.9	1.55	1.3	1.0	3.5
20	2.15	1.5	3.4	9.7	1.95	4.8	3.7	4.0	1.59	1.3	1.0	3.0
21	1.95	1.5	3.55	15.45	1.9	4.4	3.15	3.4	1.2	1.3	1.0	3.0
22	1.9	1.4	3.45	10.6	6.6	4.4	2.55	2.95	1.5	1.3	1.0	2.9
23	1.85	1.4	3.15	8.5	14.75	4.4	2.0	2.65	1.5	1.05	1.0	2.8
24	1.8	1.3	2.65	6.95	8.8	4.4	1.9	2.9	1.35	1.0	1.35	2.8
25	1.8	1.3	2.5	6.2	6.35	4.4	1.9	3.55	1.25	1.0	1.6	2.7
26	1.8	1.3	2.55	5.3	6.1	2.95	1.9	3.45	1.2	1.0	1.55	2.7
27	1.8	1.35	6.5	4.65	7.45	2.85	2.0	3.4	1.2	1.0	1.35	2.7
28	1.8	1.3	5.8	3.95	9.7	2.5	1.85	3.45	1.3	1.0	1.2	2.7
29	1.7	.....	4.35	3.6	8.5	3.15	1.5	2.9	2.3	.95	1.1	2.5
30	1.6	.....	3.55	3.2	6.85	3.0	1.4	2.45	2.6	1.0	1.1	2.0
31	1.6	.....	3.05	.....	5.4	.....	1.4	2.75	.....	1.05	.....	1.2
1902.												
1	9.5	5.8	19.0	.....	1.9	1.6	1.8	1.15	.9	1.35	0.8	2.6
2	7.5	5.25	16.4	.....	1.8	1.5	1.45	1.2	.9	1.55	.9	3.45
3	5.5	5.8	8.1	.....	1.95	1.5	1.3	1.0	.9	2.05	.85	4.25
4	4.75	5.15	6.05	.....	1.9	1.4	1.2	1.15	.9	2.25	.9	4.9
5	4.0	4.1	5.1	.....	2.0	1.4	1.2	1.1	.9	2.25	.95	4.7
6	3.55	3.7	4.5	.....	1.8	1.4	1.2	1.2	.9	2.1	1.15	4.65
7	3.28	3.35	4.35	.....	1.8	1.3	1.25	1.2	.9	1.55	1.05	3.65
8	3.1	3.2	4.8	.....	2.0	1.3	1.0	1.1	.9	1.1	1.0	3.0
9	2.85	3.05	5.85	.....	2.0	1.3	1.2	.95	.9	1.15	1.15	2.55
10	2.75	2.55	7.2	.....	1.8	1.2	1.15	.45	.9	1.1	1.25	2.3
11	2.6	2.35	6.8	.....	1.8	1.2	1.25	.95	.85	1.05	1.05	2.1
12	2.45	2.3	6.4	.....	1.7	1.2	1.1	.8	.85	1.65	.8	1.95
13	2.3	2.2	6.2	.....	1.7	1.65	1.05	.85	.85	1.9	1.0	2.05
14	2.1	2.1	6.6	.....	1.7	1.6	1.0	.95	.0	1.2	1.0	2.25
15	2.0	2.0	6.2	.....	1.6	1.5	1.1	.95	.6	1.1	.9	3.35
16	2.0	1.9	4.95	.....	1.5	1.8	1.1	1.1	.8	1.2	1.0	3.3
17	2.0	1.9	4.55	.....	1.5	1.65	.9	.55	.75	1.1	1.05	5.5
18	2.0	1.9	3.9	.....	1.5	1.35	.85	.6	.75	1.0	1.0	6.25
19	1.9	1.8	3.55	.....	1.3	1.4	.95	.95	.8	1.1	1.0	4.25
20	1.9	1.7	3.4	.....	1.3	1.35	.0	.85	.85	1.2	1.4	3.4
21	1.95	2.15	3.0	.....	1.55	1.2	1.2	.75	.0	1.15	1.55	2.8
22	2.0	2.6	3.1	.....	1.55	1.2	1.1	.75	.95	.9	1.25	2.9

Daily gage height, in feet, of James River at Holcomb Rock, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1902.												
23	1.95	2.7	.....	.....	1.55	1.35	1.0	.7	.8	.9	1.3	3.0
24	1.85	3.35	.....	.....	1.55	1.15	.9	.6	.85	.8	1.15	3.15
25	1.8	10.5	.....	.....	1.6	1.15	.8	.9	.85	.85	1.5	2.45
26	1.95	13.0	.....	.....	1.7	1.55	.8	.75	.85	.75	2.05	2.2
27	6.85	10.3	.....	1.9	1.7	1.6	.0	.8	.95	1.05	3.65	2.0
28	8.2	11.9	.....	1.9	1.8	1.4	1.0	.8	.55	1.1	3.05	1.95
29	6.4	.....	.....	1.9	1.65	1.5	.8	.8	1.05	1.2	2.4	1.75
30	5.1	.....	.....	1.9	1.6	1.6	.95	.9	1.1	.9	2.05	1.8
31	5.75	.....	.....	.....	1.6	.....	1.15	.65	.....	.8	.....	1.7
1903.												
1	.....	4.55	11.5	6.85	3.8	1.65	4.05	.....	3.5	1.35	.75	1.0
2	.....	3.8	9.45	5.6	3.3	1.65	3.2	.....	2.4	1.3	1.2	1.0
3	.....	3.65	7.5	4.95	3.2	1.6	2.65	.....	2.35	1.3	1.2	1.1
4	.....	4.6	5.5	5.25	3.0	1.6	2.2	.....	1.75	1.25	1.2	1.15
5	6.85	9.6	4.5	5.05	2.85	1.75	3.1	.....	1.65	1.4	1.4	.95
6	5.4	6.7	4.3	4.7	2.7	2.25	4.25	.....	1.45	1.3	1.4	1.0
7	4.45	5.0	3.7	4.25	2.55	13.4	2.3	.....	1.6	1.35	1.3	1.1
8	3.75	4.1	3.8	4.4	2.5	8.0	2.1	.....	1.55	2.05	1.0	1.15
9	3.2	3.55	5.05	5.15	2.35	5.3	2.1	.....	1.65	2.0	1.3	1.3
10	2.55	3.2	5.75	5.5	2.25	3.8	1.95	.....	1.8	1.65	1.2	1.2
11	2.55	3.15	5.4	4.55	2.2	4.0	2.4	.....	1.7	1.5	1.2	1.15
12	2.35	5.15	5.85	4.15	2.15	4.1	.....	.....	1.45	1.5	1.2	1.25
13	2.25	5.2	5.75	4.1	2.05	3.2	.....	.....	1.35	1.45	1.25	.9
14	2.05	4.4	5.45	5.5	1.95	2.75	.....	.....	1.4	1.35	1.25	1.1
15	2.2	4.1	5.0	5.6	1.9	2.55	.....	.....	1.35	1.35	1.0	1.25
16	2.15	4.5	4.65	5.15	1.9	2.3	.....	1.4	1.35	1.3	1.25	1.25
17	2.0	12.55	3.95	4.8	2.0	2.15	.....	1.5	7.7	1.3	1.2	1.05
18	1.8	10.55	3.55	4.25	2.1	2.05	.....	1.4	7.55	1.3	1.2	1.0
19	1.9	6.75	3.25	3.8	2.1	1.9	.....	1.5	4.1	1.3	1.3	1.25
20	1.8	5.3	3.15	3.6	1.8	1.75	.....	1.3	3.05	1.4	1.3	1.3
21	2.7	4.05	4.15	3.6	1.75	1.8	.....	1.5	2.4	1.35	1.3	1.5
22	2.9	2.9	5.2	3.4	1.7	1.7	.....	1.4	2.05	1.3	1.05	1.45
23	2.7	2.6	9.55	3.2	1.7	1.8	.....	1.25	1.85	1.3	1.3	1.3
24	2.5	2.45	16.25	3.2	1.65	1.85	.....	1.45	1.8	1.3	1.25	1.2
25	2.35	2.15	9.25	3.1	1.75	1.95	.....	1.35	1.6	1.25	1.25	1.15
26	2.3	1.95	6.8	3.0	1.8	2.3	.....	1.25	1.55	1.25	1.15	1.05
27	2.15	1.7	5.5	7.5	1.7	5.0	.....	1.7	1.3	1.2	1.15	1.15
28	4.9	3.95	5.25	6.25	1.8	6.25	.....	1.2	1.3	1.2	1.0	1.5
29	6.3	.....	4.0	5.0	1.8	6.2	.....	1.35	1.35	1.2	1.0	1.6
30	6.45	.....	5.65	4.1	1.8	5.75	.....	1.75	1.35	1.2	1.0	1.55
31	5.7	.....	8.45	.....	1.7	.....	.....	1.85	.....	1.2	.....	1.2
1904.												
1	1.3	1.75	.....	2.3	4.0	3.8	2.01	1.25	.95	.75	.9	.7
2	1.4	1.7	.....	2.6	3.7	7.25	1.8	1.4	.95	.25	.7	.75
3	1.1	1.55	.....	2.5	3.15	8.8	1.7	1.3	1.0	1.15	.65	.8
4	1.2	1.5	.....	2.5	2.8	6.7	1.65	1.3	.85	.8	.75	1.05
5	1.65	1.5	.....	2.4	2.65	5.0	1.6	1.3	1.0	.8	.8	1.1
6	1.55	1.55	3.05	2.25	2.5	6.35	1.65	1.3	1.0	.4	.2	1.1
7	1.4	2.25	4.5	2.2	2.35	3.25	1.56	1.3	.9	.85	.95	1.25
8	1.4	3.05	8.95	2.25	2.65	3.25	1.4	1.6	.9	.75	.75	1.2
9	1.4	3.6	6.85	2.55	2.85	2.75	1.4	1.3	.8	.25	.7	1.2
10	1.35	3.05	4.95	3.25	3.15	2.55	1.4	1.4	.9	.75	.75	1.0

Daily gage height, in feet, of James River at Holcomb Rock, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
11	1.4	2.4	4.05	3.15	2.9	2.35	1.45	1.9	.65	.85	.7	.65
12	1.35	2.1	3.5	2.85	2.65	2.2	1.6	1.9	.95	.85	.8	1.25
13	1.3	2.0	3.3	2.65	2.4	2.1	1.5	1.5	.95	.75	.2	.9
14	1.25	1.85	3.1	2.45	2.3	1.95	1.45	1.2	.95	.75	1.15	.75
15	1.1	1.6	2.85	2.25	2.3	1.75	1.25	1.4	1.0	.8	.85	.75
16	1.2	1.8	2.8	2.25	2.35	1.85	1.3	1.45	1.0	.0	.9	.85
17	.85	1.6	2.65	2.05	2.3	2.1	1.25	1.3	.95	.45	.9	.8
18	1.3	1.45	2.5	2.1	2.5	1.85	1.2	1.5	.75	.7	.8	.8
19	1.15	1.6	2.35	2.05	10.0	1.95	1.0	.9	.9	.6	.8	.8
20	1.15	1.7	2.15	1.95	8.05	1.85	1.2	1.35	.9	.65	.2	.65
21	1.2	1.6	2.2	1.8	5.5	2.6	1.1	1.05	.9	.85	.95	.85
22	1.45	3.2	2.15	1.7	4.3	2.5	1.2	1.3	.8	.95	.75	.9
23	3.75	5.5	2.1	1.7	3.6	2.1	1.3	1.3	.8	1.0	.8	.9
24	3.85	4.35	2.55	1.7	3.1	1.9	1.2	1.15	.8	.7	.8	.9
25	3.2	3.55	3.45	1.6	3.05	1.8	1.4	1.15	.45	.75	.9	.95
26	2.5	3.15	3.1	1.6	3.15	1.6	1.4	1.05	1.1	.7	.8	.95
27	2.2	2.6	2.85	2.65	3.3	1.6	1.25	1.0	.85	.75	.85	.85
28	1.9	.....	2.75	8.75	3.3	2.05	1.3	1.0	.8	.7	.9	1.45
29	1.75	.....	2.55	5.9	2.8	2.1	1.55	1.1	.7	.8	.85	1.35
30	1.75	.....	2.44	4.85	2.5	2.15	1.4	.9	.7	.05	.75	1.3
31	1.65	.....	2.3	.....	2.4	.....	1.0	1.0	.....	.75	.....	1.25
1905.												
1	1.1	1.0	2.65	2.2	1.45	2.3	1.7	1.75	1.2	.7	1.15	.9
2	1.2	1.0	3.3	1.9	1.4	2.05	1.65	1.6	1.65	.7	1.1	.85
3	1.3	.9	3.7	2.0	1.35	1.8	1.8	1.6	1.8	.75	1.0	1.4
4	1.15	.9	3.4	1.9	1.25	1.7	1.7	1.85	1.95	1.0	.3	2.95
5	1.2	.55	4.05	1.9	1.35	1.65	1.9	1.95	1.75	.9	.8	3.4
6	1.2	1.2	4.4	2.05	1.3	1.6	2.4	1.3	1.6	.85	1.05	2.4
7	2.3	1.25	3.8	2.85	1.1	1.5	6.55	1.65	1.4	.8	1.0	1.95
8	1.9	1.2	4.35	2.95	1.5	1.45	4.85	1.6	1.3	.65	1.0	1.55
9	1.65	1.15	5.15	2.65	1.55	1.35	4.5	1.8	1.2	.65	1.0	1.35
10	1.55	1.2	11.1	2.45	1.55	1.25	2.85	1.6	.65	.75	1.05	.95
11	1.6	1.2	8.8	2.3	1.6	1.0	2.45	1.6	1.2	.8	1.0	.9
12	1.55	1.35	7.5	2.25	6.7	1.25	2.8	1.6	1.2	1.1	.5	.85
13	3.5	1.5	5.25	2.2	9.5	1.3	15.55	1.25	1.2	1.05	1.0	.85
14	4.5	1.65	4.75	2.3	6.3	1.2	13.6	1.6	1.2	1.0	.85	.85
15	3.05	1.6	4.1	2.15	5.8	1.2	9.65	3.15	1.2	.75	.85	.85
16	2.65	1.6	3.55	2.0	8.45	1.2	6.5	2.3	1.2	1.05	.9	1.0
17	2.0	1.5	3.25	1.8	7.3	1.2	4.7	2.05	.....	.95	.9	1.0
18	2.0	1.5	3.0	1.85	5.25	1.0	3.6	1.9	.....	.95	.8	1.0
19	1.85	1.5	3.1	1.7	4.3	1.3	2.9	1.75	.....	.85	.2	1.0
20	1.7	1.6	3.1	1.6	3.55	1.35	2.6	1.55	.....	.85	.85	1.2
21	1.65	1.35	3.05	1.6	2.95	1.65	2.45	1.65	.....	.8	.9	1.55
22	1.4	1.65	5.6	1.5	2.6	2.55	2.5	1.5	.....	.7	.9	7.25
23	1.5	2.0	5.0	1.55	2.35	2.3	2.6	1.55	.....	.85	.9	8.35
24	1.45	2.25	3.85	1.6	2.15	3.0	3.55	1.3	.....	.8	.9	8.5
25	1.4	2.55	3.35	1.4	2.0	5.75	2.9	1.35	.....	.8	.9	6.75
26	1.1	2.7	3.15	1.45	1.8	4.3	2.4	1.7	.....	.9	.35	4.0
27	1.3	3.1	2.95	1.45	2.0	2.8	2.15	.95	.....	.95	1.0	2.55
28	1.2	2.7	2.75	1.35	2.05	2.35	1.95	1.5	.....	.85	.85	8.5
29	1.15	.....	2.6	1.5	2.1	2.05	1.5	1.45	.....	.95	.85	8.45
30	1.1	.....	2.5	1.5	2.1	1.8	1.6	1.25	.....	1.2	.85	6.5
31	1.0	.....	2.35	.....	2.15	.....	1.9	1.2	.....	1.15	.....	4.5

JAMES RIVER AT CARTERSVILLE, VA.

A gaging station was established January 1, 1899, by Prof. D. C. Humphreys at the highway bridge crossing the James between Pemberton and Cartersville, 300 yards from the railroad station and 50 miles above Richmond, Va. The original wire gage was attached to a horizontal gage rod fastened to the bridge, and was referred to a bench mark, the top of the lower end of the fourth floor beam from the right bank, which was 32.04 feet above the zero of the gage. The original wire gage was replaced by a standard chain gage installed July 24, 1903. The length of the chain from the end of the weight to the marker is 37.98 feet. Bench mark No. 1 is a standard copper plug set in the capstone on the upstream side of the right abutment. It is inclosed by a ring of white paint and is marked by the letters "B. M. U. S. G. S. Hydro." Its elevation is 31.77 feet above gage datum. Bench mark No. 2 is a spot of white paint on the inner eyebar of the lower chord of the bridge, under the pulley end of the gage box. Its elevation is 32.95 feet above gage datum. To provide for readings over 10 feet, two additional markers, respectively ten and twenty feet below the first, have been placed. The gage is attached to the timbers of the second span from the right bank on the downstream side, at the same height as the hand rail. Discharge measurements are made from the lower side of the old wooden 6-span highway bridge. The initial point for soundings is the lower corner of the right end post, downstream side. The channel is straight for one-third mile above the station and for one mile below. Both banks are high and will overflow only at extreme flood stages. The bed of the stream is composed of rocks and sand, and is quite permanent. The gage is read once each day by B. W. Palmore, the postmaster at Cartersville.

Discharge measurements of James River at Cartersville, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
		Sq. feet.	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
1897.					
September 8	F. H. Anschutz	801	.75	*a*0.42	603
1898.					
July 16	D. C. Humphreys	760	1.74	*a*1.04	1,323
1899.					
January 3	F. H. Anschutz	3,187	2.24	3.82	7,156
June 23	D. C. Humphreys	1,862	1.44	1.46	2,686
1900.					
April 2	D. C. Humphreys	3,860	2.46	4.74	9,469
June 30	do	2,228	1.81	2.35	4,049
August 8	do	1,182	1.28	0.97	1,515
August 24	E. W. Myers	1,199	1.17	1.00	1,405
December 22	D. C. Humphreys	1,908	1.76	2.08	3,360
1901.					
July 26	D. C. Humphreys	2,182	1.89	2.36	4,136
August 9	do	6,593	2.98	8.00	19,700
1902.					
July 15	D. C. Humphreys	1,488	1.35	1.10	2,008
August 25	do	1,277	1.16	0.80	1,482
1903.					
March 30	E. C. Murphy	7,961	3.06	10.00	24,380
May 22	E. W. Myers	2,339	2.03	2.42	4,753
May 23	do	2,292	2.08	2.42	4,777
July 23	B. S. Drane	1,952	1.75	1.90	3,414
September 26	Paul and Sawyer	1,798	1.81	1.81	3,264
December 4	W. C. Sawyer	1,460	1.44	1.29	2,105
1904.					
June 23	R. H. Bolster	2,546	1.96	2.84	4,994
September 13	do	1,202	1.08	.75	1,301
October 3	do	1,169	.96	.70	1,117
October 22	J. C. Hoyt	1,265	1.11	.85	1,405
1905.					
March 17	A. H. Horton	3,928	2.41	4.60	9,468

*a*Gage height not accurate.

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

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1899.												
1	4.4	3.3	13.90	6.05	3.0	2.3	1.53	1.3	1.4	1.3	4.97	1.2
2	4.4	3.25	10.35	5.62	2.85	2.2	1.35	1.1	1.32	1.15	4.15	1.2
3	3.7	3.2	8.8	5.15	2.86	2.7	1.25	1.0	2.9	1.1	3.6	1.2
4	4.0	4.3	9.4	4.65	3.05	2.4	1.12	.9	1.44	1.1	5.3	1.2
5	4.6	5.65	20.33	4.6	2.8	2.27	1.22	.85	1.35	1.1	3.3	1.2
6	8.2	7.5	24.75	4.25	2.8	2.1	1.25	2.3	1.15	1.05	2.8	1.2
7	19.5	8.8	19.25	4.15	3.65	2.05	1.3	2.0	1.15	1.0	2.5	1.2
8	15.4	10.5	13.17	9.55	4.5	1.97	1.47	1.45	1.3	1.8	2.2	1.15
9	11.75	8.75	10.4	8.5	5.0	1.75	1.2	1.35	1.6	2.0	1.95	1.1
10	9.0	6.4	10.9	8.15	6.2	1.8	1.15	1.1	1.44	2.05	1.85	1.0
11	7.05	5.1	8.6	7.12	6.5	2.0	1.06	1.0	1.27	1.5	1.6	1.0
12	5.98	5.1	7.3	6.15	7.3	2.3	1.24	1.25	1.2	1.4	1.5	1.1
13	5.4	5.1	7.1	4.9	5.05	3.1	1.09	1.19	1.3	1.3	1.45	3.15
14	5.17	5.1	6.9	4.7	5.65	3.45	1.02	1.09	1.31	1.2	1.75	2.8
15	5.17	6.0	8.12	4.5	5.15	3.4	1.0	1.1	1.13	1.1	1.5	3.1
16	4.7	7.75	10.65	4.15	5.15	3.47	1.07	2.64	1.05	1.1	1.3	2.9
17	5.47	14.0	8.3	4.07	4.45	3.0	1.0	2.12	1.0	1.0	1.3	2.8
18	5.15	9.75	8.05	3.95	3.9	2.1	1.04	1.4	.92	1.2	1.25	2.4
19	4.73	10.55	17.33	3.75	3.65	2.0	1.15	1.3	.85	1.1	1.25	1.8
20	4.5	10.55	18.32	3.6	3.4	1.78	1.05	1.15	3.4	1.0	1.25	1.8
21	4.2	14.0	12.82	3.55	3.17	1.7	.88	.97	5.4	.98	1.25	1.6
22	4.02	16.1	8.8	3.47	2.86	1.5	.82	.8	3.4	.97	1.25	1.5
23	3.85	16.3	8.0	3.32	2.8	1.48	.8	.8	2.65	.98	1.25	1.45
24	3.75	13.75	7.6	3.17	2.7	1.4	.77	.82	2.1	1.0	1.25	1.6
25	4.3	11.0	6.65	3.08	2.5	1.4	.7	.76	1.3	1.0	1.25	1.8
26	4.1	8.65	6.15	3.05	2.45	1.7	.8	.66	3.5	.98	1.25	2.0
27	3.8	10.9	5.85	3.2	2.45	2.1	2.23	7.0	2.35	.97	1.2	2.1
28	3.75	12.3	5.25	3.25	2.15	1.6	2.3	6.45	1.7	.97	1.2	2.0
29	3.55	.....	6.35	3.3	2.05	1.4	1.33	3.5	1.4	.97	1.2	1.8
30	3.5	.....	6.15	3.1	2.2	1.8	1.4	2.7	1.3	.97	1.2	*a*1.75
31	3.42	.....	6.55	.....	2.25	.....	1.7	1.84	.....	.97	.....	*a*1.65
1900.												
1	*b*2.0	2.1	7.8	4.75	3.5	2.65	2.3	1.75	.86	.94	1.77	6.56
2	2.2	1.75	15.65	4.73	3.3	2.48	2.0	1.53	.81	.94	1.62	3.79
3	2.42	1.5	12.9	4.45	3.2	2.25	2.0	1.3	.66	.94	1.62	3.24
4	2.42	2.25	9.5	4.2	3.0	2.55	1.95	1.22	.64	1.24	2.86	9.41
5	2.42	4.35	7.55	4.0	2.9	2.6	1.95	1.15	.61	1.14	2.22	11.2
6	2.2	4.0	6.4	3.75	2.8	2.25	1.85	1.1	.56	1.04	2.17	11.06
7	2.1	3.9	5.4	3.5	2.75	2.15	1.7	1.0	.56	.99	2.07	7.91
8	1.85	3.15	5.1	3.4	2.75	2.0	1.55	.97	.46	.99	1.92	5.81
9	1.8	2.9	5.1	3.2	2.5	2.3	1.5	.95	.46	.99	1.82	5.46
10	1.6	2.9	5.05	3.1	2.6	2.15	1.48	.95	.56	.94	1.64	4.96
11	3.65	3.4	4.8	3.0	2.6	1.95	1.47	.81	.56	.96	1.59	3.91
12	4.4	3.45	4.4	3.1	2.5	1.65	1.3	.8	.46	.94	1.47	3.43
13	4.2	7.3	4.0	3.5	2.35	5.0	1.27	.78	2.5	.84	1.45	3.21
14	4.1	9.33	3.6	3.3	2.25	3.78	1.27	.72	4.4	2.24	1.44	3.06
15	4.0	12.2	3.4	3.1	2.15	5.0	1.25	.71	4.6	1.49	1.4	3.01
16	3.4	8.1	3.4	2.5	2.1	3.22	1.2	.68	2.46	1.14	1.39	2.81
17	2.8	6.05	3.4	2.5	2.0	10.6	1.1	.63	3.21	.84	1.39	2.41
18	2.4	5.3	3.6	11.15	1.95	10.2	1.1	.63	2.86	1.14	1.38	2.28
19	4.3	4.5	4.2	8.2	2.4	9.0	1.1	.8	2.13	1.19	1.36	2.25

*a*River blocked with ice December 30 and 31, 1899.
*b*River blocked with ice January 1 to 12, 1900.

Daily gage height, in feet, of James River at Cartersville, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1900.												
20	13.08	4.0	6.0	7.5	2.75	7.5	1.21	.63	1.96	1.09	1.32	2.21
21	13.0	3.8	10.5	7.4	2.68	5.5	1.14	.68	1.26	1.04	1.3	2.14
22	11.6	8.3	11.75	8.5	2.58	4.48	1.07	.73	1.11	.94	1.29	2.06
23	7.5	11.8	9.3	7.73	2.5	3.85	1.17	.93	.96	1.14	1.26	2.1
24	6.1	11.25	7.0	7.5	2.4	3.5	1.8	.98	1.01	1.64	1.22	2.0
25	5.0	9.05	6.0	6.4	3.4	3.2	1.7	1.23	.99	10.84	1.22	2.75
26	4.2	7.0	5.5	5.5	3.35	3.25	1.4	.93	.98	6.92	3.32	2.5
27	3.15	6.0	5.4	5.33	4.4	3.1	2.8	.78	.96	4.64	15.07	2.22
28	3.25	5.1	5.3	4.57	3.6	2.65	2.8	1.13	.96	3.64	18.0	2.1
29	3.0	.....	5.2	4.1	3.1	2.65	2.3	1.08	.96	2.69	7.92	2.0
30	2.55	.....	5.0	3.8	2.95	2.35	2.25	.8	.96	2.69	7.57	2.0
31	2.35	.....	5.3	.....	2.73	.....	1.95	1.01	.....	2.34	.....	2.0
1901.												
1	2.0	2.35	1.6	4.37	5.25	8.1	4.9	3.4	4.11	5.7	1.53	1.61
2	2.0	2.15	1.6	3.65	5.1	6.5	4.45	1.8	5.3	4.1	1.5	1.6
3	1.9	2.1	1.6	13.5	4.1	5.98	4.75	1.8	6.23	3.75	1.5	3.0
4	1.85	2.5	1.6	14.0	3.8	5.5	4.35	1.62	4.89	3.12	1.48	4.52
5	1.85	2.7	1.55	13.1	3.55	6.4	4.05	1.55	4.03	2.65	1.47	3.38
6	1.8	2.62	1.55	13.0	3.35	6.6	3.65	6.2	3.44	2.55	1.52	3.15
7	1.77	2.55	1.53	8.2	3.1	6.67	3.67	13.61	3.1	2.33	1.48	2.85
8	1.72	2.48	1.5	7.5	3.0	7.5	3.7	11.35	3.0	2.2	1.48	2.7
9	1.7	2.42	1.5	6.7	4.75	7.3	3.6	7.8	2.82	2.15	1.48	2.52
10	1.95	2.4	1.5	5.9	3.7	7.0	2.9	5.28	2.71	2.0	1.47	2.35
11	8.2	2.35	2.2	5.8	4.45	6.45	2.7	5.88	4.4	2.0	1.47	2.82
12	11.0	2.25	9.28	4.6	6.2	4.8	2.6	11.28	3.85	1.95	1.47	2.73
13	*a*12.62	2.25	11.0	4.05	5.1	4.55	2.7	9.25	2.85	1.9	1.47	2.52
14	14.72	2.2	6.95	10.12	4.45	4.22	3.02	6.68	2.4	2.05	1.47	3.0
15	7.62	2.2	6.5	15.60	4.7	3.85	5.9	16.3	2.3	2.05	1.45	10.0
16	5.8	2.2	6.3	12.5	4.45	11.0	6.45	12.55	2.2	2.0	1.45	18.25
17	5.3	2.1	4.02	9.5	4.4	17.82	6.3	11.88	2.0	1.98	1.43	16.5
18	3.6	2.1	3.6	8.5	4.0	12.1	7.3	9.7	2.55	1.85	1.33	8.75
19	3.35	2.05	3.25	8.1	2.87	11.05	6.35	7.95	3.0	1.75	1.32	6.5
20	3.0	2.05	3.0	7.9	2.87	9.15	6.15	6.77	2.65	1.73	1.32	5.75
21	2.85	2.02	2.95	14.8	7.77	7.8	5.2	5.71	2.35	1.68	1.32	*b*4.55
22	2.8	2.02	3.3	21.05	17.35	7.1	4.4	4.9	2.2	1.62	1.31	*b*4.0
23	2.82	2.0	3.95	15.45	24.5	7.0	3.75	4.27	2.15	1.62	1.3	*b*3.3
24	2.6	1.9	4.3	12.22	18.8	6.95	3.15	5.6	2.1	1.62	4.7	*b*3.35
25	2.6	1.88	3.65	9.0	12.45	6.9	2.8	5.63	2.05	1.58	3.3	3.45
26	2.85	1.85	3.5	8.1	9.8	6.5	2.35	6.3	2.03	1.58	2.4	3.6
27	2.63	1.8	5.0	7.1	8.8	5.35	2.23	6.2	2.0	1.55	2.15	4.45
28	2.54	1.65	6.3	6.55	10.50	5.15	2.0	7.11	2.25	1.5	1.9	5.38
29	2.52	.....	7.0	6.1	11.1	5.1	2.18	6.55	9.05	1.45	1.85	14.82
30	2.32	.....	5.5	5.55	10.45	4.73	1.83	4.4	10.0	1.53	1.53	25.39
31	2.4	.....	4.6	.....	8.5	.....	2.0	4.01	.....	1.5	.....	24.3
1902.												
1	16.5	7.5	22.90	8.0	3.45	1.98	1.7	1.48	.6	1.4	1.8	9.0
2	11.2	8.0	22.05	6.4	3.1	1.7	1.65	1.3	.55	1.4	1.62	6.3
3	8.5	9.6	14.0	5.4	3.4	1.68	2.0	1.8	.52	1.4	1.52	11.4
4	7.2	8.0	10.5	5.2	3.3	1.5	1.9	2.1	.5	1.0	1.42	8.3

*a*January 13, 1901, approximate.
*b*Ice conditions December 21 to 24, 1901.

Daily gage height, in feet, of James River at Cartersville, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1902.												
5	6.15	7.05	9.5	5.0	2.8	1.4	1.7	1.7	.5	7.95	1.4	10.95
6	5.55	5.5	9.2	4.7	3.4	1.3	1.4	2.15	.8	16.85	1.38	9.3
7	5.25	5.05	7.75	4.8	3.3	1.2	1.4	2.0	.75	5.6	1.7	7.15
8	5.0	4.92	7.0	7.2	3.0	1.4	1.6	1.9	.6	4.05	1.5	6.3
9	4.88	4.22	8.7	10.8	2.7	1.3	1.9	1.3	1.0	3.25	1.3	5.05
10	4.38	3.88	8.6	8.3	2.8	1.2	1.5	1.6	1.0	2.4	1.3	4.7
11	4.0	3.62	9.2	7.6	2.55	1.2	1.8	1.7	.9	1.6	1.28	3.9
12	3.6	3.5	8.8	7.0	2.4	1.35	1.42	1.0	.9	10.02	1.3	3.6
13	3.4	3.6	8.2	6.52	2.1	1.2	1.33	1.05	.88	5.72	1.32	3.5
14	3.3	3.3	8.0	5.54	2.3	1.35	1.2	1.1	.75	3.8	1.22	3.5
15	3.25	3.12	8.72	5.31	2.0	1.3	1.0	1.35	.7	2.8	1.2	3.5
16	3.0	3.1	7.9	5.1	2.0	2.5	1.0	4.25	.6	2.2	1.28	4.5
17	2.95	3.1	10.7	4.5	2.2	14.35	1.0	3.15	.55	2.05	1.2	8.5
18	2.9	2.82	10.08	4.4	2.15	4.7	1.0	1.45	.5	1.87	3.5	7.55
19	2.88	2.6	9.8	4.35	2.1	3.1	1.0	1.25	.5	1.72	4.22	8.1
20	2.72	2.7	7.72	4.05	1.9	2.13	1.22	1.2	.5	1.65	3.22	6.2
21	2.72	3.1	6.7	3.2	2.38	1.88	1.32	1.0	.6	1.6	2.52	5.3
22	7.15	7.7	6.2	3.6	2.4	1.72	1.3	1.15	1.0	1.52	2.4	6.3
23	6.12	7.9	5.5	3.5	2.0	1.6	1.2	1.1	.7	1.42	2.2	6.15
24	4.3	7.0	5.2	3.4	3.0	1.6	1.1	.9	.6	1.35	1.9	5.3
25	3.6	10.2	4.7	3.3	3.4	1.58	1.0	.9	.7	1.3	2.3	4.6
26	3.3	21.85	4.3	3.2	3.5	2.0	.92	.8	2.0	1.28	9.35	4.2
27	5.72	19.15	4.2	3.1	2.4	2.3	.88	.82	4.35	1.2	6.2	3.75
28	9.44	17.27	3.9	2.9	2.2	2.0	.8	.74	1.75	6.11	5.3	3.2
29	10.1	.....	5.4	3.0	2.2	1.98	.78	.8	1.35	4.0	5.0	3.1
30	8.0	.....	7.2	3.8	2.1	1.8	.65	.7	1.4	2.3	5.15	3.08
31	7.8	.....	9.4	.....	2.0	.....	1.62	.65	.....	2.0	.....	3.05
1903.												
1	3.0	7.45	14.05	11.35	5.3	2.65	6.82	1.65	6.11	1.5	1.31	1.25
2	2.8	6.55	14.52	9.6	5.0	2.5	5.62	2.33	6.51	1.39	1.3	1.25
3	16.05	5.7	10.72	7.9	4.6	2.32	4.6	2.18	5.58	1.42	1.3	1.25
4	15.55	6.2	7.82	7.3	4.4	2.3	4.0	2.23	3.98	1.32	1.38	1.29
5	13.7	9.7	6.85	7.12	4.28	2.31	3.45	2.81	2.83	1.35	1.5	1.2
6	9.7	11.95	5.88	6.92	4.15	6.0	4.0	2.21	2.43	1.38	1.65	1.23
7	7.8	9.02	5.85	6.3	4.05	17.78	3.48	2.28	2.11	1.5	1.82	1.25
8	6.7	7.0	7.15	6.78	3.9	18.0	4.42	2.28	1.85	1.5	1.58	1.25
9	5.68	6.52	8.12	7.78	3.62	11.8	3.3	1.85	1.73	4.3	1.5	1.23
10	4.88	5.75	7.82	7.32	3.3	7.8	2.82	1.71	1.71	3.4	1.42	1.35
11	4.82	5.05	7.7	7.4	3.28	6.35	2.62	1.55	1.93	2.25	1.48	1.25
12	4.7	7.2	7.82	7.78	3.2	7.85	2.87	1.81	2.23	2.1	1.4	1.2
13	4.2	7.5	7.85	6.92	3.1	6.8	3.72	1.78	1.93	1.92	1.38	1.35
14	4.0	7.3	7.6	11.22	3.03	5.77	5.97	3.43	1.71	1.78	1.32	1.65
15	3.6	6.2	6.9	9.22	3.0	4.3	4.87	2.23	1.68	1.62	1.35	1.58
16	3.6	7.8	6.6	8.9	2.9	4.0	4.32	2.01	1.51	1.5	1.3	1.4
17	3.6	16.85	5.95	7.65	2.8	3.5	3.54	2.38	1.55	1.45	1.3	1.25
18	3.4	17.4	5.5	6.9	2.75	4.25	2.94	2.01	6.73	2.15	1.7	1.2
19	3.3	13.2	5.08	6.28	2.7	3.15	2.69	2.61	8.45	2.0	1.78	1.15
20	3.1	9.0	4.8	7.18	2.62	2.9	2.42	3.31	4.93	1.72	1.72	1.25
21	6.45	7.5	4.82	6.78	2.5	2.85	2.22	2.28	3.68	1.65	1.65	2.05
22	7.65	7.2	10.72	5.68	2.42	2.7	2.02	2.15	2.95	1.58	1.62	2.68
23	6.15	6.3	15.5	5.48	2.4	2.72	1.92	1.71	2.53	1.52	1.5	2.25
24	5.1	5.8	18.08	5.1	2.28	3.02	1.82	1.55	2.18	1.5	1.4	1.95
25	4.8	5.55	18.7	4.85	2.9	2.7	1.76	1.43	2.03	1.38	1.4	1.85
26	4.3	5.2	12.07	4.78	2.5	4.03	1.65	1.43	1.88	1.35	1.35	1.7

Daily gage height, in feet, of James River at Cartersville, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
27	4.1	5.0	8.83	4.95	2.75	4.52	1.55	1.48	1.7	1.32	1.3	1.8
28	7.5	6.75	7.8	7.76	4.6	4.35	1.43	5.05	1.9	1.38	1.25	1.45
29	8.6	.....	6.9	8.0	3.32	9.94	1.53	3.68	2.22	1.32	1.25	1.4
30	8.45	.....	10.37	6.8	2.98	8.1	1.45	12.15	1.65	1.3	1.23	1.55
31	8.35	.....	11.32	.....	2.9	.....	1.53	7.13	.....	1.3	.....	1.65
1904.												
1	a1.6	2.1	3.38	3.3	5.9	3.85	2.55	1.45	.81	.8	.65	.85
2	1.68	2.0	3.3	3.1	5.0	5.2	2.52	1.72	1.0	.75	.75	.88
3	1.5	1.9	4.85	3.1	4.32	7.52	2.1	3.1	.9	.7	.75	.9
4	1.38	1.85	4.85	3.3	3.77	10.0	1.85	2.52	.85	.55	.72	1.0
5	1.35	1.8	4.3	3.28	3.48	7.4	1.7	1.58	.8	.5	.8	1.0
6	1.35	1.88	3.9	3.0	3.22	5.98	1.62	3.37	.7	.55	.72	1.6
7	2.25	3.32	6.08	3.1	3.1	4.92	1.48	2.0	.85	.55	.7	1.7
8	2.55	3.8	13.0	3.05	6.3	4.4	1.85	2.35	.85	.7	.7	1.52
9	1.9	3.5	11.1	3.1	4.92	4.03	1.9	1.7	.8	.65	.7	1.3
10	1.55	4.8	9.18	3.65	5.12	3.6	2.0	1.3	.98	.55	.75	1.38
11	1.45	4.52	6.65	4.55	4.8	3.3	2.55	1.8	1.1	.52	.8	1.28
12	1.47	3.25	5.5	4.1	4.2	2.85	1.52	1.9	.95	.5	.78	1.22
13	1.62	2.9	4.7	3.78	3.75	2.62	1.4	2.12	.78	.5	1.0	1.02
14	1.55	2.75	4.6	3.4	3.42	2.45	1.6	2.0	1.25	.5	1.45	1.1
15	1.5	2.52	4.4	3.2	3.25	2.31	1.48	1.9	3.8	.5	1.32	1.15
16	1.45	2.22	4.0	3.0	3.12	2.18	1.3	1.77	2.43	.68	1.1	1.4
17	1.35	2.2	3.7	2.75	3.02	2.15	1.38	1.4	1.8	.68	1.0	1.38
18	1.4	1.8	3.58	2.58	3.43	2.22	1.4	2.0	.98	.65	.92	2.15
19	1.25	1.9	3.5	2.55	5.13	2.18	1.3	1.95	.98	.55	.95	2.3
20	1.35	2.0	3.2	2.4	10.55	2.15	1.25	1.9	.88	.6	.93	2.22
21	1.45	2.25	3.15	2.3	9.15	2.32	1.1	1.45	.82	.6	.9	b2.3
22	1.68	4.6	3.0	2.2	6.15	2.4	1.0	1.23	.95	.82	.85	b2.5
23	2.42	6.22	2.9	2.1	5.32	2.85	1.3	1.21	.9	.82	.88	b2.3
24	3.0	6.29	2.85	2.08	4.5	2.52	2.08	1.2	.88	.78	.95	1.48
25	5.6	6.15	2.85	2.05	3.98	2.18	2.0	1.28	.82	.75	.9	1.65
26	4.02	4.63	4.3	2.0	3.55	1.88	1.55	1.19	.8	.78	.9	1.9
27	3.48	4.12	4.0	3.0	3.52	1.8	1.62	1.0	.75	.7	.85	1.8
28	3.25	3.95	3.98	6.0	3.5	1.65	2.05	1.0	.68	.62	.85	2.0
29	2.85	3.5	3.65	9.6	3.6	2.0	1.9	.98	.82	.62	.8	2.2
30	1.9	.....	3.3	7.42	3.45	2.35	1.95	.8	.85	.7	.75	1.9
31	2.1	.....	4.0	.....	3.02	.....	1.6	.65	.....	.75	.....	1.75
1905.												
1	c1.7	c2.45	5.72	3.18	1.82	4.2	2.32	2.9	1.6	1.5	1.5	1.15
2	1.55	2.9	5.32	2.95	1.65	3.3	2.1	2.38	2.4	1.2	1.38	1.1
3	1.53	2.1	5.05	2.8	1.8	2.95	2.5	2.18	7.6	1.2	1.22	1.48
4	1.5	1.82	5.25	2.58	1.7	2.22	2.2	2.05	5.12	1.0	1.28	3.3
5	1.55	2.25	5.48	2.88	1.78	2.15	6.5	2.12	3.8	1.12	1.25	2.58
6	1.45	2.45	5.32	4.62	1.7	1.95	5.0	2.25	3.28	1.1	1.22	4.8
7	6.35	1.95	5.6	4.1	1.72	1.92	6.12	2.38	2.32	1.02	1.12	3.52
8	5.78	2.35	5.05	3.5	1.78	2.55	9.75	2.45	2.08	1.0	1.23	2.9
9	4.98	2.58	5.1	3.9	1.72	2.1	5.95	2.2	1.85	1.0	1.28	2.5
10	3.0	2.35	8.15	3.62	1.8	1.8	5.22	4.05	1.68	.95	1.22	2.9
11	2.6	2.65	12.1	3.6	1.7	1.5	4.55	5.0	1.58	1.0	1.2	2.82
12	2.8	2.7	9.85	3.82	4.7	1.48	4.05	3.55	1.5	2.58	1.12	2.2
13	4.28	2.9	8.1	4.22	9.82	1.38	7.1	2.9	1.58	2.3	1.2	2.1
14	4.05	3.32	6.68	4.1	11.9	1.38	16.39	2.9	1.5	1.8	1.1	1.88

a Ice conditions during part of January, 1904.
b River frozen December 21 to 23, 1904.
c Ice conditions during latter part of January and during February, 1905. The river was frozen from bank to bank, with the exception of a 50-foot channel of open water under the gage. Ice 10 to 12 inches thick.

Daily gage height, in feet, of James River at Cartersville, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
15	5.48	3.55	5.75	3.78	8.42	1.3	16.0	7.05	1.45	1.58	1.03	1.8
16	4.42	3.0	5.08	3.55	9.6	1.35	11.4	8.6	1.3	1.45	1.2	1.9
17	3.5	2.85	4.55	3.25	10.85	1.35	8.55	5.05	2.5	1.42	1.15	2.0
18	3.12	2.85	4.25	2.85	9.12	1.35	6.35	4.0	3.7	1.2	1.15	2.4
19	2.85	2.6	3.98	2.7	7.12	1.3	5.15	3.15	2.92	1.22	1.1	2.42
20	2.48	2.7	3.95	2.52	5.68	1.25	4.52	2.65	2.21	1.22	1.12	2.7
21	2.5	3.37	4.0	2.4	4.68	4.5	4.5	2.48	1.85	1.2	1.08	10.99
22	2.2	4.05	4.5	2.32	4.25	3.25	3.85	2.2	1.58	1.12	1.02	12.9
23	2.1	5.38	5.6	2.2	3.58	1.98	8.5	2.15	1.45	1.05	1.22	9.8
24	1.88	5.3	6.22	2.08	3.15	7.3	5.22	1.95	1.35	1.0	1.22	8.62
25	1.9	4.7	5.1	2.05	2.85	5.12	5.25	2.1	1.28	1.0	1.2	6.45
26	1.8	5.45	4.82	2.1	2.58	5.8	4.1	5.3	1.22	1.25	1.2	5.39
27	1.9	6.55	4.3	2.02	2.5	5.75	3.55	2.9	1.12	1.52	1.15	4.68
28	2.0	5.4	4.2	2.0	2.5	4.15	3.1	2.55	1.12	1.6	1.05	4.05
29	2.45	.....	3.85	2.8	2.88	3.5	2.85	2.0	1.12	1.52	1.02	5.28
30	2.9	.....	3.62	1.92	2.9	2.82	4.1	1.9	1.12	1.38	1.15	6.38
31	2.65	.....	3.38	.....	3.4	.....	2.8	1.73	.....	1.35	.....	5.57

Rating table for James River at Cartersville, Va., from January 1, 1899, 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	480	2.20	3,880	4.40	8,790	9.00	22,300
0.30	615	2.30	4,080	4.60	9,280	9.50	24,000
0.40	755	2.40	4,280	4.80	9,780	10.00	25,750
0.50	900	2.50	4,490	5.00	10,300	10.50	27,500
0.60	1,050	2.60	4,700	5.20	10,820	11.00	29,260
0.70	1,200	2.70	4,910	5.40	11,350	11.50	31,080
0.80	1,355	2.80	5,120	5.60	11,890	12.00	32,930
0.90	1,510	2.90	5,330	5.80	12,430	12.50	34,780
1.00	1,670	3.00	5,550	6.00	12,980	13.00	36,670
1.10	1,830	3.10	5,770	6.20	13,540	13.50	38,570
1.20	2,000	3.20	5,990	6.40	14,100	14.00	40,520
1.30	2,170	3.30	6,210	6.60	14,680	15.00	44,500
1.40	2,350	3.40	6,440	6.80	15,260	16.00	48,600
1.50	2,530	3.50	6,670	7.00	15,860	17.00	52,820
1.60	2,710	3.60	6,900	7.20	16,460	18.00	57,200
1.70	2,900	3.70	7,130	7.40	17,080	19.00	61,700
1.80	3,090	3.80	7,360	7.60	17,700	20.00	66,300
1.90	3,280	3.90	7,590	7.80	18,330		
2.00	3,480	4.00	7,830	8.00	18,970		
2.10	3,680	4.20	8,310	8.50	20,610		

The above table is strictly applicable only for open channel conditions. It is based upon 24 discharge measurements made during 1897 to 1905. It is well defined between gage heights .70 feet and 10.0 feet. The table has been extended beyond these limits. Between gage heights 10.00 feet and 20.00 feet, the table is the product of the area curve by the extension of the velocity curve. See Plate I, page 10.

Estimated monthly discharge of James River at Cartersville, Va.

(Drainage area, 6,232 square miles.)

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1899.								
January	64,000	6,486	13,550	2.17	2.50	69	3.61	1.11
February	49,850	5,990	22,400	3.59	3.74	76	4.92	1.18
March	93,750	10,950	28,610	4.59	5.29	83	6.38	1.09
April	24,180	5,660	9,753	1.56	1.74	101	1.72	—.02
May	16,770	3,580	7,304	1.17	1.35	37	3.40	2.05
June	6,601	2,350	3,799	.610	.681	19	3.55	2.87
July	4,080	1,200	2,030	.326	.376	13	2.93	2.55
August	15,860	1,140	3,227	.518	.598	11	5.35	4.75
September	11,350	1,432	3,187	.511	.570	14	4.11	3.54
October	3,580	1,622	1,968	.316	.364	13	2.62	2.26
November	11,080	2,000	3,566	.572	.638	69	0.93	.29
*a*December	5,880	1,670	3,020	.485	.559	29	1.90	1.34
The year	93,750	1,140	8,534	1.37	18.40	44	41.42	23.02
1900.								
*b*January	36,970	1,060	8,929	1.43	1.65	49	3.35	1.70
February	33,670	2,530	12,590	2.02	2.10	48	4.41	2.31
March	47,160	6,440	14,810	2.38	2.74	73	3.76	1.02
April	29,800	4,490	10,560	1.69	1.89	67	2.84	.95
May	8,790	3,380	5,096	.818	.943	32	2.92	1.98
June	27,850	2,805	8,072	1.30	1.45	27	5.34	3.89
July	5,120	1,782	2,828	.454	.523	17	2.98	2.46
August	2,995	1,095	1,599	.257	.296	19	1.54	1.24
September	9,280	842	2,498	.401	.447	11	3.98	3.53
October	28,690	1,417	3,860	.619	.713	19	3.75	3.04
November	57,200	2,034	7,109	1.14	1.27	41	3.12	1.85
December	29,980	3,480	8,348	1.34	1.54	55	2.78	1.24
The year	57,200	842	7,192	1.15	15.56	38	40.77	25.21

*a*River blocked with ice December 30 and 31, 1899. No correction made in estimates.
*b*River blocked with ice January 1 to 12, 1900. No correction made in estimates.

Estimated monthly discharge of James River at Cartersville, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1901.								
January	43,380	2,900	8,770	1.41	1.63	61	2.67	1.04
February	4,910	2,805	3,852	.618	.644	108	.59	—.05
March	29,260	2,530	8,241	1.32	1.52	44	3.48	1.96
April	71,580	7,015	24,870	3.99	4.45	64	6.92	2.47
May	92,200	5,267	18,630	2.99	3.45	51	6.70	3.25
June	56,400	7,475	17,010	2.73	3.05	54	5.62	2.57
July	16,770	3,147	7,858	1.26	1.45	28	5.23	3.78
August	49,850	2,620	16,670	2.67	3.08	30	10.22	7.14
September	25,750	3,480	6,972	1.12	1.25	33	3.75	2.50
October	12,160	2,440	3,887	.624	.719	131	.55	—.17
November	9,530	2,170	2,946	.473	.528	37	1.43	.90
[a]December	97,800	2,710	17,740	2.85	3.29	46	7.19	3.90
The year	97,800	2,170	11,450	1.84	25.06	46	54.35	29.29
1902.								
January	50,690	4,952	12,860	2.06	2.38	74	3.21	0.83
February	76,040	4,700	17,130	2.75	2.86	60	4.79	1.93
March	82,290	7,590	22,830	3.66	4.22	128	3.30	—.92
April	28,550	5,330	10,930	1.75	1.95	95	2.05	.10
May	6,670	3,280	5,578	.895	1.03	40	2.58	1.55
June	41,900	2,000	4,425	.710	.792	21	3.83	3.04
July	3,480	1,125	2,197	.353	.407	17	2.35	1.94
August	8,430	1,125	2,488	.399	.460	16	2.80	2.34
September	8,670	900	1,647	.264	.294	8	3.75	3.46
October	52,180	1,670	7,328	1.18	1.36	22	6.05	4.69
November	23,490	2,000	5,004	.802	.895	25	3.57	2.67
December	30,710	5,660	12,940	2.08	2.40	70	3.41	1.01
The year	82,290	900	8,780	1.41	19.05	46	41.69	22.64

[a]Ice conditions December 21 to 24, 1901. No correction made in estimates.

Estimated monthly discharge of James River at Cartersville, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1903.								
January	48,810	5,120	14,890	2.39	2.76	62	4.43	1.67
February	54,550	10,300	19,550	3.14	3.27	64	5.08	1.81
March	60,340	9,780	23,260	3.73	4.30	81	5.29	.99
April	30,520	9,730	16,920	2.71	3.02	88	3.42	.40
May	11,080	4,040	6,367	1.02	1.18	66	1.78	.60
June	57,200	4,080	13,240	2.12	2.36	31	7.73	5.37
July	15,320	2,404	6,063	.973	1.12	37	3.06	1.94
August	33,480	2,404	5,396	.866	.998	23	4.38	3.38
September	20,440	2,548	5,910	.948	1.06	44	2.39	1.33
October	8,550	2,170	2,976	.478	.551	23	2.38	1.83
November	3,128	2,051	2,443	.392	.437	47	.93	.49
December	4,868	1,915	2,506	.402	.463	33	1.41	.95
The year	60,340	1,915	9,960	1.60	21.52	51	42.28	20.76
1904.								
*a*January	11,890	2,085	3,660	.587	.677	31	2.21	1.53
February	13,790	3,090	6,332	1.02	1.10	62	1.76	.66
March	36,670	5,225	10,060	1.61	1.86	72	2.59	.73
April	24,350	3,480	6,777	1.09	1.22	50	2.46	1.24
May	27,680	5,594	9,334	1.50	1.73	49	3.53	1.80
June	25,750	2,805	6,927	1.11	1.24	27	4.53	3.29
July	4,595	1,670	2,935	.471	.543	12	4.41	3.87
August	6,371	1,125	2,900	.465	.536	23	2.39	1.85
September	7,360	1,170	1,828	.293	.327	17	1.98	1.65
October	1,386	900	1,115	.179	.206	39	.54	.33
November	2,440	1,125	1,470	.236	.263	23	1.15	.89
*b*December	4,490	1,432	2,724	.437	.504	21	2.41	1.91
The year	36,670	900	4,672	.750	10.21	34	29.96	19.75

*a*Ice conditions during part of January, 1904. No correction made in estimates.
*b*River frozen over December 21 to 23, 1904. No correction made in estimates.

Estimated monthly discharge of James River at Cartersville, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1905.					
*a*January	13,960	2,440	5,439	.873	1.01
*a*February	14,540	3,128	6,378	1.02	1.06
March	33,300	6,394	11,900	1.91	2.20
April	9,330	3,320	5,643	.905	1.01
May	32,560	2,805	9,388	1.51	1.74
June	16,770	2,085	5,309	.852	.951
July	50,230	3,680	13,490	2.16	2.49
August	20,940	2,957	6,086	.977	1.13
September	17,700	1,864	4,024	.646	.721
October	4,658	1,590	2,227	.357	.412
November	2,530	1,702	1,967	.316	.353
December	36,290	1,830	9,017	1.45	1.67
The year	50,230	1,590	6,739	1.08	14.75

*a*Ice conditions during the latter part of January and during February. No correction made in estimates.

APPOMATTOX RIVER AT MATTOAX, VA.

This station was established August 27, 1900, by E. W. Myers. It is located on the two-span deck railroad bridge at Mattoax station, 27 miles southeast of Richmond, on the road to Danville. It is equipped with a standard chain gage, which is attached to the outside of the guard rail of the first span from the right bank. The length of the chain from the end of the weight to the marker is 48.80 feet. A permanent bench mark, consisting of a United States Geological Survey standard iron post, was established August 29, 1903. This post is set at the northeast corner of the Mattoax passenger station, with an elevation of 48.68 feet above gage datum. Bench mark No. 2 is on the outer upstream edge of the top of the upper chord of the upstream truss, 111 feet from the initial point. Its elevation is 46.60 feet above gage datum. Discharge measurements are made from the downstream side of the railroad bridge to which the gage is attached. The initial point for soundings is the end of the downstream guard rail at the right bank. Distances along this rail are indicated by white paint. The channel is straight

for 400 feet above and for 100 feet below the station. The current is moderately swift. The right bank is high and is not subject to overflow. The left bank is high but overflows beneath the second span of the bridge at high water. The bed of the stream is composed of rock and sand and is clean; it shifts during and after flood stages. There is but one channel at all stages, broken at extreme flood stages by the central pier of the bridge. The sand bottom beneath the second span is subject to change in high water. The gage is read morning and noon each day by J. C. Carter.

Discharge measurements of Appomattox River at Mattoax, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1900.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
August 25	E. W. Myers	165	1.18	1.00	196
November 1	do	169	1.04	0.85	177
1901.					
January 16	E. Graves	339	2.42	4.36	820
April 23	N. C. Curtis	585	2.90	6.74	1,696
May 23	E. Graves	1,103	3.34	10.73	3,694
July 23	E. W. Myers	212	1.27	1.26	270
November 26	J. S. Henderson	388	2.13	4.40	826
1902.					
July 10	B. S. Drane	192	2.04	1.80	391
August 16	do	781	2.90	7.68	2,266
October 14	do	520	2.71	5.75	1,410
October 14	do	438	2.61	4.88	1,144
December 6	do	1,740	2.80	13.10	4,857
1903.					
March 24	B. S. Drane	2,686	3.04	20.20	8,166
March 29	E. C. Murphy	602	2.13	6.25	1,282
May 21	E. W. Myers	262	1.61	2.35	421
May 21	do	262	1.55	2.33	405
July 25	B. S. Drane	155	1.68	1.50	258
July 25	do	155	1.62	1.50	250
August 29	do	498	2.60	5.55	1,294
August 29	do	406	2.47	4.62	1,002
September 26	Paul and Sawyer	163	1.79	1.47	292
December 3	W. C. Sawyer	211	1.50	1.95	315

Discharge measurements of Appomattox River at Mattoax, Va.—Con.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1904.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
June 24	R. H. Bolster	150	1.37	1.23	205
August 4	N. C. Grover	209	1.40	2.05	293
October 4	R. H. Bolster	121	1.39	0.85	168
October 22	J. C. Hoyt	183	1.48	1.76	270
1905.					
March 10	A. H. Horton	600	2.74	6.72	1,641
September 6	R. H. Bolster	223	1.75	2.39	390

Daily gage height, in feet, of Appomattox River at Mattoax, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1900.												
1									1.25	0.72	0.8	1.2
2									.5	.68	.9	1.00
3									.35	.88	1.4	.99
4									.32	.98	2.05	1.7
5									.38	1.03	2.9	5.05
6									.05	.98	2.0	6.5
7									.12	.95	1.4	3.1
8									.15	.82	1.2	2.2
9									.15	.88	1.1	1.9
10									.18	1.68	1.15	1.55
11									.18	1.2	1.1	1.04
12									.12	.85	1.0	1.15
13									.04	.78	.95	1.25
14									.06	.85	1.0	1.3
15									.12	.95	.97	1.25
16									2.52	1.02	.94	1.15
17									3.75	0.9	1.0	1.0
18									2.25	.85	.86	.75
19									1.0	.85	.99	1.75
20									.78	.75	.96	1.5
21									.6	.7	.93	1.45
22									.6	.65	.99	1.0
23									.6	.65	1.05	1.42
24									.72	.7	.94	3.0
25									.9	.8	.9	3.92
26								0.5	.8	1.5	1.0	4.5
27								.6	.6	1.05	1.9	3.0
28								.45	.65	.8	2.93	3.3
29								.3	.55	.75	1.7	2.05
30								.55	.65	.8	1.2	2.0
31								2.5		.85		2.35

Daily gage height, in feet, of Appomattox River at Mattoax, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901.												
1	3.0	2.2	1.5	2.5	2.4	3.7	1.4	1.2	3.4	5.7	1.5	1.8
2	2.7	2.1	1.5	2.35	2.3	3.4	1.6	.9	3.0	3.55	1.5	1.75
3	2.1	2.15	1.5	12.72	2.25	3.05	3.1	.8	2.8	3.0	1.5	1.8
4	1.75	2.2	1.55	14.6	2.2	3.0	2.1	.75	2.6	2.8	1.55	8.0
5	1.5	3.4	1.5	15.72	2.1	3.4	1.4	.8	2.2	2.3	1.55	8.8
6	1.4	3.25	1.5	18.0	2.0	2.7	1.1	2.0	2.15	2.0	1.55	4.5
7	1.9	2.5	1.5	14.0	2.0	2.5	1.75	13.0	2.15	1.9	1.55	3.1
8	1.6	2.22	1.4	5.2	1.95	3.4	2.15	12.75	1.95	1.8	1.55	2.5
9	1.6	2.35	1.45	4.15	2.0	3.45	3.6	14.0	1.9	1.8	1.5	2.45
10	1.5	2.5	1.85	3.5	4.95	2.5	2.85	15.5	3.3	1.75	1.5	2.6
11	1.9	2.75	3.15	3.05	5.5	2.2	3.6	3.55	2.3	1.7	1.5	2.75
12	9.5	2.45	3.15	2.75	5.0	2.15	2.25	2.9	1.9	1.7	1.5	2.5
13	12.0	2.15	3.0	2.5	3.0	1.9	1.9	2.75	1.8	1.7	1.5	2.25
14	13.0	2.0	2.3	4.5	2.1	1.8	4.2	8.3	2.0	1.8	1.5	2.2
15	13.85	1.9	2.0	13.5	2.0	1.9	7.2	13.5	1.6	2.0	1.5	6.0
16	8.0	1.8	1.8	13.8	1.9	2.9	7.9	12.8	1.55	1.9	1.5	9.5
17	3.55	1.85	1.7	17.5	1.85	3.4	5.6	14.0	2.2	1.8	1.5	10.2
18	3.5	1.85	1.6	16.5	1.8	4.4	3.9	14.25	2.1	1.7	1.45	10.6
19	3.4	1.75	1.5	4.7	1.7	4.15	3.95	5.0	4.2	1.65	1.45	3.5
20	3.7	1.8	1.5	5.15	1.85	2.8	3.2	4.5	5.45	1.55	1.45	2.75
21	2.4	1.75	2.0	4.75	1.8	2.2	2.6	3.8	3.2	1.5	1.45	2.45
22	2.5	1.6	2.2	6.35	1.8	2.15	1.9	3.3	2.5	1.5	1.45	2.3
23	2.45	1.55	2.4	6.65	10.6	2.1	1.65	2.25	2.15	1.5	1.45	2.5
24	2.35	1.45	1.9	5.0	17.62	1.9	1.5	5.5	2.0	1.5	3.2	2.8
25	2.75	1.45	1.75	4.4	24.6	1.8	1.2	11.5	1.9	1.5	5.3	3.5
26	3.05	1.6	3.1	3.8	21.9	1.55	1.0	12.5	1.8	1.45	3.2	4.8
27	2.82	1.8	8.1	3.35	16.9	1.4	1.1	14.1	1.75	1.5	2.5	7.5
28	2.5	1.55	9.1	3.0	14.1	1.4	3.0	14.9	1.75	1.45	2.2	9.2
29	2.22	.....	6.5	2.7	14.6	1.45	3.25	9.7	2.1	1.45	2.15	10.5
30	2.1	.....	3.5	2.5	5.9	1.55	1.75	11.5	6.7	1.45	1.75	13.5
31	2.15	.....	2.95	.....	4.4	.....	1.25	4.9	.....	1.45	.....	14.5
1902.												
1	15.5	5.9	21.0	4.0	7.0	1.6	3.1	2.0	0.6	1.6	2.5	7.4
2	22.0	5.9	16.0	3.5	4.7	1.6	3.3	4.5	.5	1.9	2.5	7.0
3	15.0	11.0	15.0	3.25	4.0	1.5	2.75	2.9	.5	2.1	2.5	10.0
4	4.75	11.5	12.0	3.1	4.0	1.5	1.8	2.0	.8	1.1	1.8	11.9
5	3.8	12.0	10.0	3.1	4.5	1.4	1.8	3.6	1.3	2.0	1.75	12.0
6	3.8	8.0	9.7	3.6	3.3	1.35	1.6	3.3	1.2	10.0	1.7	13.1
7	3.15	4.3	10.5	3.65	3.6	1.25	1.65	2.0	1.0	11.0	1.75	12.0
8	3.3	4.7	7.0	8.0	3.8	1.3	1.65	4.2	.8	11.5	1.7	10.0
9	3.3	4.3	6.0	10.5	4.2	1.3	2.9	2.7	.75	3.8	1.7	8.0
10	3.15	3.5	6.5	11.0	3.5	1.3	1.7	1.65	3.0	2.2	1.65	6.0
11	3.2	3.15	5.0	10.9	3.8	1.25	2.0	1.6	3.5	2.25	1.5	3.5
12	3.1	3.3	4.8	5.0	2.5	1.25	1.3	3.6	2.3	4.7	1.45	3.0
13	2.75	3.3	4.5	4.15	2.45	1.2	1.3	1.7	1.3	7.8	1.4	2.5
14	2.1	3.25	4.2	3.15	2.45	1.2	1.25	1.5	1.0	6.5	1.45	3.0
15	2.0	2.9	3.9	3.55	2.45	1.2	1.0	2.6	.75	3.08	1.5	3.1
16	2.7	2.9	3.7	3.5	2.5	1.2	.99	6.5	.7	2.35	1.4	3.25
17	2.7	3.1	5.2	3.4	2.2	9.0	.9	3.2	.65	2.0	1.4	3.35
18	2.5	3.0	8.0	3.2	2.95	9.5	.8	2.0	.65	1.95	5.0	7.5
19	2.45	2.95	6.2	3.2	2.2	9.5	.75	1.5	.6	1.85	9.0	6.0
20	2.4	2.65	5.3	3.1	3.0	8.0	.75	1.2	.6	1.65	8.0	4.5
21	2.35	3.0	4.5	3.0	4.15	2.6	.75	3.7	.6	1.5	5.0	3.55
22	9.0	5.0	4.0	3.0	2.3	2.0	1.0	1.5	.8	1.45	2.8	8.5

Daily gage height, in feet, of Appomattox River at Mattoax, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1902.												
23	10.0	10.0	3.9	2.9	2.3	1.9	1.0	1.6	1.9	1.3	2.5	7.0
24	9.0	12.0	3.65	2.85	2.0	1.6	1.4	1.3	1.9	1.25	2.35	4.0
25	4.5	15.0	3.55	2.75	2.1	3.0	.9	1.1	1.2	1.35	3.0	3.5
26	4.0	18.0	3.45	2.75	2.3	3.0	.8	1.0	1.0	1.35	9 0	2.5
27	5.5	20.0	3.25	2.7	2.3	3.0	.85	1.0	2.35	1.25	9.0	2.25
28	8.2	24.0	3.15	2.65	2.0	3.0	.75	.7	1.6	1.85	10.0	2.3
29	8.0	.....	3.5	2.6	2.0	2.0	.65	.6	1.6	7.25	7.0	2.4
30	5.75	.....	5.5	3.5	1.7	3.55	1.2	.6	1.1	8.2	3.35	3.3
31	5.9	.....	5.55	.....	1.65	.....	2.2	.6	.....	3.8	.....	3.35
1903.												
1	3.38	4.9	8.35	13.5	3.65	3.4	2.55	1.75	11.4	1.6	1.75	1.9
2	3.0	4.25	9.9	14.5	3.4	3.15	2.05	4.05	8.65	1.45	1.7	1.95
3	11.2	3.9	7.02	11.5	3.25	2.9	1.95	3.05	8.2	1.4	1.7	1.9
4	11.8	9.5	4.55	5.4	3.52	2.6	1.75	2.24	4.6	1.45	1.7	1.85
5	13.25	10.5	4.25	6.5	4.0	2.4	1.75	2.6	2.9	1.55	2.25	1.8
6	14.0	10.5	4.0	6.5	3.55	4.4	4.0	2.01	2.55	1.55	3.3	1.8
7	16.0	11.3	3.8	5.0	3.3	6.2	8.5	2.0	2.15	1.4	3.65	1.85
8	5.7	5.3	4.85	5.8	3.32	14.0	3.3	1.8	2.0	1.45	2.55	1.8
9	4.5	6.25	7.25	9.0	3.1	11.6	2.3	1.55	1.95	3.0	2.1	1.85
10	3.75	5.8	7.38	10.0	2.95	7.4	1.95	1.5	1.95	4.4	2.08	1.85
11	3.3	4.5	6.1	6.9	2.8	6.5	1.8	1.4	1.95	2.75	2.02	2.1
12	6.1	8.0	5.8	5.1	2.75	5.4	1.7	3.3	4.0	2.25	2.0	2.05
13	5.4	6.7	6.5	4.95	2.7	5.8	4.7	2.3	2.9	1.95	1.95	2.1
14	4.0	7.65	5.3	14.5	2.65	4.0	10.2	4.6	1.95	1.75	1.9	2.7
15	3.5	5.0	4.5	15.05	2.65	3.2	11.8	3.35	1.7	1.75	1.95	2.75
16	3.4	8.0	4.1	15.5	2.55	3.1	13.1	2.6	1.6	1.65	1.8	2.8
17	3.5	14.9	3.8	16.35	2.45	2.6	4.4	3.2	1.75	1.65	1.8	1.8
18	3.5	15.9	3.6	8.5	2.4	2.7	2.8	2.1	4.1	2.95	3.3	1.5
19	3.25	18.0	3.5	5.3	2.35	2.4	2.85	3.4	3.8	3.8	4.6	1.45
20	2.95	18.0	3.35	4.75	2.3	2.3	2.5	7.65	2.32	2.98	3.3	1.7
21	2.8	15.9	3.25	5.6	2.25	2.35	2.35	5.2	1.8	2.2	2.25	7.5
22	7.2	5.3	8.9	7.25	2.22	3.3	2.05	3.2	1.7	2.01	2.2	8.0
23	7.9	4.8	15.0	5.9	2.25	2.45	2.01	2.35	1.55	1.85	2.15	4.5
24	4.9	4.35	19.2	4.9	2.25	2.3	1.8	1.9	1.5	1.9	2.1	3.1
25	4.2	4.25	22.3	4.7	4.05	2.3	1.75	1.55	1.5	2.0	2.0	3.4
26	3.75	3.9	20.0	4.35	4.65	2.4	1.5	1.5	1.45	2.05	2.0	3.1
27	3.65	3.6	17.2	5.3	3.55	2.55	1.45	1.45	1.5	1.85	2.0	3.15
28	5.25	4.6	6.6	5.5	3.1	2.7	1.35	2.0	1.45	1.75	2.0	3.2
29	9.0	.....	5.15	4.35	4.2	4.5	1.35	6.05	1.9	1.65	1.95	3.4
30	10.0	.....	6.1	3.9	4.0	2.9	1.35	6.9	2.05	1.65	2.0	2.25
31	6.3	.....	13.5	.....	4.0	.....	1.3	9.9	.....	1.6	.....	2.5
1904.												
1	2.7	3.5	4.55	3.75	3.5	1.7	1.5	1.15	0.8	1.2	1.06	1.44
2	2.5	3.65	4.25	3.4	3.0	4.45	1.4	1.5	1.3	1.1	1.11	1.42
3	2.5	2.75	3.65	3.1	2.7	9.05	1.85	1.25	1.4	.95	1.14	1.96
4	2.45	2.7	3.5	2.75	2.5	10.3	1.2	2.35	1.25	.85	1.16	2.96
5	1.65	2.5	3.35	2.55	2.35	5.6	.9	1.35	.9	.85	1.26	2.84
6	1.2	3.1	3.1	2.55	2.25	3.2	.8	1.25	1.4	.88	1.39	6.74
7	1.92	6.25	4.9	2.7	2.25	2.5	.8	1.25	1.15	.9	1.46	7.76
8	2.75	9.0	9.75	3.5	3.5	2.25	.75	.95	.95	.95	1.26	5.77
9	2.6	7.0	11.7	3.55	5.35	2.05	.9	.85	.85	.9	1.26	3.49
10	2.1	5.4	12.6	3.1	4.0	1.95	1.15	3.55	2.05	.88	1.22	2.84

Daily gage height, in feet, of Appomattox River at Mattoax, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
11	2.05	4.5	11.2	2.95	5.75	1.75	1.3	4.85	2.05	.95	1.22	2.49
12	2.3	3.1	4.6	2.55	4.2	1.9	1.05	4.65	1.0	.94	1.19	2.1
13	3.15	2.7	4.2	2.45	3.05	1.7	1.02	2.5	.9	.92	1.64	1.49
14	2.35	2.6	3.65	2.3	2.25	1.5	1.1	1.5	.8	.92	3.84	1.86
15	2.25	2.5	4.1	2.25	3.05	1.4	1.15	1.15	14.05	.86	5.69	2.12
16	2.25	2.75	3.75	2.3	6.1	1.35	.85	1.15	15.3	.92	3.24	1.92
17	2.5	4.45	3.6	2.35	3.75	1.4	.8	1.0	15.25	.83	2.39	2.54
18	2.2	3.5	3.65	2.25	3.2	1.3	.85	1.05	4.05	.92	2.08	2.24
19	1.85	2.4	3.5	2.1	5.1	1.4	.95	4.85	2.2	.89	1.76	2.62
20	1.5	3.5	3.45	2.1	7.0	1.25	.6	5.75	1.85	.83	1.66	2.44
21	1.85	5.5	3.15	2.05	4.3	1.15	.65	1.75	1.55	1.84	1.67	2.42
22	3.05	8.3	3.55	2.0	3.25	1.15	1.1	1.35	1.4	1.86	1.56	2.44
23	3.5	11.75	3.65	2.0	2.3	1.2	.8	2.75	1.3	1.93	1.67	2.02
24	4.5	12.6	3.45	1.95	2.45	1.25	2.0	1.15	1.2	1.54	1.66	3.66
25	3.8	12.85	3.45	2.0	2.2	1.05	4.8	1.05	1.2	1.14	1.77	6.26
26	3.5	8.0	3.4	2.0	2.0	.95	3.75	.85	1.15	1.09	1.51	6.69
27	3.2	4.6	4.25	2.95	1.85	.9	2.5	.85	1.15	1.16	1.44	5.44
28	3.1	3.85	4.9	9.0	1.75	3.95	2.65	.75	1.1	1.19	1.36	5.39
29	3.0	4.15	4.25	8.4	1.65	4.25	1.8	.75	1.05	1.24	1.37	4.69
30	1.6	.....	3.6	4.45	1.65	3.0	2.0	.85	1.65	1.1	1.42	3.49
31	1.65	.....	3.85	.....	1.5	.....	1.6	.85	.....	1.07	.....	2.74
1905.												
1	2.64	1.84	11.4	2.81	2.25	4.72	.92	.98	1.08	.98	1.35	1.42
2	2.54	2.16	8.24	2.65	2.01	5.08	.92	.78	3.78	.88	1.3	1.28
3	2.36	2.59	8.14	2.48	1.93	3.28	1.4	.7	11.92	.98	1.3	2.12
4	2.62	2.56	5.69	2.43	2.03	2.38	1.45	.7	12.22	1.05	1.3	4.8
5	2.89	2.42	5.74	2.88	2.21	1.98	1.82	.68	4.72	1.3	1.25	4.75
6	2.52	2.22	5.26	6.48	2.15	1.78	8.0	4.25	2.62	1.3	1.28	3.2
7	8.96	2.14	4.39	9.08	2.63	1.7	4.65	3.18	2.08	1.05	1.35	1.98
8	10.3	2.66	4.02	6.45	2.78	1.7	3.72	1.35	1.78	.88	1.42	1.82
9	10.7	3.24	3.92	4.25	2.68	1.82	2.92	2.82	1.58	.85	1.3	2.1
10	4.72	2.62	6.62	3.55	2.28	1.7	2.58	1.98	1.32	.98	1.28	6.85
11	3.84	2.89	7.74	3.31	1.93	1.42	2.25	4.5	1.28	1.05	1.28	7.98
12	3.89	2.64	6.39	3.83	10.71	1.35	1.68	5.2	1.32	1.68	1.18	5.1
13	8.84	4.24	4.89	6.73	10.98	1.28	1.72	3.65	1.38	2.55	1.22	3.1
14	9.36	7.46	4.54	6.53	7.03	1.28	4.42	4.88	1.28	2.32	1.22	2.38
15	5.32	7.92	3.94	5.55	4.18	1.2	4.15	7.88	1.2	1.28	1.28	2.38
16	3.84	6.06	3.54	5.73	6.03	1.08	2.7	5.5	1.1	1.15	1.25	2.72
17	2.86	4.26	3.22	4.73	7.91	1.08	2.25	3.62	1.28	1.15	1.3	3.18
18	3.32	3.64	3.16	3.88	7.31	1.12	1.45	3.38	2.15	1.15	1.32	4.78
19	3.16	3.42	3.02	3.35	4.55	1.5	1.32	2.08	2.68	1.15	1.18	5.7
20	2.94	3.19	2.96	3.15	3.43	1.38	1.2	1.6	2.05	1.12	1.25	8.5
21	2.82	5.19	3.32	2.91	2.78	1.42	1.42	1.48	1.58	1.22	1.38	14.5
22	2.64	8.12	4.69	2.81	2.43	3.75	2.2	1.4	1.55	1.18	1.5	13.35
23	2.46	9.74	4.76	2.58	2.28	1.8	2.4	1.3	1.35	1.15	1.4	13.6
24	2.39	10.5	3.52	2.45	2.08	1.62	3.1	1.18	1.25	1.1	1.28	14.7
25	2.39	12.5	3.34	2.35	1.93	2.58	1.9	1.12	1.1	1.18	1.32	14.75
26	1.84	11.3	3.24	2.33	1.81	2.1	1.42	3.4	1.32	1.35	1.32	7.3
27	1.26	11.7	4.04	2.43	2.05	1.58	1.25	5.18	1.08	1.68	1.35	3.88
28	1.79	11.7	4.92	2.68	3.18	1.28	1.15	2.9	1.02	2.5	1.32	3.4
29	2.64	.....	3.84	2.55	2.88	1.08	1.02	1.8	1.05	2.38	1.28	6.85
30	2.09	.....	3.26	2.35	2.21	.98	1.02	1.3	.98	2.58	1.32	8.3
31	2.02	.....	2.99	.....	2.95	.....	1.05	1.25	.....	1.45	.....	8.38

Rating table for Appomattox River at Mattoax, Va., from May 1, 1901, to December 31, 1903.

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	140	2.20	390	4.00	815	8.50	2,615
0.50	150	2.30	410	4.20	875	9.00	2,850
0.60	160	2.40	430	4.40	935	9.50	3,090
0.70	170	2.50	450	4.60	995	10.00	3,330
0.80	180	2.60	473	4.80	1,065	10.50	3,575
0.90	190	2.70	496	5.00	1,135	11.00	3,820
1.00	200	2.80	519	5.20	1,205	11.50	4,065
1.10	212	2.90	542	5.40	1,275	12.00	4,310
1.20	224	3.00	565	5.60	1,345	12.50	4,555
1.30	237	3.10	590	5.80	1,415	13.00	4,805
1.40	251	3.20	615	6.00	1,490	13.50	5,055
1.50	265	3.30	640	6.20	1,576	14.00	5,315
1.60	282	3.40	665	6.40	1,662	15.00	5,845
1.70	299	3.50	690	6.60	1,748	16.00	6,395
1.80	316	3.60	715	6.80	1,834	17.00	6,965
1.90	333	3.70	740	7.00	1,920	18.00	7,555
2.00	350	3.80	765	7.50	2,150	19.00	8,170
2.10	370	3.90	790	8.00	2,380	20.00	8,815

The above table is strictly applicable only for open channel conditions. It is based upon discharge measurements made during 1901 to 1903.

Rating table for Appomattox River at Mattoax, Va., from August 25, 1900, to April 30, 1901, and 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	102	1.80	274	3.60	626	6.80	1,736
0.10	109	1.90	288	3.70	652	7.00	1,820
0.20	116	2.00	303	3.80	679	7.50	2,037
0.30	124	2.10	318	3.90	707	8.00	2,260
0.40	132	2.20	334	4.00	735	8.50	2,492
0.50	140	2.30	350	4.20	793	9.00	2,730
0.60	148	2.40	367	4.40	853	9.50	2,977
0.70	156	2.50	385	4.60	915	10.00	3,230
0.80	165	2.60	404	4.80	979	10.50	3,490
0.90	174	2.70	423	5.00	1,046	11.00	3,750
1.00	183	2.80	443	5.20	1,115	11.50	4,010
1.10	192	2.90	464	5.40	1,187	12,00	4,270
1.20	202	3.00	485	5.60	1,261	12.50	4,530
1.30	212	3.10	507	5.80	1,337	13.00	4,790
1.40	223	3.20	529	6.00	1,415	13.50	5,050
1.50	235	3.30	552	6.20	1,493	14.00	5,310
1.60	247	3.40	576	6.40	1,573		
1.70	260	3.50	601	6.60	1,654		

The above table is strictly applicable only for open channel conditions. It is based upon discharge measurements made during 1900 to 1905. Above gage height 14.5 feet this table is the same as the preceding table Estimates obtained from this and the preceding table can only be considered approximate owing to the continued scouring and filling at the section.

Estimated monthly discharge of Appomattox River at Mattoax, Va.

(Drainage area, 745 square miles.)

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1900.								
August 26–31	385	124	180	.242	.054	.....	.....	.....
September	665	105	170	.228	.254	7	3.37	3.12
October	257	152	175	.235	.271	11	2.36	2.09
November	470	165	219	.294	.328	13	2.53	2.20
December	1,613	161	376	.505	.582	17	3.38	2.80
1901.								
January	5,232	223	941	1.26	1.45	44	3.34	1.89
February	576	229	320	.430	.448	48	.94	.49
March	2,779	223	505	.678	.782	26	3.05	2.27
April	7,555	358	2,322	3.12	3.48	58	5.99	2.51
May	12,160	299	2,064	2.77	3.19	44	7.26	4.07
June	935	251	477	.640	.714	22	3.20	2.49
July	2,334	200	575	.772	.890	24	3.67	2.78
August	6,115	175	2,592	3.48	4.01	31	13.06	9.05
September	1,791	273	493	.662	.739	18	4.20	3.46
October	1,380	258	360	.483	.557	160	.35	—.21
November	1,240	258	336	.451	.503	47	1.06	.56
December	5,575	307	1,489	2.00	2.31	43	5.38	3.07
The year	12,160	175	1,039	1.40	19.07	37	51.50	32.43

Estimated monthly discharge of Appomattox River at Mattoax, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1902.								
January	10,200	350	1,684	2.26	2.61	77	3.37	0.76
February	11,700	484	2,501	3.36	3.50	88	3.96	.46
March	9,490	602	2,014	2.70	3.11	76	4.09	.98
April	3,820	473	1,004	1.35	1.51	65	2.33	.82
May	1,920	290	601	.81	.93	54	1.72	.79
June	3,090	224	668	.90	1.00	20	5.04	4.04
July	640	165	277	.37	.43	22	1.94	1.51
August	1,705	160	437	.59	.68	19	3.56	2.88
September	690	150	246	.33	.37	14	2.63	2.26
October	4,065	212	934	1.25	1.44	19	7.60	6.16
November	3,330	251	877	1.18	1.32	33	3.99	2.67
December	4,855	400	1,637	2.20	2.54	71	3.60	1.06
The year	11,700	150	1,073	1.44	19.44	44	43.83	24.39
1903.								
January	6,395	519	1,762	2.37	2.73	57	4.82	2.09
February	7,555	715	2,582	3.46	3.60	69	5.22	1.62
March	10,410	627	2,592	3.48	4.01	67	5.96	1.95
April	6,591	790	2,449	3.29	3.67	113	3.26	—.41
May	1,012	394	598	.80	.92	47	1.97	1.05
June	5,315	410	1,006	1.35	1.51	41	3.70	2.19
July	4,855	237	852	1.14	1.31	32	4.14	2.83
August	3,282	251	704	.94	1.08	18	6.15	5.07
September	4,016	258	681	.71	1.02	45	2.29	1.27
October	935	251	372	.50	.58	22	2.61	2.03
November	995	299	414	.56	.62	47	1.31	.69
December	2,380	258	551	.74	.85	45	1.88	1.03
The year	10,410	237	1,214	1.63	21.90	51	43.31	21.41

Estimated monthly discharge of Appomattox River at Mattoax, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of, in inches.
1904.								
January	884	202	397	.533	.614	30	2.00	1.39
February	4,712	367	1,290	1.73	1.87	82	2.27	.40
March	4,582	507	1,109	1.49	1.72	64	2.68	.96
April	2,730	296	569	.764	.852	79	1.08	.23
May	1,820	235	595	.799	.921	24	3.83	2.91
June	3,386	174	537	.721	.804	19	4.18	3.38
July	979	148	254	.341	.393	10	3.86	3.47
August	1,318	160	339	.455	.525	20	2.70	2.17
September	6,007	165	789	1.06	1.18	49	2.40	1.22
October	292	168	193	.259	.299	51	.59	.29
November	1,295	188	295	.396	.442	21	2.13	1.69
December	2,152	225	662	.889	1.02	54	1.88	.86
The year	6,007	148	586	.786	10.64	36	29.60	18.95

Estimated monthly discharge of Appomattox River at Mattoax, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.
1905.					
January	3,594	208	892	1.20	1.38
February	4,530	280	1,443	1.94	2.02
March	3,958	477	1,074	1.44	1.66
April	2,769	355	776	1.04	1.16
May	3,740	275	807	1.08	1.24
June	1,073	181	321	.431	.481
July	2,260	176	407	.546	.630
August	2,206	154	511	.686	.791
September	4,384	181	549	.737	.822
October	400	170	229	.307	.354
November	235	200	213	.286	.319
December	5,710	210	1,710	2.30	2.65
The year	5,710	154	744	.999	13.51

ROANOKE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Roanoke River rises among the eastern foothills of the Blue Ridge southwest of the cities of Roanoke and Salem, in Virginia, and flows at first northeast, then southeast through Montgomery, Roanoke, Bedford, Campbell, Halifax, and Mecklenburg Counties. At Clarksville, Mecklenburg County, Va., it receives the waters of its main tributary, the Dan River. From this junction it flows on 185 miles southeast, into North Carolina, and empties into Albemarle Sound, a short distance below Plymouth, N. C. It is navigable at all stages for 120 miles to Weldon, N. C., where the river crosses the fall line. The area draining into the Roanoke River above its junction with the Dan is 3,546 square miles; that of the Dan River is 3,798 square miles. The total area drained by the Roanoke River is about 9,200 square miles.

A large part of the area drained by the Dan lies in North Carolina. The stream rises in Surrey County, N. C., and in Patrick County, Va., and flows at first southeast through Stokes County, N. C., then northeast through Rockingham and Caswell counties, N. C., and through Pittsylvania, Halifax, and Mecklenburg counties, Va., to the junction with the Roanoke.

The rainfall on the basin above the fall-line is about 48 inches per annum, and is evenly distributed throughout the year. The average amount probably increases slightly as the stream is ascended, though the records of rainfall over the basin are too incomplete to decide this matter. The slopes in the headwaters and in the upper tributaries are steep, freshets on the river are violent, and the fluctuations of height occur with great rapidity. Rises of 50 feet and over have been noted at Weldon, and freshets in which the rate of rise is 10 feet a day or more are frequent.

The United States Weather Bureau maintains gages on Roanoke River at Clarksville and Weldon, and on Dan River at Danville. Gaging stations were maintained by the United States Geological Survey during 1905 as follows: Roanoke at Roanoke, Va.; Roanoke at Randolph, Va.; Banister at Houston, Va.; Dan at South Boston, Va., and Dan at Madison, N. C.

During the summer of 1905 a survey of the Roanoke River was made in order to determine a plan and profile and other information which would be of use in hydraulic development. The survey consisted of a line of levels along the river, the bench marks of which served as a base for elevations, and a stadia transit survey by which

the plan of the river, elevations of the water surface and general topography were determined.

The level line started at a precise bench mark at Clarksville and ended at a precise bench mark at Rocky Mount, a distance of about 133 miles. A Berger 10-second level and a Philadelphia rod were used, the closing error being 0.623 feet. Permanent bench marks were set every few miles which served as a basis for the stadia levels.

The transit party ran a stadia traverse as close to the river as possible. The distances were read on the stadia and elevations determined by vertical angles. Sufficient side shots were taken to develop the plan of the river, elevations of the water surface were taken at least every mile, and above and below all falls and riffles. The method of carrying elevations by vertical angles and stadia proved to be very satisfactory, the closure upon bench marks of the level line being as follows:

From Brookneal to Hurt, a distance of 30 miles, half of which was over very rough country, the differences of elevation as determined by the transit was about 4 feet from that determined by the level; total difference of elevation, 150 feet, number of stations, 200. From Pig River to Roanoke City, a distance of 50 miles, the transit differed from the level by 1 foot; total difference of elevation, 400 feet, number of stations, 300.

The azimuth of the transit line was checked by observations on Polaris, and supplemented by frequent observations on the sun.

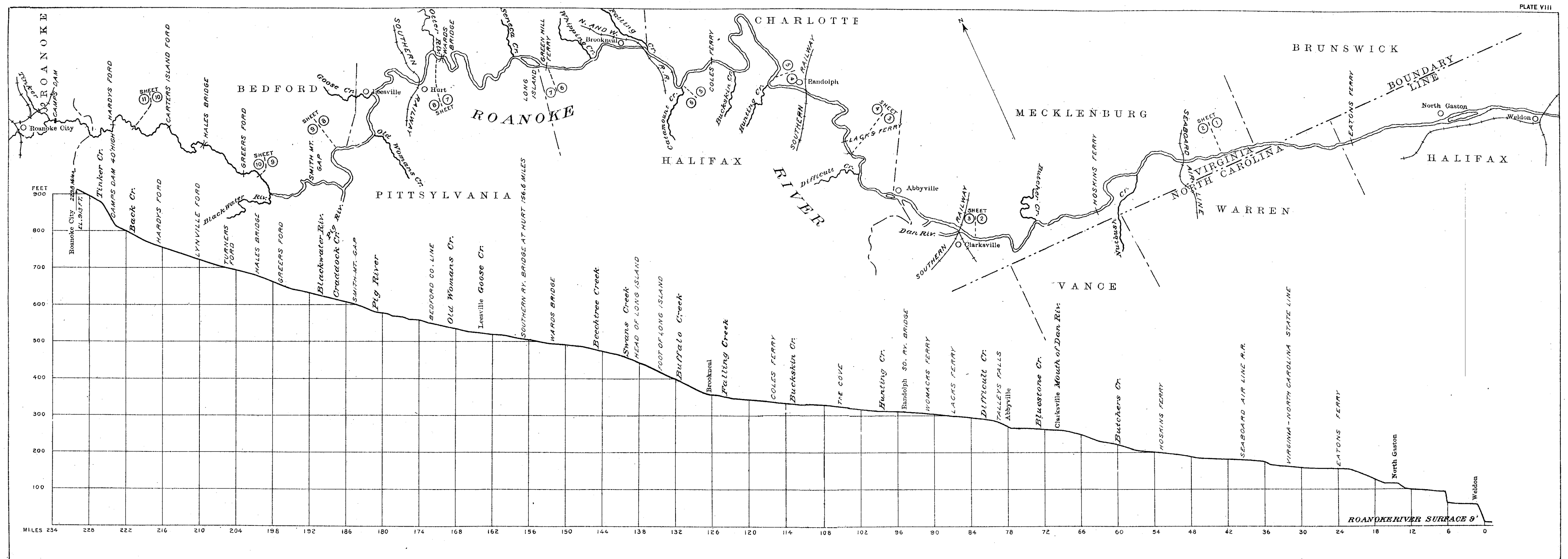
The following table shows the errors in azimuth from Pig River to Roanoke City:

Errors in Azimuth Determined from Observations on Polaris.

Length of Transit line. Miles.	Total Error. Minutes.
14	12 small.
29	6 small.
48	22 small.

After starting the survey it was found that the army engineers had made plans and profiles of the following stretches of the river: (1) Between Weldon and Clarksville. (2) Between Randolph and Brookneal, and (3) between Hurt and Pig River. The results of this work were obtained from the War Department, and the transit survey was omitted from these portions of the river.

Gages for determining the fluctuations of the water surface were established at various points along the river and from these records the final profile was reduced to uniform datum.



PLAN AND PROFILE OF ROANOKE RIVER FROM WELDON, N. C., TO ROANOKE, VA.

The Roanoke River from Weldon to Roanoke City is some 230 miles long, the lower 32 miles lie in North Carolina, the remainder being in Virginia. Along its entire length it flows through country that is fairly well cultivated, the principal crops being corn and tobacco; corn being grown mostly on the "low grounds" next to the river, and tobacco on the hill land. Land is worth from $3.00 to $20.00 per acre. The soil for the most part is sandy and the heavy rains wash large quantities of sediment into the river, which in high floods is deposited over the "low grounds," thus enriching the soil. The banks of the river are lined with a heavy growth of willows and brush, which protect them from scour in times of flood. This heavy fringe of trees and the immense fields of corn about 10 feet high made surveying extremely difficult, in numerous instances it was impossible to get within ½ mile of the river with the transit.

The region is subject to heavy rainstorms which produce floods that rise very rapidly and subside as quickly. The flood of 1877 is the highest known flood along the river. Below is a table of the heights above low water at various places:

Table of 1877 Flood Heights along Roanoke River.

Locality.	Distance above Weldon in miles.	Height above low water, in feet.
South Gaston	14	18
Eaton's Ferry	24	18
Boyd's Mill	36	34
St. Tammany's Ferry	40	33
Goode's Ferry	44	33
Taylor's Ferry	57	34
Field's Ferry	63	23
Clarksville	70	24
Randolph	95	36
Cole's Ferry	116	43
Dearwood Ford	182	32
Above Smith Mt. Gap	190	25
Lynville Ford	210	37
Backwater Ford	221	28

The flood of 1889 was about 5 feet below the 1877 flood at Taylor's Ferry.

The river is crossed by railroads at the following places: 40 miles above Weldon; at Clarksville; Randolph; Brookneal; Hurt, and Roanoke City. The Deepwater-Tidewater Railroad will parallel the river from the vicinity of Randolph to Leesville. This railroad, when finished, should help develop the country along its course and

should aid, by furnishing a means of transporting machinery, to develop the water-power along the river near which the railroad runs.

The roads as a rule are poor, due to the sandy nature of the soil, lack of care, and the heavy rains. In wet seasons they are practically impassable in some places.

In most cases where there is a power site there is suitable rock for masonry and the bed of the river is suitable for foundations.

The river is divided naturally into six sections:

1	Weldon to Clarksville	70 miles.
2.	Clarksville to Randolph	25 miles.
3.	Randolph to Brookneal	32 miles.
4.	Brookneal to Hurt	30 miles.
5.	Hurt to Pig River	24 miles.
6.	Pig River to Roanoke	50 miles

Section I, Weldon-Clarksville.—This section is 70 miles long, total fall from Clarksville is about 250 feet, average about 36 feet to the mile. The river varies in width from 600 feet to 1300 feet, banks are low, the valley is from ½ to 1 mile wide, bottom bowlders and rock. There are many sites favorable for dams and mills. The total fall in the old canal at Weldon is about 90 feet in a distance of 8½ miles. At Eaton's Falls, about 14 miles above Weldon, there is a fall of 12 feet in 3300 feet. From Clarksville to Taylor's Ferry, a distance of 13 miles, there is a total fall of 55 feet. The Dan River joins the Roanoke at Clarksville.

Section II, Clarksville to Randolph.—This stretch is 25 miles long, fall from Randolph about 49 feet, average, about 2.0 feet per mile. The width varies from 300 to 600 feet, banks low, bottom of river bowlders and rock, valley ½ to 1 mile wide. The only large falls in this stretch is Tally's Falls near Abbyville, about 8 miles above Clarksville. The total fall is some 18 feet in a distance of 2½ miles, the remainder of the river is of comparatively uniform slope with an occasional fall of a foot or two.

Section III, Randolph to Brookneal.—The length of this section is about 32 miles, total fall from Brookneal, 48 feet, average per mile 1.5, width about 400 feet, banks high, bottom bowlders and rock. There are no falls or ripples of any extent on this stretch.

Section IV, Brookneal to Hurt.—Length, 30 miles, total fall from Hurt is 151 feet, average per mile, 5 feet, banks of medium height, valley ¼ to ½ mile wide, bottom bowlders and rock. Just above Brookneal there is a fall of 18 feet in 1¾ miles. From Green Hill Ferry to Brookneal, a distance of 8 miles, there is a fall of 64 feet.

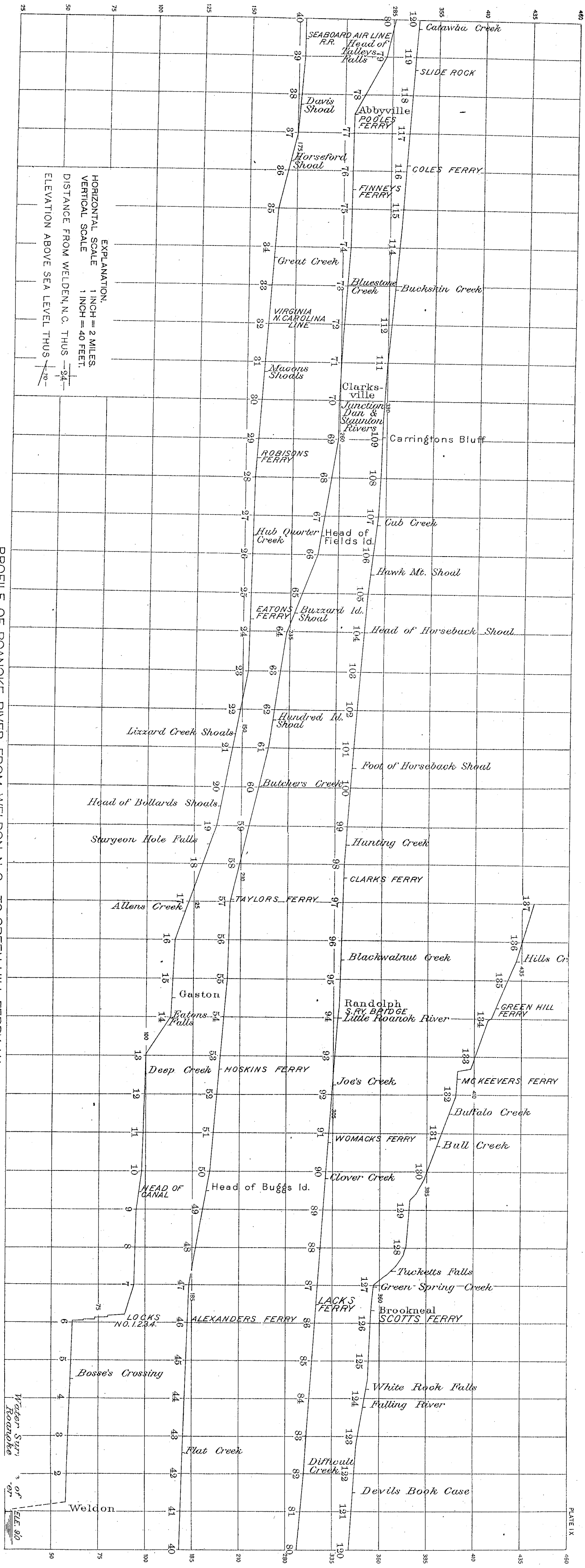
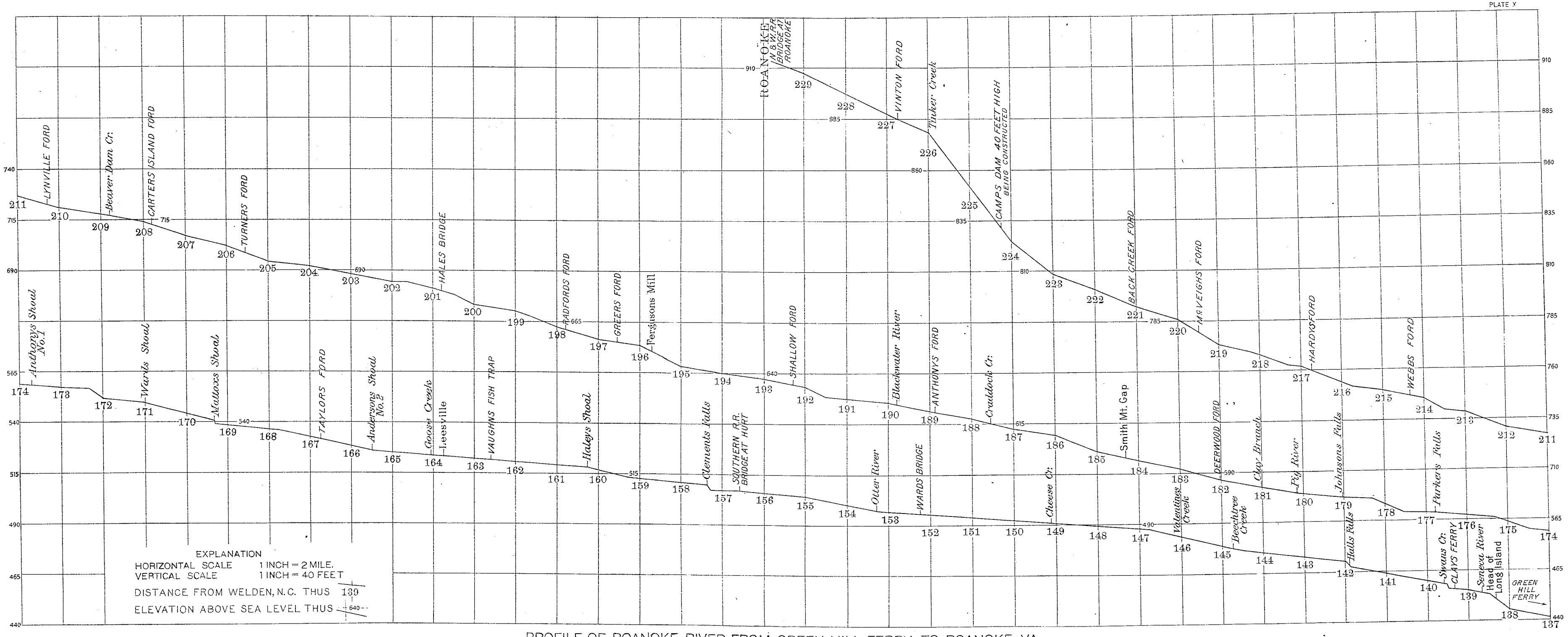

PROFILE OF ROANOKE RIVER FROM WELDON, N.C., TO GREEN HILL FERRY, VA.
EXPLANATION.
HORIZONTAL SCALE 1 INCH = 2 MILES.
VERTICAL SCALE 1 INCH = 40 FEET.
DISTANCE FROM WELDEN, N.C. THUS
ELEVATION ABOVE SEA LEVEL THUS
Catawba Creek
SEABOARD AIR LINE R.R.
Head of Talleys Falls
SLIDE ROCK
Davis Shoal
Abbyville
POOLES FERRY
Horseford Shoal
COLES FERRY
FINNEYS FERRY
Great Creek
Bluestone Creek
Buckskin Creek
VIRGINIA N. CAROLINA LINE
Macons Shoals
Clarksville
Junction Dan & Staunton Rivers
Carringtons Bluff
ROBISONS FERRY
Cub Creek
Hub Quarter Creek
Head of Fields Id.
Hawk Mt. Shoal
EATONS FERRY
Buzzard Id. Shoal
Head of Horseback Shoal
Hundred Id. Shoal
Lizzard Creek Shoals
Foot of Horseback Shoal
Butchers Creek
Head of Bollards Shoals
Sturgeon Hole Falls
Hunting Creek
CLARKS FERRY
TAYLORS FERRY
Allens Creek
Blackwalnut Creek
Hills Cr
Gaston
Randolph
S.RY. BRIDGE
Eatons Falls
Little Roanoke River
GREEN HILL FERRY
Deep Creek
HOSKINS FERRY
Joe's Creek
MCKEEVERS FERRY
Buffalo Creek
WOMACKS FERRY
Bull Creek
Clover Creek
HEAD OF CANAL
Head of Buggs Id.
Tucketts Falls
Green Spring Creek
LACKS FERRY
Brookneal
SCOTTS FERRY
LOCKS NO. 1.2.3.4.
ALEXANDERS FERRY
Bosse's Crossing
White Rock Falls
Falling River
Flat Creek
Difficult Creek
Devils Book Case
Weldon
ELE. 90
PLATE IX

PLATE X



PROFILE OF ROANOKE RIVER FROM GREEN HILL FERRY, TO ROANOKE, VA.

Section V, Hurt to Pig River.—Length, 24 miles, fall from Pig River, 72 feet, average per mile, 3, width about 200 feet, banks low, bottom bowlders and rock. There are no falls of any magnitude in this section.

Section VI. Pig River to Roanoke.—Length, 52 miles, fall from Roanoke, 406 feet, average about 8 per mile, width about 150 feet, banks low, bottom bowlders and rock, valley narrow.

There are several power sites along this stretch, probably the best being at Smith Mountain Gap where there is a narrow gorge between vertical walls of rock. A dam at this point, 75 feet high, would develop approximately 2000 horse-power at low water, this estimate being based upon the discharge at Roanoke City, where there is a gaging station, assuming that the discharge at Smith Mountain is directly proportional to the drainage areas.

ROANOKE RIVER AT ROANOKE, VA.

This station was established July 10, 1896, by D. C. Humphreys. The original gage, of the wire type, was replaced November 28, 1903, by a standard chain gage. The datum is the same as that of the gage which it replaced. The length of the chain from the end of the weight to the marker is 27.50 feet. Bench mark No. 1 is the upper edge of the second floor beam from the left abutment, downstream side. Its elevation is 21.99 feet above gage datum. Bench mark No. 2 is a standard copper bolt set in the face of the lower wing wall of the left abutment about 4 feet above the ground. Its elevation is 19.71 feet above gage datum. Discharge measurements were made from the Walnut Street bridge, at which the gage is located, up to July 21, 1903. Since that time they have been made from the Jefferson Street bridge, at which the section is more suitable. The initial point for soundings is the left end of the downstream handrail. The channel is straight for 500 feet above, and sharply curved directly below. It has a width of 124 feet between abutments. The current is sluggish at low stages. The bed of the stream is composed of hard clay, overlain by a shifting stratum of mud. The banks can overflow only at extreme flood stages. Crystal Spring overflows into the river between the gage and the measuring section. The gage is read once daily by Richard P. Royer.

Discharge measurements of Roanoke River at Roanoke, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1896.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
June 26	D. C. Humphreys	190	1.28	1.21	244
July 10	do	474	4.34	3.28	2,057
1897.					
April 2	F. H. Anschutz	220	1.45	1.30	320
1898.					
February 26	D. C. Humphreys	157	.84	.94	132
May 7	do	552	4.92	3.75	2,716
July 20	do	141	.80	.95	113
1899.					
March 29	D. C. Humphreys	348	3.23	2.51	1,123
June 27	do	205	1.41	1.32	290
August 7	do	156	.87	.88	135
1900.					
May 5	D. C. Humphreys	199	1.50	1.30	298
June 26	do	318	2.63	2.16	837
July 30	do	157	.95	.91	149
August 21	do	177	.52	.65	92
December 19	do	200	1.53	1.28	307
1901.					
March 28	D. C. Humphreys	331	2.65	2.20	878
July 15	N. C. Curtis	576	4.54	3.75	2,616
July 18	D. C. Humphreys	887	6.40	6.06	5,694
1902.					
July 10	D. C. Humphreys	204	0.98	1.09	199
August 21	do	158	0.49	0.63	78
1903.					
March 23	E. C. Murphy	1,077	6.36	6.92	6,846
May 1	do	362	1.94	2.01	701
May 13	E. W. Myers	250	1.39	1.40	349
May 13	do	250	1.40	1.40	350
July 21	B. S. Drane	245	0.59	1.03	146
September 22	Paul and Sawyer	329	0.96	1.35	316
November 26	W. C. Sawyer	265	0.45	.90	120

Discharge measurements of Roanoke River at Roanoke, Va.—Con.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1904.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
June 20	F. H. Brundage	269	1.09	1.32	294
August 8	N. C. Grover	345	1.37	1.67	473
September 16	R. H. Bolster	214	.59	.80	129
September 29	do	186	.49	.68	93
October 18	do	170	.44	.63	76
1905.					
March 18	A. H. Horton	284	1.39	1.44	395
September 12	R. H. Bolster	323	.84	1.22	274

NOTE.—Measurements prior to June, 1903, with the exception of the one of August 21, 1900, were made from the Walnut Street Bridge; measurements after June, 1903, and that of August 21, 1900, were made from the Jefferson Street bridge.

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

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1896.												
1								.8	.7	1.95	.75	2.0
2								.9	.65	1.7	.75	1.9
3								.9	.6	1.4	.75	1.9
4								.9	.72	1.1	.75	.85
5								.9	.78	1.0	2.6	.82
6								.85	.8	.95	2.1	.82
7								.7	.75	.9	1.95	.8
8								.7	.7	.85	1.95	.8
9								.7	.7	.85	1.9	.78
10							3.53	.7	.55	.8	1.85	.78
11							2.8	.9	.5	.8	1.82	.76
12							2.2	.8	.6	.75	1.8	.75
13							1.95	.7	.5	.8	1.7	.75
14							1.75	.75	.55	.85	1.65	.75
15							1.63	.8	.52	.8	1.5	.75
16							1.53	.74	.65	.75	1.45	.75
17							1.55	.8	.6	.75	1.4	.9
18							1.5	.69	.59	.75	1.3	.95
19							1.45	.62	.5	.75	1.22	.9
20							1.4	.62	.55	.75	1.1	.85
21							1.4	.6	.6	.75	1.0	.85
22							1.38	.65	.55	.75	.9	.85
23							1.5	.75	.5	.75	.85	.82
24							1.33	1.03	.5	.75	.85	.82
25							1.3	.99	.45	.75	.8	.8
26							1.25	.81	.5	.75	.75	.8
27							1.2	.75	.5	.75	1.0	.8
28							1.2	.75	.55	.75	1.3	.8
29							1.18	.75	1.33	.75	2.8	.8
30							.75	.6	3.4	.75	2.45	.75
31							.85	.75		.75		.75

Daily gage height, in feet, of Roanoke River at Roanoke, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1897.												
1	.75	.45	1.75	1.55	1.55	1.3	.7	.75	.75	1.5	.85	.5
2	.7	.45	1.55	1.55	4.0	1.3	.7	.75	.7	1.45	.85	.5
3	.7	.45	1.2	1.5	3.85	1.75	.75	.8	.65	1.4	.8	.5
4	.65	.45	1.0	1.85	3.45	1.7	.72	.8	.65	1.3	.8	.9
5	.63	.5	.95	1.8	2.95	1.65	.72	1.75	.65	1.25	.8	1.3
6	.6	6.82	.9	1.75	2.75	1.6	.72	1.7	.65	1.2	.75	1.15
7	.55	3.78	1.85	1.7	2.6	1.55	.72	1.65	.65	1.1	.75	1.1
8	.5	2.6	1.25	1.65	2.5	1.55	.7	1.4	.6	1.0	.75	1.0
9	.45	2.2	1.0	1.6	2.25	1.5	.7	1.2	.6	.9	.75	.95
10	.45	1.95	.95	1.55	1.9	1.5	.65	1.0	.6	.9	.7	.95
11	.45	1.9	.9	1.5	1.6	1.5	.62	.8	.55	.85	.7	.9
12	.45	3.0	1.95	1.5	1.58	1.45	1.0	.75	.45	.85	.65	.85
13	.45	2.9	2.2	1.5	1.55	1.45	1.0	.75	.45	1.9	.6	.85
14	.45	2.5	3.6	1.5	1.55	1.4	.95	.75	.45	1.95	.6	.8
15	.5	2.2	3.85	1.5	1.75	1.45	.9	.7	.4	1.85	.6	.8
16	.6	2.0	3.3	1.6	1.7	1.4	.85	.7	.4	1.7	.6	.8
17	.65	1.95	3.0	1.55	1.65	1.4	1.0	.7	.4	1.45	.6	.8
18	.6	1.8	3.0	1.5	1.6	1.35	1.1	.7	.35	1.2	.6	.8
19	.6	1.55	2.9	1.45	1.55	1.75	1.0	.7	.35	1.0	.6	.85
20	.65	1.45	2.75	1.45	1.55	1.75	1.1	.65	.35	1.2	.55	.85
21	.68	4.5	2.6	1.4	1.55	1.7	1.55	.65	.35	1.1	.55	.9
22	.7	4.4	2.45	1.4	1.5	1.65	1.45	.65	.35	1.0	.55	.9
23	.7	8.3	2.1	1.4	1.5	1.6	1.95	.9	1.85	.9	.55	.9
24	.65	3.5	1.95	1.4	1.5	1.55	1.85	1.1	1.85	.9	.55	.95
25	.65	2.6	1.75	1.4	1.45	1.5	1.7	.....	1.75	.85	.5	.95
26	.6	2.2	1.45	1.35	1.45	1.4	1.55	.....	1.7	1.1	.5	.95
27	.5	1.9	1.25	1.3	1.4	1.0	1.4	.....	1.65	1.1	.5	.95
28	.5	1.85	1.65	1.3	1.4	.72	1.25	.....	1.6	1.0	.5	1.0
29	.5	.....	1.63	1.25	1.4	.72	1.0	.75	1.55	.95	.5	1.0
30	.5	.....	1.6	1.2	1.35	.72	.8	.75	1.55	.9	.5	1.1
31	.45	.....	1.58	.....	1.35	.....	.75	.8	.....	.85	.....	1.1
1898.												
1	1.15	2.0	.95	2.25	.8	1.35	.95	1.85	1.05	1.3	1.85	1.4
2	1.15	1.9	.95	2.0	.75	1.3	.9	1.9	.95	1.4	1.8	1.4
3	1.15	1.85	1.0	1.85	.75	1.2	.85	1.95	.95	1.68	1.75	1.5
4	1.1	1.85	1.0	1.7	.7	1.15	.85	2.5	1.05	2.0	1.75	2.0
5	1.1	1.8	1.1	1.65	.7	1.1	.85	3.1	2.04	2.68	1.7	3.4
6	1.0	1.8	1.0	1.6	3.8	1.05	.85	2.45	2.0	3.0	1.75	2.5
7	.95	1.7	.95	1.6	4.9	1.05	.8	1.95	2.3	2.35	1.7	2.25
8	.95	1.65	.95	1.5	3.25	1.0	.75	1.9	1.07	2.0	1.7	2.0
9	.9	1.6	.9	1.5	2.5	1.0	.6	1.9	1.07	1.9	1.65	1.9
10	.9	1.6	.85	1.4	2.1	.95	.55	1.95	1.07	1.8	1.65	1.6
11	.85	1.55	.8	1.4	2.0	.9	.45	1.95	1.07	1.7	1.6	1.5
12	.85	1.5	.75	1.35	2.2	.9	.45	1.9	1.05	1.65	1.6	1.5
13	.85	1.5	.75	1.3	1.65	.95	.45	1.9	1.03	1.6	1.55	1.5
14	.95	1.4	.75	1.65	1.5	1.0	.45	2.6	1.01	1.55	1.55	1.45
15	1.3	1.35	.7	1.6	1.45	1.25	.5	2.45	1.01	1.5	1.45	1.4
16	1.4	1.3	.7	1.55	1.45	1.3	.5	2.2	1.01	1.5	1.4	1.35
17	1.35	1.2	.7	1.5	1.4	1.4	.45	1.9	1.05	1.4	1.55	1.65
18	1.25	1.15	.65	1.5	1.3	1.5	1.2	1.75	1.0	1.6	1.55	.....
19	1.2	1.1	.65	1.45	1.25	1.5	1.25	1.5	1.0	3.5	1.95	.....
20	1.15	1.1	.65	.....	1.2	1.45	1.15	1.3	1.0	2.6	2.2	.....
21	2.0	1.0	.65	.....	1.15	1.4	.95	1.25	1.05	2.6	2.0	1.6
22	2.5	1.0	.6	.....	1.55	1.6	1.75	1.2	1.4	5.0	1.9	1.55

Daily gage height, in feet, of Roanoke River at Roanoke, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1898.												
23	2.35	1.0	.6	.....	3.1	1.7	1.75	1.1	3.55	4.45	1.85	2.8
24	2.35	.95	.7	.....	2.95	1.6	1.6	1.1	2.2	3.0	1.75	2.5
25	2.4	.95	1.5	.....	2.4	1.55	1.45	1.0	1.85	2.75	1.65	2.35
26	2.4	.95	1.75	.....	1.95	1.5	1.25	.95	1.7	2.65	1.65	2.2
27	2.35	.9	2.0	.....	1.62	1.35	1.15	.95	1.5	2.5	1.5	2.0
28	2.2	.9	2.5	.....	1.5	1.15	1.35	1.1	1.5	1.9	1.4	1.9
29	2.15	.....	2.75	.....	1.45	1.0	1.4	.....	1.4	.....	1.5	1.85
30	2.15	.....	3.05	.....	1.4	1.0	1.55	.....	1.3	.....	1.4	1.8
31	2.15	.....	2.75	.....	1.4	.....	1.55	1.15	.....	1.95	.....	1.8
1899.												
1	1.8	2.25	3.2	2.0	1.43	1.15	1.0	.9	.75	.65	1.2	.8
2	1.8	2.35	2.95	1.88	1.43	1.3	1.05	.8	.85	.65	1.17	.8
3	1.75	2.05	2.85	.....	1.39	1.18	1.03	.8	1.0	.65	1.25	.75
4	2.0	3.1	6.15	1.75	1.35	1.06	1.0	.7	.85	.65	1.3	.75
5	1.9	3.5	8.15	1.72	1.32	1.0	1.0	.7	.75	.65	1.1	.75
6	2.75	3.75	4.7	1.67	1.32	.98	1.0	.8	.75	.63	1.05	.75
7	5.85	4.08	3.68	1.62	1.41	.97	1.05	.9	.7	.6	1.0	.77
8	3.55	3.9	3.1	2.1	1.8	.95	.98	.85	.65	.85	.95	.8
9	2.9	3.85	3.0	1.9	2.03	.9	.93	.85	.7	.9	.9	.78
10	2.4	3.6	2.8	1.8	1.85	.95	.9	.85	.65	.8	.85	.75
11	2.5	3.5	2.7	1.75	1.76	1.0	.85	.75	.6	.85	.83	.75
12	2.4	2.45	*a*3.1	1.7	1.7	1.75	.82	.75	.57	.8	.8	1.5
13	2.3	2.28	*a*3.5	1.66	1.82	2.25	.8	1.04	.7	.75	.8	1.55
14	2.8	.....	3.9	1.63	1.85	1.9	.8	1.0	.65	.7	.8	1.3
15	2.7	2.2	4.75	1.6	1.75	1.65	.95	1.0	.65	.7	.8	1.15
16	2.55	2.2	4.25	1.55	1.66	1.45	.83	.95	.65	.8	.78	1.05
17	2.45	3.55	3.7	1.52	1.57	1.3	.75	.9	.65	.77	.78	.95
18	2.3	3.25	3.45	1.47	1.46	1.18	1.05	.8	.65	.75	.75	.9
19	2.2	3.5	7.1	1.45	1.4	1.15	.9	.75	1.46	.73	.75	.9
20	2.15	3.95	4.9	1.4	1.32	1.1	.85	.72	2.05	.7	.73	.9
21	2.1	4.5	3.9	1.4	1.28	1.08	.82	.7	1.25	.7	.73	.88
22	2.07	4.4	3.55	1.37	1.25	1.05	.78	.67	1.0	.68	.7	.85
23	2.05	3.75	3.35	1.36	1.35	1.0	.8	.65	.85	.68	.75	.8
24	2.5	3.25	3.15	1.34	1.27	1.0	.85	.63	.8	.68	.75	1.1
25	2.25	2.9	3.0	1.38	1.2	1.1	.9	.6	.8	.68	.75	1.05
26	2.15	2.7	2.35	1.75	1.16	2.15	.85	.65	.75	.65	.73	.95
27	2.1	5.0	2.4	1.7	1.15	1.45	1.15	.75	.85	.65	.73	.9
28	2.05	3.65	2.45	1.6	1.13	1.15	1.0	.85	.75	.65	.75	1.25
29	.....	.....	2.3	1.5	1.1	1.05	.85	1.0	.7	.65	1.0	1.3
30	.....	.....	2.15	1.48	1.2	1.0	.82	.85	.65	.73	.85	1.45
31	2.25	.....	2.1	.....	1.13	.....	1.05	.8	.....	.8	.....	1.6
1900.												
1	1.7	1.1	3.8	1.85	1.5	1.2	1.5	.9	.65	.8	1.4	1.58
2	1.8	1.13	3.1	1.78	1.48	1.13	1.4	.85	.65	.95	1.5	1.55
3	1.8	1.1	2.5	1.72	1.45	1.15	1.3	.85	.65	1.0	1.65	1.5
4	1.7	1.05	2.1	1.65	1.4	1.1	1.7	.8	.65	1.1	1.75	4.43
5	1.15	1.2	2.0	1.58	1.37	1.05	1.85	.8	.65	1.15	1.45	3.7
6	.85	1.1	1.88	1.5	1.25	1.03	1.6	.75	.65	1.1	1.3	2.6
7	.8	1.15	1.77	1.45	1.22	1.03	1.4	.75	.65	1.05	1.2	2.2
8	.75	1.1	1.7	1.45	1.2	1.1	1.25	.75	.65	1.05	1.15	2.0
9	.75	1.1	1.95	1.45	1.2	1.2	1.15	.7	.65	1.0	1.1	1.85
10	.85	1.1	1.8	1.4	1.35	1.15	1.1	.7	.6	.95	1.07	1.72

a Interpolated; March 12 and 13, 1899.

Daily gage height, in feet, of Roanoke River at Roanoke, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1900.												
11	.9	.3	.....	1.38	1.2	1.1	1.05	.65	.6	.9	1.05	1.62
12	1.2	.45	1.75	1.4	1.18	1.15	1.0	.65	.6	.85	1.05	1.55
13	1.5	4.35	1.75	1.4	1.15	1.4	1.0	.65	.6	.85	1.03	1.48
14	1.35	3.08	1.8	1.36	1.13	1.85	.97	.63	.6	1.8	1.03	1.4
15	1.2	2.32	1.75	1.3	1.08	1.35	.95	.63	1.1	1.35	1.0	1.38
16	1.15	1.95	1.72	1.27	1.05	1.6	.95	.6	2.0	1.15	1.0	1.34
17	1.1	1.78	1.7	1.25	1.05	2.25	.93	.6	1.3	1.05	1.0	1.3
18	1.1	1.6	1.85	1.3	1.03	2.15	.93	.6	1.0	1.0	1.0	1.31
19	1.2	1.48	2.05	3.75	*a*1.05	1.75	.9	.65	.8	.95	1.0	1.25
20	4.1	1.4	4.45	2.65	*a*1.05	1.55	.9	.65	.7	.9	1.0	1.2
21	2.5	1.35	3.52	2.9	*a*1.1	1.4	.87	.65	.65	.85	1.0	1.25
22	2.0	3.8	2.75	2.95	*a*1.1	1.3	.87	.65	.8	.85	1.0	1.29
23	1.72	2.85	2.35	2.55	*a*1.5	1.3	.9	.65	1.15	.9	1.0	1.27
24	1.55	1.4	2.15	2.25	2.4	1.3	.95	.65	.95	4.75	1.0	1.42
25	1.4	2.1	1.95	2.05	1.85	1.8	1.05	.75	.85	2.5	.95	1.4
26	1.3	1.9	2.05	1.9	1.45	2.6	1.25	.7	.8	1.95	8.2	1.35
27	1.2	1.75	2.25	1.78	1.3	1.45	1.05	.65	.75	1.75	2.9	1.3
28	1.1	1.65	2.4	1.65	1.25	2.45	1.0	.65	.7	1.55	2.2	1.27
29	1.1	.....	2.2	1.6	2.0	2.13	.95	.7	.65	1.5	1.95	1.28
30	1.08	.....	2.03	1.55	1.6	1.7	.9	.65	.6	1.45	1.75	1.24
31	1.05	.....	1.98	.....	1.35	.....	.9	.65	.....	1.4	.....	1.28
1901.												
1	1.3	1.11	1.05	1.62	1.8	2.25	1.73	1.29	1.95	2.05	1.09	1.0
2	1.2	1.18	1.0	1.62	1.74	2.08	1.9	1.23	1.85	1.89	1.1	1.01
3	1.2	1.15	1.06	6.94	1.7	1.99	1.88	1.19	1.78	1.7	1.1	1.51
4	1.19	1.3	1.05	4.12	1.6	1.95	1.96	1.37	1.7	1.43	1.11	1.6
5	1.15	1.39	1.08	3.0	1.55	1.8	1.59	1.7	1.65	1.35	1.12	1.45
6	1.2	1.23	1.12	2.55	1.53	1.75	1.1	14.34	1.63	1.27	1.1	1.32
7	1.2	1.3	1.0	2.33	1.53	2.82	1.17	5.15	1.6	1.2	1.09	1.15
8	1.15	1.3	1.0	2.1	1.6	2.25	1.23	2.75	1.55	1.25	1.09	1.14
9	1.12	1.37	1.0	1.93	1.78	1.89	1.4	2.3	1.5	1.25	1.07	1.13
10	1.16	1.45	1.22	1.8	2.4	1.87	1.35	2.03	1.48	1.25	1.07	1.13
11	1.3	1.48	3.95	1.7	2.15	1.7	1.33	1.76	1.45	1.23	1.06	1.13
12	4.05	1.35	2.55	1.63	1.75	1.63	1.29	2.95	1.4	1.2	1.06	1.15
13	3.9	1.29	2.05	1.6	1.6	1.7	1.25	3.2	1.48	1.23	1.06	1.15
14	2.34	1.15	1.84	2.9	1.55	1.6	4.8	3.31	1.5	1.23	1.06	2.3
15	2.05	1.2	1.78	3.22	1.49	2.82	3.75	3.45	1.6	1.22	1.05	4.8
16	1.87	1.3	1.6	2.63	1.45	2.95	3.15	3.85	1.52	1.21	1.03	3.26
17	1.62	1.29	1.48	2.2	1.45	3.12	2.99	4.15	1.52	1.23	1.03	2.21
18	1.53	1.2	1.41	2.03	1.49	2.9	3.05	4.32	1.45	1.2	1.03	1.95
19	1.48	1.2	1.35	1.9	1.55	2.32	4.0	3.73	1.4	1.2	1.03	1.7
20	1.4	1.15	1.3	10.45	1.6	2.1	2.75	3.4	1.4	1.2	1.03	1.45
21	1.4	1.1	1.35	4.54	1.76	2.2	2.15	2.95	1.37	1.18	1.03	1.3
22	1.42	1.05	1.38	3.55	11.92	2.0	2.05	2.8	1.35	1.17	1.21	1.45
23	1.4	1.1	1.3	3.08	4.9	2.72	1.85	2.6	1.35	1.17	1.31	1.6
24	1.35	1.0	1.3	2.78	3.1	2.72	1.7	2.49	1.3	1.15	1.2	1.85
25	1.35	.88	1.3	2.58	3.0	2.35	1.65	2.21	1.27	1.12	1.15	2.1
26	1.28	1.2	1.72	2.4	3.4	2.07	1.59	2.25	1.25	1.1	1.08	2.2
27	1.31	1.07	3.21	2.2	4.61	2.03	1.55	2.23	1.3	1.1	1.03	2.25
28	1.25	1.06	2.54	2.05	4.4	1.9	1.49	2.21	2.1	1.09	1.01	2.15
29	1.05	.....	2.0	1.95	3.35	1.91	1.43	2.2	2.4	1.08	1.0	11.9
30	1.23	.....	1.79	1.85	2.4	1.75	1.36	2.2	2.1	1.09	1.0	7.25
31	1.2	.....	1.72	.....	2.49	.....	1.29	2.21	.....	1.09	.....	5.95

*a*Estimated; repairing bridge, May 19 to 23, 1900.

Daily gage height, in feet, of Roanoke River at Roanoke, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1902.												
1	5.2	2.17	3.9	2.45	1.38	1.05	1.35	1.02	.6	.7	.85	2.3
2	3.76	2.3	3.4	2.0	1.35	1.0	1.2	.9	.6	.75	.8	1.9
3	2.15	2.3	3.09	1.95	1.45	1.03	1.05	.82	.6	.68	.8	2.9
4	2.0	2.35	2.75	1.9	1.35	1.0	1.0	.8	.6	.68	.85	2.2
5	1.9	2.25	2.4	1.9	1.35	1.0	.9	.9	.6	1.95	.8	2.55
6	1.85	2.05	2.23	1.8	1.3	1.0	.95	.9	.6	1.5	.9	2.3
7	1.8	1.91	2.15	1.75	1.3	1.0	.95	.8	.6	.10	.9	1.95
8	1.75	1.77	2.32	1.68	1.35	1.0	.95	.7	.6	.85	.85	1.75
9	1.7	1.65	2.43	1.75	1.35	1.1	1.6	.7	.6	.75	.83	1.6
10	1.7	1.55	2.33	1.85	1.29	1.05	1.1	.7	.65	.7	.8	1.5
11	1.65	1.48	2.2	1.93	1.25	1.0	.95	.7	.65	.8	.75	1.45
12	1.47	1.4	2.15	2.0	1.22	.95	.95	.7	.63	1.05	.8	1.4
13	1.3	1.34	2.09	1.93	1.22	.93	.9	.68	.6	1.0	.78	1.4
14	1.25	1.3	2.03	1.8	1.25	1.0	.85	.7	.6	.9	.8	1.5
15	1.4	1.25	1.98	1.73	1.29	1.05	.85	.68	.6	.85	.8	1.5
16	1.5	1.21	2.03	1.73	1.25	1.25	.8	.7	.6	.8	.8	1.5
17	1.43	1.18	2.95	1.66	1.2	1.25	.8	.7	.6	.75	.8	2.4
18	1.38	1.15	2.5	1.63	1.19	1.15	.75	.65	.6	.75	1.7	2.2
19	1.3	1.15	2.25	1.65	1.19	1.1	.71	.65	.6	.75	1.6	1.9
20	1.35	1.2	2.12	1.63	1.19	1.05	.7	.65	.6	.75	1.3	1.7
21	1.5	1.35	2.0	1.63	1.25	1.05	.7	.65	.6	.7	1.15	1.6
22	1.67	1.7	1.95	1.55	1.2	1.0	.7	.65	.65	.7	1.05	1.75
23	1.75	2.1	1.7	1.5	1.15	1.0	.7	.65	.65	.7	1.0	1.65
24	1.6	2.15	1.64	1.5	1.15	1.0	.92	.63	.63	.7	1.0	1.55
25	1.53	10.06	1.5	1.5	1.12	1.0	.85	.61	.65	.73	1.15	1.5
26	1.4	5.15	1.45	1.5	1.12	1.25	.78	.6	.7	.75	2.1	1.4
27	1.8	3.5	1.4	1.48	1.13	1.25	.7	.6	.7	.8	2.4	1.1
28	2.95	8.75	2.05	1.45	1.12	1.25	.7	.6	.7	.93	1.8	1.3
29	2.8	.....	3.5	1.5	1.1	1.35	.72	.6	.65	1.1	1.65	1.3
30	2.71	.....	3.0	1.5	1.1	1.35	1.22	.6	.63	.9	1.4	1.3
31	2.35	.....	2.73	.....	1.08	.....	1.15	.6	.....	.9	.....	1.2
1903.												
1	1.2	.....	3.1	3.2	2.1	1.5	1.6	1.6	2.05	1.0	1.0	.65
2	1.25	.....	2.6	2.9	1.93	1.3	1.45	1.4	1.2	1.0	1.0	.9
3	4.1	1.6	2.3	2.6	1.85	1.25	1.4	1.2	1.08	.98	1.0	.9
4	2.7	2.1	2.1	2.9	1.9	1.1	1.3	2.6	1.0	1.0	1.0	.8
5	2.5	2.1	2.0	2.6	1.8	1.2	1.28	1.8	.95	.98	1.15	.95
6	2.2	2.25	1.95	2.4	1.7	1.25	1.35	1.35	.9	1.0	1.25	.85
7	1.95	2.0	2.0	2.35	1.65	2.1	1.45	1.2	.9	1.0	1.2	.9
8	1.85	1.9	2.0	2.4	1.63	1.65	1.35	1.1	.9	2.1	1.1	.8
9	1.4	1.75	2.9	2.45	1.55	1.45	1.2	1.08	2.1	1.5	1.1	.8
10	1.5	1.7	2.7	2.65	1.53	2.1	1.18	1.0	1.8	1.25	1.05	.8
11	1.5	1.8	2.4	2.4	1.5	1.9	1.5	1.05	1.1	1.15	1.0	.7
12	1.6	2.75	2.85	2.3	1.5	1.45	1.85	1.05	1.05	1.1	1.0	.75
13	1.35	2.4	2.85	2.2	1.48	1.5	2.35	1.0	1.0	1.05	1.0	.95
14	1.5	2.2	2.6	3.55	1.45	1.4	2.0	1.0	.95	1.05	1.0	.9
15	1.45	2.0	2.4	3.0	1.42	1.3	1.6	1.3	.95	1.03	1.0	.85
16	1.4	2.1	2.1	2.7	1.38	1.25	1.3	1.15	.9	1.0	1.0	.65
17	1.4	8.5	2.1	2.5	1.38	1.2	1.3	1.15	6.75	1.15	1.0	.65
18	1.35	3.5	2.0	2.3	1.38	1.2	1.25	1.18	2.6	1.45	1.1	.95
19	1.25	2.6	1.9	2.15	1.35	1.2	1.2	1.15	2.4	1.2	1.1	.55
20	1.25	2.35	1.8	2.05	1.3	1.1	1.1	1.2	1.6	1.15	1.0	.95
21	1.3	2.25	2.05	2.1	1.3	1.15	1.1	1.1	1.45	1.1	1.0	1.2
22	1.95	2.1	2.15	1.95	1.25	1.1	1.1	.95	1.35	1.05	1.0	1.05

Daily gage height, in feet, of Roanoke River at Roanoke, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
23	1.7	2.0	6.7	1.9	1.25	1.8	1.1	.95	1.3	1.05	.98	1.0
24	1.6	1.95	4.85	1.8	1.23	1.3	1.05	.95	1.25	1.05	1.0	.95
25	1.5	1.85	3.8	1.8	1.25	1.2	1.0	.9	1.2	1.05	1.0	1.0
26	1.5	1.75	2.8	2.45	1.33	1.2	1.05	.85	1.15	1.05	1.05	1.2
27	1.45	1.7	2.55	4.05	1.3	2.1	1.0	.88	1.15	1.0	1.0	1.0
28	2.35	2.4	2.3	2.9	1.2	1.8	.95	.9	1.13	1.0	.8	1.1
29	2.4	.....	2.2	2.5	1.2	2.9	1.0	.9	1.13	1.0	.85	1.1
30	.....	.....	4.8	2.3	1.3	2.0	.98	.9	1.08	1.0	.9	.85
31	.....	.....	4.75	.....	1.25	.....	1.0	1.5	.....	1.0	.....	.65
1904.												
1	.95	.75	1.75	1.15	1.05	2.45	2.1	1.5	.85	.65	.65	.7
2	.9	.75	1.8	1.1	1.05	3.25	1.5	1.7	1.2	.65	.65	.7
3	.8	.8	1.65	1.05	1.05	1.95	1.2	1.4	1.3	.6	.65	.75
4	.3	.95	1.55	1.05	1.05	1.45	1.0	1.5	.95	.6	.65	.9
5	1.05	.7	1.45	1.05	1.05	1.55	1.1	1.6	.95	.65	.75	.8
6	.65	.95	1.35	1.0	1.1	1.35	1.0	2.6	.9	.6	.7	1.0
7	.8	1.15	2.55	1.0	1.1	1.25	1.0	1.65	.85	.6	.75	1.0
8	.8	1.8	2.75	1.1	1.2	1.35	1.0	1.7	.8	.65	.75	.9
9	.8	1.4	2.05	1.15	1.2	1.15	.95	2.0	.8	.65	.75	.8
10	.8	1.25	1.8	1.15	1.3	2.05	1.5	3.0	.8	.65	.7	.8
11	.9	1.1	1.65	1.1	1.25	1.55	1.2	3.6	.75	.65	.7	.75
12	.9	1.1	1.45	1.25	1.15	1.75	1.1	2.4	.8	.65	.7	.7
13	.8	1.05	1.45	1.2	1.1	1.45	.95	1.6	.8	.65	.75	.7
14	.8	1.1	1.4	1.1	1.05	1.35	.9	1.4	.8	.65	.9	.7
15	.3	.95	1.4	1.15	1.15	1.2	.8	1.4	.9	.6	.85	.7
16	.85	.85	1.3	1.05	1.1	1.3	.8	1.4	.85	.65	.75	.7
17	.85	1.05	1.25	1.05	1.05	1.55	.7	1.15	.75	.65	.8	.75
18	.6	.9	1.2	.95	1.1	1.45	.7	1.15	.75	.65	.8	.75
19	1.35	.95	1.2	1.05	2.35	1.25	.7	1.1	.75	.65	.75	.7
20	.6	1.1	1.15	1.05	1.95	1.4	.7	1.15	.75	.65	.75	.65
21	.8	.95	1.15	.9	1.65	1.6	.7	1.0	.75	.65	.75	.65
22	.85	1.1	1.1	.85	1.45	1.4	.7	1.0	.75	.65	.75	.65
23	1.45	1.8	1.1	1.05	1.35	1.2	1.0	1.0	.7	.65	.75	.65
24	1.25	1.5	1.25	.75	1.25	1.1	1.2	.95	.7	.65	.75	.7
25	1.05	1.3	1.25	.85	1.25	1.0	.95	.95	.7	.65	.75	.7
26	1.05	1.25	1.25	.95	1.55	1.0	1.7	.9	.7	.65	.7	.8
27	.9	1.15	1.25	.95	1.35	1.4	1.3	.9	.7	.65	.7	.9
28	.85	1.1	1.25	1.45	1.25	1.4	2.75	.85	.7	.7	.7	.9
29	.95	1.35	1.2	1.15	1.05	1.2	1.5	.9	.7	.65	.7	.8
30	.85	.....	1.15	1.15	1.05	1.2	1.3	.85	.7	.65	.7	.7
31	.75	.....	1.15	.....	1.65	.....	1.2	.85	.....	.65	.....	.7
1905.												
1	.8	.8	1.85	1.25	1.0	1.4	0.9	1.95	1.03	.9	.9	.8
2	.8	.7	2.5	1.15	.95	1.3	1.0	1.6	5.28	.9	.9	.8
3	.9	.65	2.3	1.1	.9	1.3	1.7	1.5	2.92	.9	.85	1.47
4	.9	.8	2.0	1.1	.95	1.25	1.85	1.4	2.15	.92	.8	1.55
5	.9	.8	2.1	1.1	.95	1.15	2.5	1.7	1.78	.9	.8	1.3
6	1.0	.75	1.85	1.6	1.0	1.1	3.05	1.45	1.53	.9	.8	1.2
7	1.15	.8	1.85	1.65	1.3	1.05	2.45	1.35	1.5	.82	.8	1.18
8	1.1	.8	1.95	1.55	1.15	1.0	2.1	2.0	1.3	.82	.8	1.15
9	.95	.7	2.7	1.45	1.1	.9	1.4	1.4	1.23	.85	.8	1.25
10	1.0	.8	3.6	1.4	1.1	.85	1.7	1.3	1.3	.85	.8	1.2

Daily gage height, in feet, of Roanoke River at Roanoke, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
11	.95	.85	2.75	1.35	1.15	.85	2.1	1.35	1.28	1.12	.8	1.0
12	1.1	.8	2.2	1.4	4.72	.8	7.9	1.4	1.25	1.23	.8	.9
13	2.1	.8	2.0	1.45	4.0	.8	7.4	1.35	1.23	.92	.8	.9
14	1.75	.85	1.8	1.45	3.8	1.3	3.2	1.65	1.17	.85	.8	.9
15	1.45	.8	1.6	1.5	2.65	1.25	3.1	1.7	1.1	.83	.8	1.0
16	1.1	.9	1.6	1.5	3.7	1.2	2.6	1.5	1.1	.9	.8	1.0
17	1.15	.85	1.5	1.45	3.3	1.25	1.6	1.4	1.17	.85	.8	.95
18	1.15	.85	1.45	1.45	2.5	1.25	1.35	1.3	1.13	.85	.77	1.0
19	1.15	1.0	1.4	1.3	2.0	1.25	1.5	1.25	1.1	.87	.72	1.2
20	1.05	.95	1.1	1.3	1.9	1.4	1.75	1.2	1.03	.88	.78	4.3
21	1.0	1.3	1.3	1.25	1.65	2.75	1.85	1.15	1.0	.85	.88	2.3
22	.95	1.7	1.5	1.25	1.55	1.3	1.85	1.1	.95	.8	.82	1.0
23	.95	1.4	1.3	1.25	1.45	1.35	1.8	1.05	.97	.8	.8	1.9
24	.9	1.5	1.3	1.15	1.4	1.6	1.6	1.35	.95	.8	.8	1.8
25	.6	2.0	1.3	1.15	1.4	1.95	1.75	1.2	.92	.88	.8	1.7
26	1.1	2.2	1.3	1.1	1.35	1.5	1.55	1.9	.9	1.1	.8	1.6
27	.8	2.2	1.3	1.1	1.8	1.35	.....	1.4	.9	1.12	.9	1.65
28	.8	1.85	1.25	1.1	1.75	1.2	.....	1.3	.9	1.02	.82	1.6
29	.9	.....	1.25	1.05	1.6	1.1	.....	1.2	.9	.9	.8	1.55
30	.8	.....	1.2	1.0	1.5	1.0	.....	1.15	.9	.9	.8	1.4
31	.7	.....	1.25	.....	1.45	.....	2.1	1.1	.....	.9	.....	1.4

Rating table for Roanoke River at Roanoke, Va., from July 10, 1896, to December 31, 1903.

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.5	70	1.4	347	2.3	955	3.2	1,900
0.6	76	1.5	405	2.4	1,045	3.3	2,020
0.7	85	1.6	463	2.5	1,135	3.4	2,140
0.8	99	1.7	521	2.6	1,230	3.5	2,265
0.9	121	1.8	580	2.7	1,330	3.6	2,390
1.0	151	1.9	641	2.8	1,435	3.7	2,515
1.1	189	2.0	707	2.9	1,545	3.8	2,645
1.2	237	2.1	785	3.0	1,660	3.9	2,775
1.3	290	2.2	865	3.1	1,780	4.0	2,905

The above table is strictly applicable only for open channel conditions. It is based upon discharge measurements made during 1896 to 1903. It is well defined between gage heights .6 feet and 7.0 feet. The table has been extended beyond these limits. Above gage height 4.00 feet the rating curve is a tangent, the difference being 135 per tenth.

Rating table for Roanoke River at Roanoke, Va., from January 1, to December 31, 1904

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.30	43	0.75	115	1.40	330	2.30	940
0.35	47	0.80	127	1.50	380	2.40	1,030
0.40	52	0.85	140	1.60	430	2.50	1,130
0.45	58	0.90	153	1.70	490	2.60	1,230
0.50	65	0.95	167	1.80	550	2.70	1,330
0.55	73	1.00	181	1.90	620	2.80	1,435
0.60	82	1.10	212	2.00	690	2.90	1,545
0.65	92	1.20	247	2.10	770	*a*3.00	1,660
0.70	103	1.30	286	2.20	850		

The above table is strictly applicable only for open channel conditions. It is based upon discharge measurement made during 1896 to 1904. See also foot note to 1903 table.

*a*Above 3.00 feet gage height the 1904 table is the same as the 1903 table.

Rating table for Roanoke River at Roanoke, Va., 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	74	1.30	310	2.00	725	2.70	1,340
0.70	96	1.40	360	2.10	800	2.80	1,440
0.80	122	1.50	415	2.20	880	2.90	1,550
0.90	152	1.60	470	2.30	960	3.00	*a*1,660
1.00	186	1.70	530	2.40	1,050		
1.10	224	1.80	590	2.50	1,140		
1.20	264	1.90	655	2.60	1,240		

The above table is strictly applicable only for open channel conditions. It is based upon discharge measurements made during 1896 to 1905. See also foot note to 1903 table.

*a*Above gage height 3.00 feet the 1905 table is the same as that for 1903.

Estimated monthly discharge of Roanoke River at Roanoke, Va.

(Drainage area, 388 square miles.)

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1896.								
July 10–31	2,302	91	506	1.30	1.06	.....	a6.88	.....
August	162	76	98	.254	.294	13	2.15	1.86
September	2,140	67	154	.397	.443	9	4.98	4.54
October	673	91	142	.366	.422	44	.95	.53
November	1,435	91	422	1.09	1.22	27	4.47	3.25
December	707	91	156	.402	.464	92	.50	.04
1897.								
January	91	67	75	.194	.224	13	1.64	1.42
February	8,710	67	1,514	3.90	4.06	57	7.10	3.04
March	2,710	121	796	2.05	2.36	63	3.74	1.38
April	610	237	404	1.04	1.16	69	1.67	.51
May	2,905	318	771	1.99	2.29	62	3.71	1.42
June	550	87	378	.974	1.09	57	1.90	.81
July	673	78	203	.523	.603	13	4.72	4.12
bAugust	550	80	157	.405	.467	17	2.83	2.36
September	610	61	190	.490	.547	28	1.96	1.41
October	673	109	250	.644	.742	19	3.86	3.12
November	109	70	82	.210	.234	21	1.13	.89
December	290	70	132	.340	.392	10	3.72	3.33
The year	8,710	61	413	1.06	14.17	37	37.98	23.81

aPrecipitation for complete month July, 1896.
bDischarge interpolated August 25 to 28, 1897.

Estimated monthly discharge of Roanoke River at Roanoke, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1898.								
January	1,135	109	454	1.17	1.35	47	2.90	1.55
February	707	121	350	.902	.939	152	.62	—.32
March	1,720	76	318	.820	.945	27	3.47	2.53
April 1-19	910	290	466	1.20	.848	.....	*b*1.96	.....
May	4,120	85	747	1.93	2.22	36	6.14	3.92
June	521	121	270	.696	.776	28	2.82	2.04
July	550	67	203	.523	.603	14	4.32	3.72
*a*August	1,780	135	570	1.47	1.70	47	3.59	1.89
September	2,327	135	381	.982	1.10	29	3.75	2.65
*a*October	4,255	290	1,028	2.65	3.06	48	6.32	3.26
November	865	347	510	1.31	1.46	77	1.89	.43
*a*December	2,140	318	659	1.70	1.96	75	2.60	.64
1899.								
*c*January	5,403	550	1,124	2.90	3.34	90	3.73	.39
*c*February	4,255	745	2,098	5.41	5.63	96	5.83	.20
March	8,508	785	2,521	6.50	7.49	115	6.49	—1.00
*c*April	785	312	482	1.24	1.38	49	2.82	1.44
May	730	189	377	.972	1.12	35	3.23	2.11
June	910	121	278	.717	.800	16	5.03	4.23
July	212	91	130	.335	.386	12	3.16	2.77
August	165	76	105	.271	.312	8	3.72	3.41
September	745	74	133	.343	.383	9	4.03	3.65
October	121	76	88	.227	.262	16	1.59	1.33
November	290	85	128	.330	.368	23	1.62	1.25
December	463	91	173	.446	.514	27	1.92	1.41
The year	8,508	74	636	1.64	21.98	51	43.17	21.19

*a*Estimates August 29 and 30, October 29 and 30, and December 18, 19 and 20, 1898, interpolated.
*b*Precipitation for complete month, April, 1898.
*c*Estimates January 29 and 30, February 14 and April 3d, 1899, interpolated.

Estimated monthly discharge of Roanoke River at Roanoke, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches
1900.								
January	3,040	91	403	1.04	1.20	46	2.62	1.42
February	3,377	58	639	1.65	1.72	45	3.84	2.12
*a*March	3,512	521	964	2.48	2.86	58	4.91	2.05
April	2,580	263	687	1.77	1.98	81	2.44	.46
*b*May	1,045	162	320	.825	.951	27	3.55	2.60
June	1,230	162	422	1.09	1.22	21	5.85	4.63
July	610	114	214	.552	.636	21	3.08	2.44
August	121	76	86	.222	.256	17	1.50	1.24
September	707	76	123	.317	.354	7	5.16	4.81
October	3,918	99	381	.982	1.13	27	4.26	3.13
November	8,575	135	593	1.53	1.71	44	3.88	2.17
December	3,486	237	576	1.48	1.71	52	3.31	1.60
The year	8,575	58	451	1.16	15.73	35	44.40	28.67
1901.								
January	2,972	169	501	1.29	1.49	63	2.36	.87
February	393	116	247	.637	.663	93	.71	.05
March	2,840	151	531	1.37	1.58	48	3.26	1.68
April	11,610	463	1,702	4.39	4.90	75	6.50	1.60
May	13,600	376	1,466	3.78	4.36	58	7.46	3.10
June	1,804	463	885	2.28	2.54	36	7.06	4.52
July	3,985	189	859	2.21	2.55	48	5.26	2.71
August	16,860	232	1,926	4.96	5.72	53	10.72	4.99
September	1,045	263	454	1.17	1.30	37	3.52	2.22
October	745	181	267	.688	.793	92	.86	.07
November	296	151	183	.472	.527	51	1.04	.51
December	13,570	151	1,425	3.67	4.23	57	7.45	3.22
The year	16,860	116	870	2.24	30.65	55	56.20	25.55

*a*Estimate March 11, 1900, interpolated.
*b*Bridge being repaired May 19 to 23, 1900, estimates approximate.

Estimated monthly discharge of Roanoke River at Roanoke, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1902.								
January	4,525	263	781	2.01	2.32	78	2.96	.64
February	11,090	212	1,423	3.67	3.82	76	5.05	1.23
March	2,775	347	1,047	2.69	3.10	102	3.04	—.06
April	1,090	376	543	1.40	1.56	89	1.76	.20
May	376	181	256	.660	.761	41	1.85	1.09
June	318	129	187	.484	.540	14	3.84	3.30
July	463	85	143	.369	.425	13	3.24	2.81
August	158	76	89	.229	.264	27	.98	.72
September	85	76	78	.201	.224	9	2.40	2.18
October	673	83	134	.345	.398	9	4.36	3.96
November	1,045	91	239	.616	.687	15	4.60	3.91
December	1,545	189	567	1.46	1.68	69	2.43	.75
The year	11,090	76	457	1.07	15.78	43	36.51	20.73
1903.								
January 1–29	3,040	237	606	1.56	1.68	.....	a4.08	.....
February 3–28	8,980	463	1,154	2.97	2.87	.....	a5.40	.....
March	6,550	580	1,528	3.94	4.54	70	6.46	1.92
April	2,972	580	1,190	3.07	3.43	87	3.94	.51
May	785	237	391	1.01	1.16	125	.93	—.23
June	1,545	189	422	1.09	1.22	22	5.65	4.43
July	1,000	135	306	.79	.91	24	3.72	2.81
August	1,230	109	247	.64	.74	21	3.60	2.86
September	6,617	121	531	1.37	1.53	34	4.56	3.03
October	785	145	206	.53	.61	29	2.14	1.53
November	263	99	162	.42	.47	25	1.91	1.44
December	237	73	127	.33	.38	30	1.25	.87

*a*Precipitation for complete months, January and February, 1903.

Estimated monthly discharge of Roanoke River at Roanoke, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inshes.
1904.								
January	355	43	150	0.387	0.446	22	2.08	1.63
February	550	103	229	.590	.636	33	1.90	1.26
March	1,380	212	395	1.02	1.18	48	2.44	1.26
April	355	115	202	.521	.581	25	2.28	1.70
May	985	196	292	.753	.868	25	3.44	2.57
June	1,960	181	417	1.07	1.19	15	8.14	6.95
July	1,380	103	264	.680	.784	15	5.10	4.32
August	2,390	140	453	1.17	1.35	41	3.31	1.96
September	286	103	133	.343	.383	31	1.22	.84
October	103	82	91	.235	.271	208	.13	—.14
November	153	92	111	.286	.319	17	1.87	1.55
December	181	92	118	.304	.350	11	3.16	2.81
The year	2,390	43	238	.613	8.36	24	35.07	26.71

Estimated monthly discharge of Roanoke River at Roanoke, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1905.					
January	800	74	213	.549	.633
February	880	85	259	.668	.696
March	2,390	224	620	1.60	1.84
April	500	186	316	.814	.908
May	3,877	152	802	2.07	2.39
June	1,390	122	317	.817	.912
*a*July	8,170	152	1,190	3.07	3.54
August	725	205	374	.964	1.11
September	4,633	152	469	1.21	1.35
October	278	122	157	.405	.467
November	152	101	126	.325	.363
December	3,310	122	425	1.10	1.27
The year	8,170	74	439	1.13	15.48

*a*July 27 to 30, 1905, discharge interpolated.

ROANOKE RIVER AT RANDOLPH, VA.

This station was originally established August 27, 1900, by E. W. Myers, and is located on the railroad bridge about five-eighths of a mile southwest of the Southern Railway station at Randolph, Va. During the summer of 1902 the old bridge was replaced by a new one, a temporary gage, set by the observer, being used during the construction work; datum not known. October 13, 1902, a new wire gage was installed. The gage heights before and after this date indicate that the datum was raised approximately 2.00 feet. The present gage was installed May 20, 1903. It is a standard chain gage and occupies practically the same position as the wire gage which it replaced. It is attached to the upstream guard rail in the middle of the second span from the left bank. The datum is the same as that of the gage which it replaced. The length of the chain from the end of the weight to the marker is 43.13 feet. Bench mark No. 1 is the top of the floor beam nearest the zero of the gage scale at a point 0.2 foot downstream from the adjacent tie. Its elevation is 41.97 feet above gage datum. Bench mark No. 2 is a copper bolt set in the capstone on the downstream side of the left abutment about 3 feet from the end of the ties. Its elevation is 36.99 feet above gage datum. Discharge measurements are made from the bridge to which the gage is attached. The current is moderately rapid and has a well-distributed velocity. The channel is straight for a considerable distance above and below the station and has a width at ordinary stages of about 400 feet, broken by one bridge pier. The bed is composed mainly of firm material and is quite permanent. The bridge makes an angle of about 73° with the direction of the current. The gage is read once daily by J. E. Figg, the station agent.

Discharge measurements of Roanoke River at Randolph, Va.

Date.	Hydrographer.	Area of section	Mean velocity.	Gage height.	Discharge.
1900.		*Sq. feet.*	*Ft. per Sec.*	*Feet.*	*Sec-feet.*
August 27	E. W. Myers	573	2.35	1.00	1,349
October 31	....do	915	2.52	2.75	2,304
1901.					
January 15	E. Graves	1,975	3.11	*a*7.10	6,153
March 29	E. W. Myers	1,782	2.85	7.17	5,091
April 23	N. C. Curtis	3,179	3.85	11.25	12,260
May 23	E. Graves	14,000	4.15	*b*28.2	58,000
July 19	N. C. Curtis	3,791	3.94	14.10	14,950
July 25	E. W. Myers	1,276	3.05	*a*4.07	3,896
1902.					
August 15	B. S. Drane	928	2.49	*a*4.05	2,312
October 13	....do	2,214	2.80	9.15	6,203
December 5	....do	3,277	3.33	13.47	10,920
1903.					
March 27	E. C. Murphy	2,454	3.21	*a*10.45	7,877
May 20	E. W. Myers	1,068	2.83	5.19	3,025
June 24	....do	1,012	2.49	5.32	2,520
June 24	....do	1,010	2.46	5.29	2,490
August 8	B. S. Drane	865	2.57	4.59	2,220
August 28	....do	642	2.26	3.62	1,451
August 28	....do	652	2.25	3.61	1,468
September 25	Paul & Sawyer	772	2.43	4.20	1,877
December 3	W. C. Sawyer	696	2.11	3.82	1,466
1904.					
June 22	F. H. Brundage	865	2.37	4.47	2,049
September 27	R. H. Bolster	468	1.68	2.70	787
October 22	....do	517	1.59	2.92	822
1905.					
March 11	A. H. Horton	2,580	3.19	11.18	8,233
July 23	Grover and Horton	1,601	3.01	7.58	4,820
September 7	R. H. Bolster	1,070	2.36	5.43	2,520

*a*Gage height doubtful.
*b*30.2 as used for 1903 to 1905 rating table on account of a difference of approximately 2.0 feet between the 1901 and 1903 datums.

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

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1900.												
1	.....	.....	.....	.....	.....	.....	.....	.....	1.0	1.3	2.6	3.7
2	.....	.....	.....	.....	.....	.....	.....	.....	1.0	1.35	2.5	3.3
3	.....	.....	.....	.....	.....	.....	.....	.....	.75	1.6	2.8	3.05
4	.....	.....	.....	.....	.....	.....	.....	.....	.7	1.5	4.4	4.75
5	.....	.....	.....	.....	.....	.....	.....	.....	.75	1.55	4.6	15.5
6	.....	.....	.....	.....	.....	.....	.....	.....	2.0	2.0	4.0	10.5
7	.....	.....	.....	.....	.....	.....	.....	.....	1.0	1.8	3.45	6.75
8	.....	.....	.....	.....	.....	.....	.....	.....	.8	1.6	3.1	5.5
9	.....	.....	.....	.....	.....	.....	.....	.....	.7	1.8	2.95	4.3
10	.....	.....	.....	.....	.....	.....	.....	.....	.5	2.0	2.75	4.35
11	.....	.....	.....	.....	.....	.....	.....	.....	.5	1.65	2.6	4.0
12	.....	.....	.....	.....	.....	.....	.....	.....	.4	1.0	2.55	3.75
13	.....	.....	.....	.....	.....	.....	.....	.....	.3	1.5	2.55	3.6
14	.....	.....	.....	.....	.....	.....	.....	.....	.3	1.55	2.5	3.4
15	.....	.....	.....	.....	.....	.....	.....	.....	1.0	2.05	2.45	3.3
16	.....	.....	.....	.....	.....	.....	.....	.....	9.1	2.5	2.35	3.2
17	.....	.....	.....	.....	.....	.....	.....	.....	6.9	2.05	2.3	3.0
18	.....	.....	.....	.....	.....	.....	.....	.....	3.3	1.7	2.3	3.0
19	.....	.....	.....	.....	.....	.....	.....	.....	2.05	1.5	2.25	3.0
20	.....	.....	.....	.....	.....	.....	.....	.....	1.6	1.45	2.3	3.0
21	.....	.....	.....	.....	.....	.....	.....	.....	1.35	1.4	2.3	3.15
22	.....	.....	.....	.....	.....	.....	.....	.....	1.3	1.35	2.35	3.5
23	.....	.....	.....	.....	.....	.....	.....	.....	1.4	1.5	2.3	3.7
24	.....	.....	.....	.....	.....	.....	.....	.....	1.35	6.0	2.25	5.7
25	.....	.....	.....	.....	.....	.....	.....	.....	2.5	15.15	2.25	4.8
26	.....	.....	.....	.....	.....	.....	.....	.....	2.0	6.1	3.1	4.0
27	.....	.....	.....	.....	.....	.....	.....	.....	1.5	4.5	12.4	3.8
28	.....	.....	.....	.....	.....	.....	.....	.....	1.4	3.7	6.5	3.5
29	.....	.....	.....	.....	.....	.....	.....	.....	1.55	3.3	4.75	3.5
30	.....	.....	.....	.....	.....	.....	.....	.....	1.4	3.0	4.0	3.3
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.75	.....	3.95
1901.												
1	3.95	3.55	2.9	4.6	4.9	6.3	5.5	3.4	6.1	5.9	3.35	3.4
2	3.75	3.3	2.85	4.5	4.7	5.7	5.15	3.35	6.0	5.2	3.35	3.4
3	3.4	3.4	2.85	19.0	4.5	5.2	5.0	3.25	5.4	4.7	3.35	4.2
4	3.2	4.3	2.85	22.6	4.35	5.0	4.2	3.1	5.1	4.3	3.35	6.1
5	3.0	4.7	2.8	13.0	4.15	4.9	3.8	3.7	4.8	4.0	3.35	6.2
6	3.1	4.3	2.8	8.5	4.1	4.7	4.8	14.4	4.7	3.9	3.3	4.9
7	3.1	3.8	2.75	7.4	4.0	5.3	5.5	22.6	4.5	3.75	3.3	4.0
8	3.1	3.7	2.7	6.3	4.1	6.2	4.3	24.8	4.4	3.75	3.3	3.8
9	3.05	4.15	2.9	5.6	5.0	5.7	4.3	11.3	4.3	3.7	3.3	3.7
10	3.05	4.4	3.65	5.1	6.0	5.1	3.9	6.8	4.1	3.65	3.3	3.9
11	4.0	4.3	4.1	4.7	6.7	4.3	3.3	6.6	4.0	3.65	3.3	4.5
12	19.4	4.0	8.0	4.4	5.55	4.1	3.2	8.1	4.0	3.65	3.3	4.3
13	22.3	3.75	6.0	4.35	4.55	3.8	4.2	13.6	3.9	7.5	3.4	4.0
14	10.4	3.5	4.8	9.2	4.0	4.0	6.3	8.7	3.9	6.4	3.35	3.8
15	7.1	3.4	4.25	12.6	3.8	3.95	19.2	22.0	3.8	4.8	3.3	9.0
16	6.0	3.55	3.85	9.2	3.65	3.9	18.7	24.0	3.7	4.0	3.3	19.5
17	5.6	3.4	3.6	6.7	3.6	10.0	9.9	8.0	5.2	3.7	3.25	10.0
18	5.15	3.4	3.4	5.8	3.8	8.5	8.2	14.6	7.7	3.6	3.3	6.8
19	4.6	3.35	3.3	5.3	3.75	6.5	14.15	11.6	7.4	3.5	3.3	5.5
20	4.05	3.3	3.2	9.8	4.1	5.6	11.4	9.1	5.3	3.5	3.3	5.1
21	4.0	3.1	3.55	19.6	5.5	5.6	7.5	7.6	4.5	3.45	3.25	4.6
22	3.95	2.95	4.75	19.75	22.0	6.7	6.1	6.1	4.2	3.45	3.25	4.3

Daily gage height, in feet, of Roanoke River at Randolph, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901.												
23	4.0	2.95	4.05	11.3	28.2	5.4	5.4	6.6	3.9	3.45	3.9	4.4
24	3.9	2.8	3.55	8.7	22.0	5.2	4.85	8.7	3.9	3.4	5.2	4.5
25	4.0	2.8	3.6	7.8	9.8	5.9	4.5	10.1	3.8	3.35	6.2	5.2
26	3.9	2.9	7.7	6.85	9.1	5.0	4.2	9.4	3.7	3.35	4.7	6.2
27	3.6	2.95	13.5	6.3	9.65	8.3	4.15	19.0	3.5	3.35	4.0	8.7
28	3.55	3.0	9.6	5.8	12.8	6.2	4.6	20.0	3.1	3.35	3.6	8.9
29	3.5	.....	6.7	5.4	11.0	4.65	3.8	9.0	6.7	3.35	3.5	13.2
30	3.4	.....	5.5	5.1	8.3	6.15	3.6	7.7	7.3	3.35	3.4	32.0
31	3.55	.....	4.9	.....	7.0	.....	3.4	6.8	.....	3.35	.....	28.0
1902.												
1	19.0	10.2	23.7	7.5	5.5	3.9	5.1	3.7	2.3	4.2	4.2	9.0
2	10.5	12.5	21.2	6.8	5.1	3.9	5.0	5.1	2.3	4.0	4.0	11.5
3	8.9	17.5	14.2	6.3	6.4	3.9	4.2	4.4	3.2	3.7	3.85	16.0
4	7.9	11.5	9.9	5.9	7.0	3.8	3.8	3.9	3.0	3.7	3.8	13.4
5	6.9	7.9	10.6	6.0	5.5	3.85	3.7	3.5	3.7	8.6	3.8	13.7
6	6.1	6.4	10.9	6.5	5.4	3.7	3.5	3.9	3.3	23.0	3.8	15.05
7	6.0	6.0	8.7	5.8	5.3	3.6	5.3	4.3	3.0	20.0	4.1	10.2
8	6.05	6.2	8.0	10.3	6.7	3.9	4.8	3.8	2.6	5.6	4.1	8.0
9	5.9	5.7	8.3	11.2	6.0	3.9	4.3	3.8	4.0	5.1	4.1	6.9
10	5.8	5.0	8.4	8.4	5.5	3.7	4.55	3.5	3.0	4.5	3.8	6.1
11	5.7	4.95	7.7	7.1	5.2	3.6	4.6	3.9	3.4	5.0	3.75	5.8
12	5.5	4.9	7.3	6.6	4.8	3.5	3.6	3.3	3.0	10.0	3.7	5.55
13	4.9	4.9	6.9	6.2	4.8	3.4	3.4	3.05	2.7	8.8	3.7	6.2
14	*a*4.5	4.9	6.6	6.0	4.7	3.5	3.1	3.6	2.5	6.0	3.65	6.4
15	*a*4.5	4.9	6.3	6.1	4.7	6.0	3.0	3.8	2.5	5.2	3.65	6.2
16	4.9	4.85	6.8	5.9	4.6	11.1	2.8	7.4	2.5	4.7	3.6	6.5
17	4.9	4.9	14.3	5.8	4.5	18.3	2.6	4.3	2.5	4.4	3.5	9.2
18	4.8	4.8	10.3	5.6	5.0	8.1	2.5	3.7	2.5	4.2	3.6	10.6
19	4.75	4.6	8.3	5.5	4.7	5.6	2.5	3.3	2.5	4.1	5.1	8.1
20	4.7	4.7	7.3	5.4	4.65	4.7	2.6	2.7	2.5	3.9	5.0	7.0
21	5.2	5.1	6.75	5.3	4.7	4.5	2.8	2.7	2.5	3.8	5.4	6.4
22	8.5	9.0	6.4	5.2	4.7	4.1	3.5	2.7	2.8	3.75	5.0	8.0
23	8.5	9.5	6.2	5.15	4.75	4.0	3.0	2.7	2.8	3.7	4.5	8.0
24	6.5	11.5	6.0	5.1	4.75	3.9	2.8	2.5	2.7	3.7	4.3	7.0
25	5.4	19.2	5.8	5.0	5.6	3.8	2.7	2.4	2.7	3.65	6.0	6.3
26	5.4	26.5	5.65	4.9	4.7	4.2	2.6	2.5	2.7	3.6	11.0	5.85
27	7.6	24.0	5.5	4.9	4.6	4.5	2.6	3.3	4.1	3.6	11.4	5.2
28	10.2	20.2	5.5	4.8	4.4	4.6	2.5	2.7	4.4	8.1	8.1	4.9
29	10.2	.....	10.6	6.9	4.2	4.5	2.5	3.3	3.4	6.7	7.0	4.7
30	7.7	.....	12.2	6.5	4.1	5.6	2.4	2.7	3.0	5.0	7.0	5.5
31	7.7	.....	9.0	.....	4.0	.....	3.9	2.5	.....	4.4	.....	5.4
1903.												
1	5.1	7.7	18.8	15.7	7.4	6.6	7.9	4.4	10.6	4.1	4.1	3.8
2	5.6	6.9	12.3	11.3	7.0	6.4	6.8	4.7	9.1	3.9	4.3	3.9
3	19.9	6.55	9.2	9.7	7.0	6.1	6.3	5.1	5.7	3.8	4.2	3.8
4	18.0	10.7	8.6	10.9	7.0	5.9	5.9	5.3	4.5	3.7	4.5	3.9
5	16.0	13.6	7.8	10.2	6.9	6.4	5.7	5.1	4.3	3.9	4.8	4.1
6	11.2	11.1	7.5	8.9	6.7	6.8	5.5	4.9	4.4	4.2	5.0	4.0
7	9.1	8.3	7.8	8.4	6.5	8.9	5.6	4.7	4.6	4.8	4.9	4.2
8	8.2	8.1	7.9	13.0	6.4	11.1	5.3	4.5	4.5	6.6	4.6	4.1
9	7.2	8.1	9.4	13.4	6.1	7.6	5.0	4.3	4.4	7.3	4.4	4.4
10	6.6	7.5	10.2	11.5	6.1	8.4	4.7	4.4	4.2	6.4	4.1	4.2

*a*River frozen January 14 and 15, 1902.

Daily gage height, in feet, of Roanoke River at Randolph, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec
1903.												
11	7.8	7.7	9.0	9.1	6.0	9.4	4.4	4.2	4.3	5.6	3.9	4.0
12	7.6	13.0	9.4	8.3	6.0	6.9	4.6	4.3	3.8	5.3	3.8	4.1
13	6.7	11.0	9.7	9.6	5.9	5.6	4.7	4.4	4.3	4.9	3.7	3.9
14	6.0	8.8	9.4	13.2	5.9	5.8	5.2	4.3	4.6	4.7	3.9	4.2
15	5.7	8.0	8.6	12.8	5.8	5.7	5.4	4.2	5.4	4.9	4.1	4.1
16	5.8	8.4	8.0	11.9	5.6	5.4	5.3	4.6	7.8	5.1	4.2	3.8
17	5.8	22.6	7.6	9.8	5.5	5.5	5.0	5.0	8.5	4.8	4.0	4.2
18	5.8	26.2	7.2	8.9	5.4	5.4	5.1	5.5	15.3	4.7	3.9	4.4
19	5.55	16.8	6.9	7.4	5.3	5.1	4.7	6.3	7.9	4.6	3.8	4.6
20	5.2	10.1	6.75	7.5	5.2	4.9	4.2	5.9	6.8	4.4	3.9	4.8
21	7.1	8.9	9.4	7.35	5.1	5.0	4.3	5.6	6.3	4.3	4.0	4.6
22	10.7	8.4	21.8	7.2	5.2	5.2	4.5	5.2	6.1	4.2	4.1	4.5
23	9.0	7.8	24.0	7.4	5.3	5.0	4.4	4.9	5.4	4.0	4.2	4.6
24	7.5	7.4	26.3	7.5	5.5	5.1	4.2	4.8	4.9	3.9	4.4	4.8
25	6.7	7.1	22.8	7.7	5.8	5.2	4.0	4.5	4.2	4.1	4.2	4.9
26	6.3	6.8	12.9	7.9	5.7	6.4	3.9	4.1	4.0	4.2	4.1	4.7
27	6.0	6.5	10.2	9.0	5.9	8.1	3.7	3.8	4.5	4.1	4.2	4.6
28	10.3	11.0	9.4	11.45	6.2	11.9	3.8	3.4	4.6	4.2	3.9	4.4
29	13.4	.....	8.6	9.8	6.4	10.5	3.9	3.7	4.3	4.0	3.8	4.5
30	10.0	.....	13.4	8.6	6.5	9.6	4.0	12.3	4.0	3.9	3.7	4.3
31	8.6	.....	19.3	.....	6.8	.....	4.2	11.4	.....	3.8	.....	4.4
1904.												
1	4.5	3.9	5.4	4.5	4.9	11.8	6.2	5.9	4.6	2.7	2.9	3.4
2	4.6	4.2	5.2	4.4	5.1	12.2	5.8	6.0	4.8	2.8	2.8	3.7
3	4.5	4.4	5.0	4.3	5.0	8.6	5.6	6.2	4.9	2.9	2.7	3.9
4	4.4	4.8	5.1	4.4	5.2	6.9	5.4	6.4	4.7	3.0	2.8	3.8
5	4.5	5.2	5.2	4.5	5.1	5.6	4.2	7.9	4.5	2.9	2.9	3.7
6	4.6	7.1	5.0	4.6	5.1	5.4	4.3	8.2	4.6	3.1	3.0	3.8
7	4.4	7.4	5.4	4.5	5.4	5.2	3.9	6.8	4.4	2.9	3.1	3.9
8	4.2	7.2	5.6	4.4	5.6	5.1	3.6	5.5	4.2	2.8	3.0	3.9
9	4.0	6.9	5.9	4.3	5.8	4.9	3.5	6.6	3.9	2.7	3.2	4.2
10	4.1	6.6	6.1	4.4	6.0	5.0	3.6	9.4	4.0	2.9	3.6	4.1
11	4.3	6.2	6.2	4.4	6.2	4.8	3.4	9.2	4.1	2.8	3.9	4.2
12	4.5	5.6	6.4	4.5	5.8	4.9	3.5	5.6	4.6	2.7	4.3	4.4
13	4.4	5.1	6.2	4.4	5.4	5.2	3.6	4.5	5.8	2.6	4.9	4.8
14	4.7	4.6	5.9	4.5	4.9	4.7	3.7	4.2	6.4	2.7	4.7	4.5
15	4.8	4.8	5.7	4.7	4.3	4.9	3.8	3.9	6.1	2.6	4.6	4.6
16	4.9	5.1	5.6	4.8	5.7	5.1	3.6	3.6	5.4	2.7	4.3	4.4
17	4.6	5.3	5.5	4.6	6.9	5.3	3.5	3.5	4.2	2.6	3.7	4.2
18	4.4	6.1	5.2	4.4	8.4	5.0	3.3	3.7	4.1	2.5	3.3	4.1
19	4.2	6.8	5.0	4.3	7.2	5.1	3.1	3.9	3.8	2.6	3.1	3.8
20	3.8	7.4	4.8	4.1	6.5	5.3	3.2	4.1	3.6	2.7	3.2	3.7
21	4.2	8.2	5.0	4.0	5.6	5.5	3.0	4.2	3.7	3.4	3.3	3.9
22	4.8	10.4	5.3	3.9	5.4	5.2	2.8	4.4	3.4	2.9	3.2	4.3
23	5.3	9.6	5.6	3.8	5.5	5.2	2.7	4.3	3.1	2.8	3.1	4.8
24	5.4	8.2	5.4	3.9	5.3	5.4	3.3	4.5	3.0	2.7	2.9	5.2
25	5.2	6.8	5.1	3.8	4.9	5.3	3.9	4.6	2.8	2.7	3.0	5.1
26	4.9	6.2	4.9	5.9	4.6	5.5	5.8	4.8	2.9	2.8	3.1	4.9
27	4.6	5.8	4.7	7.1	4.4	5.7	7.6	4.5	2.7	2.9	3.0	4.7
28	4.3	5.4	4.5	6.9	4.2	5.8	8.1	4.7	2.9	2.8	3.2	4.5
29	4.0	5.3	4.6	5.7	4.0	6.7	7.2	4.9	2.8	2.7	3.1	4.2
30	3.9	.....	4.5	4.8	3.8	6.4	6.7	5.2	2.8	2.8	3.3	4.3
31	3.8	.....	4.4	.....	6.9	.....	5.8	5.1	.....	2.7	.....	3.9

Daily gage height, in feet, of Roanoke River at Randolph, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1	3.7	.....	9.8	4.3	4.2	6.7	7.1	*b*5.2	*b*5.2	3.3	3.45	3.95
2	3.7	.....	9.2	4.1	4.1	6.5	7.9	4.9	6.5	3.45	3.35	4.15
3	3.8	.....	8.6	4.2	4.3	6.0	8.4	4.7	19.93	3.45	3.4	4.25
4	4.3	.....	7.2	4.4	4.4	4.4	8.9	4.5	15.03	3.4	3.45	4.35
5	4.1	.....	7.4	5.2	4.2	4.5	9.5	4.4	9.8	3.35	3.45	4.5
6	3.8	.....	7.6	8.2	4.1	4.3	12.4	5.03	7.47	3.45	3.6	4.75
7	10.0	.....	7.8	7.6	4.0	4.2	14.8	5.73	5.63	3.35	3.45	4.8
8	12.9	.....	7.9	6.9	4.2	4.4	12.3	6.33	5.4	3.5	3.35	6.75
9	8.0	.....	7.7	6.2	4.3	4.2	9.4	6.67	5.43	3.65	3.45	7.0
10	5.5	.....	8.0	5.6	4.5	3.9	7.0	7.57	4.9	3.7	3.55	4.65
11	5.0	.....	11.07	4.8	7.8	3.6	8.2	7.73	4.47	3.75	3.55	4.75
12	5.1	.....	11.6	4.9	10.6	3.6	*b*10.01	8.57	4.17	4.15	3.6	4.9
13	10.1	.....	11.4	5.4	11.8	3.5	15.45	8.4	4.27	5.6	3.45	4.75
14	9.7	.....	10.9	6.2	12.0	3.6	21.6	8.1	4.27	6.05	3.6	4.75
15	7.0	.....	9.8	6.4	10.8	3.5	12.78	7.73	4.23	5.55	3.45	4.65
16	5.6	.....	8.4	5.9	9.7	3.7	8.41	7.37	4.23	4.9	3.45	4.85
17	4.7	.....	6.9	5.8	8.85	3.6	8.81	6.43	4.2	3.7	3.55	5.15
18	5.0	.....	6.2	5.4	6.85	3.7	7.95	6.07	4.27	3.65	3.65	5.2
19	4.9	.....	6.1	5.1	7.0	3.6	6.78	5.77	4.03	3.5	3.55	5.4
20	4.8	.....	5.7	4.9	6.0	3.5	5.88	5.7	3.87	3.5	3.55	5.65
21	4.5	*a*	5.8	4.7	5.9	3.7	5.48	5.5	3.77	3.65	3.45	5.55
22	4.3	10.5	5.6	4.4	5.8	3.6	5.21	5.2	3.87	3.65	3.55	5.45
23	4.1	11.9	5.4	4.2	5.6	3.5	8.48	4.37	3.7	3.65	3.55	5.65
24	3.8	12.1	5.2	4.0	5.5	12.0	10.05	4.17	3.5	3.45	3.65	13.35
25	3.5	11.4	5.1	3.9	5.7	11.8	6.91	4.1	3.17	3.6	3.55	21.85
26	3.2	11.0	5.3	4.3	5.8	9.6	6.51	4.3	3.17	3.9	3.65	16.8
27	3.3	10.8	5.4	4.2	6.0	8.8	5.85	4.23	3.33	3.75	3.65	12.05
28	*a*3.2	10.2	5.2	4.1	8.3	8.3	5.28	4.33	3.3	3.65	3.75	10.0
29	3.4	.....	4.9	4.2	7.8	7.6	5.08	4.43	3.33	3.55	3.85	8.3
30	3.4	.....	4.6	4.3	7.6	6.6	5.28	4.47	3.47	3.65	3.75	8.1
31	3.4	.....	4.4	.....	6.9	.....	5.38	4.73	.....	3.6	.....	8.15

*a*River frozen over January 28 to February 21, 1905.
*b*Gage read three times a day July 12 to September 30, 1905, and twice a day thereafter.

Rating table for Roanoke River at Randolph, Va., from September 1, 1900, to December 31, 1901.

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	1,145	3.20	2,690	6.00	5,050	10.00	9,750
0.60	1,205	3.40	2,830	6.20	5,260	10.50	10,400
0.80	1,270	3.60	2,980	6.40	5,480	11.00	11,050
1.00	1,350	3.80	3,140	6.60	5,700	11.50	11,750
1.20	1,430	4.00	3,300	6.80	5,920	12.00	12,500
1.40	1,515	4.20	3,460	7.00	6,150	12.50	13,250
1.60	1,615	4.40	3,620	7.20	6,380	13.00	14,000
1.80	1,730	4.60	3,780	7.40	6,610	13.50	14,850
2.00	1,850	4.80	3,940	7.60	6,840	14.00	15,750
2.20	1,990	5.00	4,100	7.80	7,070	14.50	16,650
2.40	2,130	5.20	4,270	8.00	7,300	15.00	17,600
2.60	2,270	5.40	4,450	8.50	7,900		
2.80	2,410	5.60	4,640	9.00	8,500		
3.00	2,550	5.80	4,840	9.50	9,125		

The above table is strictly applicable only for open channel conditions. It is not well defined.

Rating table for Roanoke River at Randolph, Va., from January 1, to October 12, 1902.

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
2.2	1,490	4.4	2,720	6.6	4,570	10.0	8,500
2.4	1,580	4.6	2,880	6.8	4,760	10.5	9,150
2.6	1,670	4.8	3,040	7.0	4,950	11.0	9,800
2.8	1,760	5.0	3,200	7.2	5,160	11.5	10,600
3.0	1,850	5.2	3,360	7.4	5,370	12.0	11,400
3.2	1,960	5.4	3,520	7.6	5,580	12.5	12,200
3.4	2,070	5.6	3,680	7.8	5,790	13.0	13,000
3.6	2,180	5.8	3,840	8.0	6,000	13.5	13,900
3.8	2,290	6.0	4,000	8.5	6,625	14.0	14,800
4.0	2,400	6.2	4,190	9.0	7,250	14.5	15,800
4.2	2,560	6.4	4,380	9.5	7,875	15.0	16,800

The above table is strictly applicable only for open channel conditions. It is not well defined.

Rating table for Roanoke River at Randolph, Va., from October 13, 1902, to December 31, 1903.

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.4	1,310	4.7	2,270	6.0	3,310	9.5	6,540
3.5	1,370	4.8	2,350	6.2	3,470	10.0	7,060
3.6	1,435	4.9	2,430	6.4	3,630	10.5	7,610
3.7	1,500	5.0	2,510	6.6	3,790	11.0	8,160
3.8	1,570	5.1	2,590	6.8	3,960	11.5	8,720
3.9	1,640	5.2	2,670	7.0	4,140	12.0	9,320
4.0	1,715	5.3	2,750	7.2	4,320	12.5	9,920
4.1	1,790	5.4	2,830	7.4	4,500	13.0	10,520
4.2	1,870	5.5	2,910	7.6	4,680	13.5	11,120
4.3	1,950	5.6	2,990	7.8	4,860	14.0	11,720
4.4	2,030	5.7	3,070	8.0	5,040	14.5	12,330
4.5	2,110	5.8	3,150	8.5	5,540	15.0	12,980
4.6	2,190	5.9	3,230	9.0	6,040		

The above table is strictly applicable only for open channel conditions. It is based upon 11 discharge measurements made during 1902 and 1903. It is fairly well defined between gage heights 3.6 feet and 14.0 feet.

Rating table for Roanoke River at Randolph, Va., from January 1, to December 31, 1904.

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
2.50	590	3.90	1,620	5.30	2,775	7.40	4,720
2.60	655	4.00	1,700	5.40	2,860	7.60	4,920
2.70	725	4.10	1,780	5.50	2,950	7.80	5,120
2.80	795	4.20	1,860	5.60	3,040	8.00	5,320
2.90	865	4.30	1,940	5.70	3,130	8.50	5,820
3.00	935	4.40	2,020	5.80	3,220	9.00	6,340
3.10	1,005	4.50	2,100	5.90	3,310	9.50	6,865
3.20	1,080	4.60	2,180	6.00	3,400	10.00	7,390
3.30	1,155	4.70	2,265	6.20	3,580	10.50	7,915
3.40	1,230	4.80	2,350	6.40	3,770	11.00	8,440
3.50	1,305	4.90	2,435	6.60	3,960	11.50	8,980
3.60	1,380	5.00	2,520	6.80	4,150	12.00	9,530
3.70	1,460	5.10	2,605	7.00	4,340		
3.80	1,540	5.20	2,690	7.20	4,530		

The above table is strictly applicable only for open channel conditions. It is based upon 14 discharge measurements made during 1902 to 1904, inclusive. It is well defined between gage heights 2.70 feet and 4.60 feet, and fairly well defined between gage heights 4.6 feet and 14.0 feet.

Rating table for Roanoke River at Randolph, Va., 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.*
3.00	920	4.30	1,870	5.60	2,950	7.80	4,980
3.10	985	4.40	1,950	5.70	3,035	8.00	5,180
3.20	1,050	4.50	2,030	5.80	3,120	8.50	5,680
3.30	1,120	4.60	2,110	5.90	3,205	9.00	6,190
3.40	1,190	4.70	2,190	6.00	3,290	9.50	6,715
3.50	1,260	4.80	2,270	6.20	3,470	10.00	7,250
3.60	1,330	4.90	2,355	6.40	3,650	10.50	7,800
3.70	1,405	5.00	2,440	6.60	3,830	11.00	8,350
3.80	1,480	5.10	2,525	6.80	4,010	11.50	8,900
3.90	1,555	5.20	2,610	7.00	4,200	12.00	9,470
4.00	1,630	5.30	2,695	7.20	4,390	12.50	10,050
4.10	1,710	5.40	2,780	7.40	4,580	13.00	10,650
4.20	1,790	5.50	2,865	7.60	4,780	13.50	11,250

The above table is strictly applicable only for open channel conditions. It is based upon discharge measurement made during 1902 to 1905, inclusive. It is fairly well defined between gage heights 2.6 feet and 14.0 feet.

Estimated monthly discharge of Roanoke River at Randolph, Va.

(Drainage area, 3,076 square miles.)

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
*a*1900.								
September	8,625	1,120	1,878	.61	.68	14	4.99	4.31
October	17,900	1,350	2,597	.84	.97	25	3.81	2.84
November	13,100	2,025	2,938	.96	1.07	34	3.15	2.08
December	18,600	2,550	3,944	1.28	1.48	44	3.40	1.92

*a*Estimates for 1900 considerably in error.

Estimated monthly discharge of Roanoke River at Randolph, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
*a*1901.								
January	35,980	2,550	5,362	1.74	2.01	71	2.83	.82
February	3,860	2,410	2,948	.98	1.02	116	.88	—.14
March	14,850	2,340	4,000	1.30	1.50	44	3.41	1.91
April	36,910	3,580	9,620	3.13	3.49	58	6.04	2.55
May	37,940	2,980	8,148	2.65	3.16	50	6.33	3.17
June	9,750	3,140	4,759	1.55	1.73	38	4.51	2.78
July	27,180	2,690	6,259	2.03	2.34	46	5.09	2.75
August	44,380	2,620	13,185	4.29	4.94	44	11.21	6.27
September	6,955	2,620	3,998	1.30	1.45	44	3.29	1.84
October	6,725	2,795	3,346	1.09	1.26	180	.70	—.56
November	5,260	2,725	2,984	.97	1.08	89	1.22	.14
December	75,100	2,830	9,621	3.13	3.61	46	7.84	4.23
The year	75,100	2,340	6,186	2.01	27.59	52	53.35	25.76
*b*1902.								
*c*January	26,200	2,800	5,388	1.75	2.02	63	3.20	1.18
February	51,050	2,880	10,290	3.35	3.49	67	5.24	1.75
March	40,500	3,600	8,616	2.80	3.23	103	3.14	—.09
April	10,120	3,040	4,398	1.43	1.60	87	1.84	.24
May	4,950	2,400	3,250	1.06	1.22	54	2.24	1.02
June	24,450	2,070	3,656	1.19	1.33	33	3.98	2.65
July	3,440	1,580	2,149	.70	.81	30	2.68	1.87
August	5,370	1,580	2,198	.71	.82	34	2.40	1.58
September	2,720	1,535	1,844	.60	.67	25	2.66	1.99
October	38,150	1,435	4,845	1.58	1.82	33	5.54	3.72
November	8,600	1,370	2,551	.83	.92	30	3.05	2.13
December	14,550	2,270	5,349	1.74	2.01	53	3.77	1.76
The year	51,050	1,370	4,545	1.48	19.94	50	39.74	19.80

*a*Estimates for 1901 considerably in error.
*b*Estimates January to October, 1902, considerably in error.
*c*River frozen January 14 and 15, 1902. No correction made in estimates.

Estimated monthly discharge of Roanoke River at Randolph, Va.—Con.

Month.	Discharge in second-feet.			Run-off.			Precipitation.	
	Maximum.	Minimum.	Mean.	Second-ft. per sq. mi.	Depth in inches.	Per cent. of precipitation.	In inches.	Loss of in inches.
1903.								
January	23,850	2,590	6,123	1.99	2.29	53	4.35	2.06
February	44,200	3,710	8,575	2.79	2.90	51	5.63	2.73
March	44,550	3,915	11,010	3.58	4.13	64	6.49	2.36
April	14,050	4,320	7,041	2.29	2.55	58	4.41	1.86
May	4,500	2,590	3,370	1.10	1.27	66	1.92	.65
June	9,200	2,430	4,147	1.35	1.51	28	5.37	3.86
July	4,950	1,500	2,445	.79	.91	28	3.29	2.38
August	9,680	1,310	2,712	.88	1.01	24	4.25	3.24
September	13,420	1,570	3,273	1.06	1.18	40	2.92	1.74
October	4,410	1,500	2,191	.71	.82	35	2.35	1.53
November	2,510	1,500	1,841	.60	.67	39	1.73	1.06
December	2,430	1,570	1,940	.63	.73	41	1.78	1.05
The year	44,550	1,310	4,556	1.48	19.97	45	44.49	24.52
1904.								
January	2,860	1,540	2,087	0.678	0.782	36	2.19	1.41
February	7,810	1,620	3,667	1.19	1.28	58	2.21	.93
March	3,770	2,020	2,787	.906	1.04	41	2.51	1.47
April	4,435	1,540	2,224	.723	.807	55	1.48	.67
May	5,720	1,540	2,939	.955	1.10	32	3.42	2.32
June	9,750	2,265	3,397	1.10	1.23	21	5.98	4.75
July	5,420	725	2,117	.688	.793	16	4.83	4.04
August	6,760	1,305	2,899	.942	1.09	30	3.66	2.57
September	3,770	725	1,801	.586	.654	35	1.86	1.21
October	1,230	590	787	.256	.295	45	.65	.35
November	2,435	725	889	.289	.322	17	1.95	1.63
December	2,690	1,230	1,881	.612	.706	24	2.94	2.23
The year	9,750	590	2,290	.744	10.10	30	33.68	23.58

Estimated monthly discharge of Roanoke River at Randolph, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1905.					
aJanuary	10,530	1,050	2,773	.901	1.04
February 22–28	9,585	7,470	8,497	2.76	.718
March	9,010	1,950	4,601	1.50	1.73
April	5,380	1,555	2,576	.837	.934
May	9,470	1,630	3,974	1.29	1.49
June	9,470	1,260	2,891	.940	1.05
July	28,960	2,508	6,485	2.11	2.43
August	5,750	1,710	3,083	1.00	1.15
September	23,940	1,030	3,213	1.04	1.16
October	3,335	1,120	1,528	.497	.573
November	1,518	1,155	1,292	.420	.469
December	29,740	1,592	4,733	1.54	1.78

aRiver frozen over January 28th to 31st. No correction made in estimates.

ROANOKE RIVER, ABOVE JUNCTION WITH DAN, AT CLARKSVILLE, VA.

This station was established October 28, 1895, and discontinued February 26, 1898. It was located at the Southern Railroad bridge about 1,000 feet above the mouth of Dan River. A wire gage was attached to the inside of the guard rail in the fourth panel of the third span from the right bank. The length of the wire from the end of the weight to the marker was 33.00 feet. A bench mark was established on the top of the third floor beam of the second span from the right abutment at the upper end; elevation 27.40 feet above gage datum.

About four miles above the junction of the Dan and the Roanoke Rivers is a cut-off, apparently occupying an old channel, diverting water from the Dan to the Roanoke. The banks are 10 feet high and about 225 feet apart. At its mouth is a shoal or riffle about 70 feet long, the water being, on December 4, 1895, about one foot deep and having an estimated velocity of approximately 3 feet per second, giving a total discharge from the Dan to the Roanoke of 200 second-feet. The total fall between the two rivers was estimated

to be approximately 2 feet, this being principally at the riffle at the mouth of the channel. The total length of the channel was about 1,000 feet. This cut-off, by carrying water from the Dan, vitiates the separate computations of discharge made at the stations below, but does not affect the total discharge for the Roanoke.

The weather Bureau maintained a gage on the Roanoke at Clarksville, Va., below its junction with the Dan, from 1891 to 1896, inclusive.

Discharge measurements of Roanoke River, above junction with Dan, at Clarksville, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1895.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
October 3	C. C. Babb	550	0.97	—0.07	533
October 28	....do	659	1.31	0.28	861
December 5	....do	917	1.25	0.61	1,151
1896.					
April 22	E. W. Meyers	1,256	1.58	3.43	1,971
May 26	....do	1,401	1.39	3.20	1,956
July 15	....do	1,890	2.25	4.70	4,252
September 15	A. P. Davis	723	1.03	2.00	748
1897.					
February 25	E. W. Myers	7,250	4.03	11.95	29,260
March 18	....do	2,838	2.93	3.67	8,326
September 29	....do	610	1.25	—0.25	763
1898.					
February 26	E. W. Myers	992	1.97	0.70	1,969

Daily gage height, in feet, of Roanoke River, above junction with Dan, at Clarksville, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1895.												
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.59	.7
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.89	.6
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.23	.6
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.03	.6
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.82	.65
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.65	.55
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.55	.5
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.5	.5
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.52	.4
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.52	.85
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.77	.85
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.79	.85
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.59	.75
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.08	.65
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.82	.55
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.73	.52
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.68	.55
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.6	.52
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.68	.7
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.55	.6
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.57	.65
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.55	2.05
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.55	3.78
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.58	3.38
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.5	1.65
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.65	1.3
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.65	1.12
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.25	.7	1.1
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.25	1.25	1.47
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.27	.9	1.5
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.2	.....	3.48
1896.												
1	4.75	3.4	.....	10.8	4.15	2.75	2.55	2.45	1.95	9.71	2.5	5.07
2	4.02	3.4	.....	11.75	5.2	2.7	2.45	2.4	1.93	10.56	2.55	6.37
3	3.42	4.25	.....	11.3	5.95	2.6	2.4	2.35	1.05	5.02	2.57	5.2
4	2.3	7.8	.....	7.3	5.0	2.5	2.35	2.3	2.9	3.26	3.0	4.09
5	3.1	6.95	.....	5.52	3.91	3.0	2.4	2.28	3.05	3.0	4.16	3.71
6	2.4	8.45	.....	4.9	3.79	3.65	2.55	2.25	2.5	2.85	8.26	3.59
7	2.55	10.55	.....	4.85	3.65	3.5	5.6	2.23	4.53	2.78	6.42	3.51
8	2.55	8.95	.....	4.5	3.5	3.0	8.25	2.2	3.36	2.7	4.01	3.43
9	3.05	7.22	.....	4.3	3.35	3.0	11.68	2.18	3.0	2.6	3.6	3.33
10	3.2	6.9	.....	4.05	3.25	3.5	15.8	2.18	2.5	2.55	3.3	3.25
11	3.1	5.91	.....	4.04	3.2	3.35	15.6	2.4	2.35	2.55	3.1	3.15
12	3.0	4.92	.....	4.03	3.15	3.25	10.45	3.18	2.15	2.5	3.0	3.09
13	2.82	4.43	.....	3.98	3.1	3.2	7.2	3.3	2.1	2.48	3.1	3.04
14	2.78	5.22	.....	3.75	3.07	3.15	4.8	3.45	2.08	2.48	3.05	2.98
15	2.72	5.0	3.43	3.7	3.0	3.15	4.12	3.5	2.1	2.55	3.04	3.09
16	2.52	4.84	3.39	3.65	2.55	3.13	4.0	3.7	2.1	2.5	3.01	3.26
17	2.55	4.47	3.98	3.6	2.5	3.1	3.92	3.03	2.15	2.49	3.0	3.69
18	3.95	3.9	4.21	3.55	2.55	3.0	3.8	2.52	2.12	2.45	2.78	3.41
19	3.88	3.74	4.33	3.5	2.65	2.9	3.7	2.26	2.1	2.4	2.75	3.26
20	3.45	3.59	5.62	3.45	3.15	2.85	3.5	2.2	2.2	2.4	2.72	3.19
21	3.4	3.44	6.05	3.38	3.71	3.0	3.38	2.18	2.46	2.38	2.69	3.13
22	3.35	3.39	4.85	3.43	4.65	3.1	3.32	2.15	3.02	2.35	2.69	3.05

Daily gage height, in feet, of Roanoke River, above junction with Dan, at Clarksville, Va. Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1896.												
23	4.55	3.49	4.25	3.43	5.9	3.25	3.33	2.15	3.3	2.42	2.68	2.98
24	7.4	3.62	4.02	3.35	4.7	4.0	3.1	2.15	2.25	2.45	2.67	2.92
25	9.15	3.7	4.25	3.43	3.7	4.55	2.95	2.12	2.1	2.5	2.66	2.88
26	7.23	3.6	4.33	4.0	3.03	5.0	2.88	2.2	2.05	2.47	2.65	2.84
27	5.3	3.49	4.0	3.93	3.85	5.2	2.7	2.3	1.0	2.45	2.64	2.82
28	4.43	3.52	3.78	3.53	4.5	4.2	2.65	2.15	1.98	2.45	2.63	2.8
29	4.0	3.6	3.79	3.43	3.85	3.55	2.6	2.1	3.26	2.45	2.85	2.77
30	3.72	.....	4.92	3.3	3.35	3.05	2.55	2.0	7.05	2.44	3.56	2.75
31	3.55	.....	9.15	.....	2.8	.....	2.5	1.95	.....	2.47	.....	2.75
1897.												
1	2.75	3.6	2.25	1.6	1.15	1.0	.....	.35	.3	— .31	1.0	2.2
2	2.75	4.1	2.12	1.55	2.48	.98	.....	.31	.2	— .31	1.5	1.85
3	2.74	4.92	2.05	1.6	4.72	.96	.....	.28	.0	— .35	2.12	1.63
4	2.74	3.55	1.93	1.7	4.3	1.03	.65	.2	.0	— .4	1.55	1.47
5	2.75	2.68	2.85	1.92	2.7	1.11	.6	.14	.0	— .45	.95	1.3
6	2.77	3.23	4.02	2.52	2.52	1.09	.57	.1	.0	— .48	.78	1.18
7	2.75	6.05	4.2	2.75	3.1	1.06	.54	.08	.0	— .52	.59	1.02
8	2.71	11.85	4.05	2.95	2.98	1.05	.51	.08	.0	— .58	.43	.84
9	2.68	8.85	3.85	2.72	2.6	1.05	.66	.09	.0	— .65	.25	.7
10	2.65	4.25	3.35	3.55	2.28	1.02	.59	.4	.0	— .4	.12	.52
11	2.62	2.58	3.45	3.15	2.85	1.98	.48	.46	.0	+ .4	.05	.4
12	2.6	2.2	4.2	2.85	3.45	1.96	.34	.31	.0	.6	.02	.37
13	2.58	3.5	4.35	2.53	3.73	*a*	1.15	.29	.0	1.55	— .05	.35
14	2.65	2.85	5.15	2.3	4.43	.....	.8	.2	.0	.66	— .1	.37
15	2.68	2.55	4.37	2.05	4.72	.....	.61	.14	.0	.6	— .2	.52
16	2.65	3.15	3.6	1.75	4.1	.....	.5	.2	.0	.53	— .24	.57
17	2.68	3.7	2.97	1.46	3.65	.....	.4	.28	.0	1.05	— .3	.65
18	3.51	2.9	3.78	1.45	3.28	.....	.48	.4	.0	1.33	— .38	1.0
19	4.47	2.35	3.4	1.38	2.75	.....	1.43	.59	.0	1.79	— .1	1.02
20	5.07	2.85	3.15	1.33	2.58	.....	1.35	.65	.0	2.3	— .13	.72
21	4.52	2.9	2.9	1.28	1.7	.....	1.65	.71	.0	1.0	— .13	1.25
22	3.66	6.07	2.77	1.2	1.57	.....	1.15	.34	.0	.25	— .14	1.85
23	3.06	7.75	2.5	1.15	1.33	.....	.87	.48	.0	.6	— .16	4.5
24	2.85	10.7	2.3	1.15	1.29	.....	.84	.4	.0	.3	— .2	2.88
25	1.74	12.04	2.05	1.15	1.26	.....	.51	.3	.0	.07	— .05	2.08
26	1.54	3.05	1.98	1.12	1.21	.....	.46	.16	.0	.28	— .02	1.68
27	1.24	2.65	1.83	1.08	1.18	.....	.34	.09	—.05	.62	+ .17	1.35
28	.83	2.35	1.8	1.05	1.13	.....	.32	.07	.0	1.85	1.33	1.05
29	1.14	.....	1.72	1.01	1.05	.....	.78	.8	—.25	2.4	4.7	.8
30	1.24	.....	1.68	.95	1.02	.....	.58	.8	—.28	1.33	2.77	.7
31	2.85	.....	1.65	.....	1.0	.....	.45	.5	.....	1.3	.....	.57
1898.												
1	.35	.49	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	.43	.4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	.39	.43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	.5	.39	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	.65	.33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	.7	.27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	.71	.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	.71	.48	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	.6	.51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	.42	.65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

a June 13 to July 3, 1897, no reports; repairing bridge.

Daily gage height, in feet, of Roanoke River, above junction with Dan, at Clarksville, Va. Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1898.												
11	.38	.6										
12	.69	.54										
13	.5	.51										
14	.5	.49										
15	.38	.38										
16	.39	.34										
17	.48	.27										
18	1.05	.25										
19	.7	.33										
20	.65	.33										
21	.42	.43										
22	.47	.48										
23	.43	.54										
24	.65	.65										
25	2.1	.74										
26	3.25	.65										
27	2.08	b										
28	1.63											
29	1.25											
30	.88											
31	.65											

b Station discontinued February 26.

DAN RIVER AT SOUTH BOSTON, VA.

This station, which was established on August 27, 1900, by E. W. Myers, is in the town of South Boston, Va., on the railroad bridge of the Norfolk and Western Railroad, which crosses the river at that place. On May 18, 1903, the wire gage was replaced by a standard chain gage referred to the same datum. The gage is located on the downstream guard rail near the center of the first span from the left bank. The length of the chain from the end of the weight to the marker is 35.02 feet. Bench mark No. 1 is the sharp inner corner, toward the left bank, of the plate attached to the inner surface of the struts at the center of the left span and furnishing bearing to the wooden floor beam and tie. The elevation of the top of the plate is 32.88 feet above gage datum. Bench mark No. 2 is the top of a standard copper bolt set in the capstone of the abutment of the viaduct by means of which the Southern Railway crosses the highway a short distance upstream from the Norfolk and Western and Southern Railway crossing. Its elevation is 30.68 feet above gage datum.

Discharge measurements are made from the bridge to which the gage is attached. The initial point for soundings is the left end of the downstream guard rail. This is a very good station for the gag-

ing of all except the very highest stages of flow. At extreme heights the river spreads out over a flood plain of considerable width. The trestle connecting the bridge with the embankment on the south side of the river is a curve of rather high degree. The bed of the stream is of coarse sand and shifts slightly. The gage is read twice daily by J. R. East.

Discharge measurements of Dan River at South Boston, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1900.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
August 27	E. W. Myers	580	1.80	1.00	1,046
October 31	....do	818	1.92	2.20	1,576
1901.					
January 15	E. Graves	1,856	2.39	5.79	4,447
March 28	E. W. Myers	3,865	2.97	11.50	11,490
April 22	N. C. Curtis	3,585	2.64	11.55	9,479
May 24	E. Graves	12,530	3.38	22.50	42,410
July 23	E. W. Myers	1,925	1.59	3.36	3,064
November 25	J. S. Henderson	1,770	2.31	4.70	4,086
1902.					
July 9	B. S. Drane	1,261	1.24	1.90	1,551
August 15	....do	1,001	1.33	1.66	1,333
October 13	....do	2,683	2.56	7.95	6,864
December 5	....do	3,237	2.84	8.90	9,197
1903.					
March 27	E. C. Murphy	3,274	2.26	8.10	7,393
February 18	B. S. Drane	11,520	3.73	22.45	43,040
May 18	E. W. Myers	1,532	1.93	3.01	2,959
May 19	....do	1,551	1.81	2.94	2,801
June 23	....do	1,809	1.68	3.59	3,044
June 23	....do	1,837	1.71	3.67	3,136
August 8	B. S. Drane	1,519	1.56	2.62	2,378
September 18	....do	3,309	2.84	8.78	9,411
August 27	....do	1,220	1.15	1.39	1,401
August 27	....do	1,225	1.13	1.44	1,389
September 25	Paul and Sawyer	1,027	1.48	1.40	1,519
December 2	W. C. Sawyer	1,080	1.16	1.51	1,258

Discharge measurements of Dan River at South Boston, Va.—Con.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1904.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
June 21	F. H. Brundage	1,542	1.57	2.68	2,422
September 15	R. H. Bolster	3,820	2.85	10.82	10,890
September 28	do	1,152	1.20	1.22	1,385
October 20	J. C. Hoyt	1,015	0.89	0.74	904
1905.					
March 11	A. H. Horton	2,498	2.34	6.38	5,853
July 22	N. C. Grover	1,514	1.72	2.71	2,610
September 8	Bolster and Winter	1,280	1.35	1.78	1,734

Daily gage height, in feet, of Dan River at South Boston, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1900.												
1									.62	1.5	2.0	3.0
2									.55	1.5	2.2	3.0
3									.95	1.5	2.0	3.0
4									.95	1.5	2.4	4.0
5									.6	1.4	2.1	14.1
6									.95	1.3	2.5	8.0
7									.77	1.9	2.7	4.8
8									.9	1.9	2.5	3.8
9									.37	2.4	2.5	3.5
10									.4	2.4	2.4	3.2
11									.5	2.4	2.0	3.2
12									.3	2.2	2.0	3.2
13									.4	2.2	2.0	3.2
14									.45	2.3	1.9	3.1
15									.4	2.0	1.9	2.9
16									4.9	2.0	1.8	2.9
17									8.55	2.4	1.7	3.0
18									3.6	2.4	1.7	3.0
19									2.0	2.0	1.7	2.9
20									1.65	2.0	1.7	2.9
21									1.25	1.9	1.7	3.0
22									1.55	2.0	1.7	3.1
23									1.3	2.0	1.6	3.1
24									1.7	2.3	1.6	3.1
25									1.7	7.5	1.6	3.0
26									1.5	3.5	2.2	3.0
27									1.6	3.5	5.6	3.0
28									1.4	2.5	3.8	3.2
29									1.3	2.5	3.2	3.0
30									1.3	2.0	3.0	2.7
31										2.0		2.8

Daily gage height, in feet, of Dan River at South Boston, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901.												
1	4.6	3.0	2.2	4.5	3.5	4.0	2.8	3.6	5.2	5.1	2.5	2.6
2	4.0	3.3	2.2	4.5	3.3	3.8	2.8	2.9	5.0	4.9	2.5	2.6
3	3.0	3.3	2.2	18.35	3.3	3.6	3.0	2.7	4.2	4.8	2.5	3.0
4	2.4	3.2	2.2	21.75	3.2	3.8	2.9	2.4	4.1	4.4	2.5	4.1
5	2.4	3.2	2.2	14.4	3.2	3.5	2.8	2.65	3.8	4.1	2.5	4.7
6	2.4	3.1	2.3	.....	3.2	3.4	2.8	10.15	3.6	3.3	2.5	4.5
7	2.4	3.0	2.3	6.5	3.1	3.2	2.9	19.25	3.3	2.8	2.5	3.6
8	2.4	3.0	2.2	6.0	3.1	3.3	3.0	21.2	3.2	2.8	2.5	3.0
9	2.4	3.5	2.2	4.2	3.0	3.0	3.0	8.0	3.1	2.8	2.5	2.9
10	2.4	3.5	2.6	3.2	3.0	2.8	2.9	5.2	3.0	2.7	2.5	2.9
11	2.7	3.4	2.6	3.2	3.0	2.7	2.9	4.6	3.1	3.0	2.5	4.1
12	7.5	3.0	2.6	3.2	3.0	2.9	3.0	9.1	3.1	3.1	2.5	4.8
13	16.95	2.8	2.2	3.2	3.5	2.8	3.0	13.05	3.1	3.1	2.5	3.0
14	7.7	2.5	2.1	3.2	3.1	2.8	18.0	17.1	3.0	3.3	2.4	2.8
15	7.5	2.3	2.0	3.6	3.2	2.7	23.1	18.85	2.9	3.0	2.4	11.8
16	7.2	2.1	2.0	3.6	3.0	2.6	19.0	15.0	2.8	2.9	2.4	17.35
17	3.4	2.0	2.2	3.6	3.0	2.7	16.0	10.4	3.1	2.9	2.3	7.45
18	3.2	2.0	2.2	4.8	3.0	2.7	10.0	10.8	6.1	2.7	2.3	4.9
19	2.9	2.0	2.2	4.8	3.0	2.7	5.0	11.0	5.9	2.6	2.3	4.1
20	2.9	2.0	2.2	4.8	3.2	3.0	4.9	7.9	5.2	2.6	2.3	3.7
21	2.8	2.0	2.0	9.2	6.0	2.9	4.0	8.4	3.6	2.6	2.3	3.2
22	2.8	2.5	2.0	11.7	21.5	2.9	3.0	6.4	3.6	2.6	2.2	3.0
23	2.8	2.5	2.0	8.0	23.45	2.9	3.0	6.1	3.3	2.6	2.2	3.2
24	2.7	2.1	2.3	6.5	22.75	2.8	3.0	5.7	3.0	2.5	4.0	3.5
25	2.6	2.1	2.5	5.0	12.0	2.7	3.0	5.3	3.0	2.5	4.7	3.8
26	2.6	2.1	6.3	3.3	9.2	2.5	3.0	5.4	3.1	2.4	3.8	4.3
27	2.6	2.1	18.0	3.3	9.0	2.5	3.2	17.9	3.1	2.4	2.8	6.4
28	2.6	2.1	16.0	3.2	7.6	2.7	3.2	9.9	3.2	2.4	2.6	8.7
29	2.9	.....	6.5	3.1	6.0	2.8	2.9	6.45	3.2	2.4	2.6	10.9
30	3.2	.....	6.5	3.1	5.0	2.8	3.2	5.4	5.4	2.4	2.6	20.45
31	3.0	.....	5.2	.....	4.0	.....	3.8	4.85	.....	2.4	.....	24.85
1902.												
1	19.5	8.7	18.35	7.75	5.3	3.9	4.75	1.4	1.1	2.7	1.7	4.5
2	8.0	13.1	15.1	6.6	5.05	3.85	4.45	1.4	1.1	2.6	1.8	7.3
3	6.7	14.2	11.0	5.9	4.75	3.7	4.2	1.35	1.2	2.6	1.8	10.7
4	6.0	8.5	8.15	5.5	4.55	3.6	4.0	1.45	1.2	2.5	1.9	13.2
5	5.2	6.7	7.8	5.5	4.55	3.5	3.9	1.3	1.3	6.8	1.9	9.65
6	4.6	5.5	8.6	5.5	4.9	3.35	2.6	1.2	1.4	7.25	2.0	10.95
7	4.6	5.3	7.4	5.5	5.0	3.05	2.0	1.2	1.5	6.9	2.3	10.65
8	4.7	5.2	6.55	7.75	5.05	2.9	1.9	1.2	1.6	6.4	2.3	6.85
9	4.6	4.9	6.5	9.45	5.25	2.9	1.7	1.2	1.7	5.9	2.3	4.55
10	4.5	4.5	6.5	7.2	4.95	3.05	2.6	1.1	1.7	6.15	2.3	4.1
11	4.4	4.1	6.0	6.55	4.65	3.2	3.2	1.1	1.6	6.75	2.2	4.1
12	4.1	4.0	5.65	6.05	4.6	3.1	2.9	1.2	1.4	7.9	2.2	4.1
13	3.8	3.9	5.2	5.6	4.7	3.0	2.1	1.2	1.3	8.5	2.2	4.0
14	3.6	3.8	4.7	5.5	4.7	3.0	1.65	1.3	1.2	8.1	2.2	4.0
15	3.5	3.8	5.1	5.4	4.7	2.9	1.3	1.6	1.1	5.7	2.3	4.0
16	3.7	3.9	5.7	5.35	4.85	3.4	1.3	1.8	1.0	3.7	2.3	4.0
17	4.0	4.0	8.2	5.45	5.05	8.3	1.4	1.7	.9	2.5	2.5	3.9
18	3.8	4.1	7.7	5.75	5.45	16.45	1.5	1.3	.8	2.1	2.6	3.65
19	3.5	3.8	7.2	5.8	5.25	8.85	1.4	1.2	.7	1.8	2.6	3.45
20	3.8	4.0	6.3	5.65	5.05	5.0	1.3	1.1	.7	1.8	2.6	3.3
21	4.8	4.1	6.0	5.55	4.9	4.45	1.3	1.2	.7	1.8	2.7	3.15
22	5.65	5.2	5.5	5.3	4.8	3.35	1.3	1.3	1.0	1.7	2.7	3.0

Daily gage height, in feet, of Dan River at South Boston, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1902.												
23	7.75	6.1	5.65	5.05	4.95	3.0	1.2	1.65	1.9	1.6	2.8	3.0
24	5.3	7.2	5.8	4.9	5.1	2.9	1.1	1.7	2.6	1.6	2.7	2.9
25	5.2	13.35	5.7	4.8	5.1	2.9	1.1	1.45	3.05	1.5	2.7	2.8
26	5.1	18.55	5.1	4.7	5.1	2.8	1.05	1.15	4.2	1.4	2.5	2.8
27	5.0	18.4	5.0	4.85	5.0	2.8	1.1	1.0	4.35	1.5	2.4	2.8
28	4.8	12.85	5.15	4.95	4.65	3.45	1.3	1.0	3.75	1.6	2.3	2.8
29	4.8	.....	9.35	5.7	4.45	4.3	1.3	1.0	3.15	1.7	2.65	2.9
30	4.9	.....	15.8	5.2	4.15	4.85	1.3	1.1	2.9	1.7	3.3	2.9
31	4.9	.....	12.05	.....	4.0	.....	1.3	1.1	.....	1.7	.....	2.9
1903.												
1	3.0	3.9	8.2	11.65	5.2	7.4	6.65	1.9	.....	1.32	1.35	1.65
2	4.25	3.9	7.75	7.95	5.15	6.2	5.0	2.35	2.0	1.22	1.42	1.6
3	12.05	3.9	6.35	7.15	4.8	4.3	3.5	2.65	.....	1.2	1.4	1.62
4	18.8	5.45	5.65	7.75	4.5	3.92	3.1	2.9	.....	1.1	1.6	1.65
5	15.55	15.95	5.15	8.1	4.5	3.88	7.25	4.45	.....	1.2	2.9	1.67
6	9.1	11.7	4.95	6.9	4.5	4.85	12.45	4.3	.....	1.22	3.4	1.62
7	6.9	8.85	4.9	6.1	4.5	8.28	14.0	4.0	.....	1.3	2.75	1.62
8	5.9	8.25	4.9	12.45	4.3	14.55	9.35	2.55	.....	1.65	1.9	1.48
9	5.25	7.25	5.15	16.8	4.3	7.22	3.75	2.4	.....	3.12	1.72	1.38
10	4.95	6.75	5.35	13.95	4.3	5.72	2.5	2.3	.....	3.85	1.7	1.45
11	4.7	6.85	6.05	9.05	4.05	11.28	2.4	2.2	.....	1.9	1.65	1.58
12	5.1	14.2	8.05	6.9	3.88	12.55	2.4	2.8	.....	1.45	1.55	1.65
13	5.0	10.4	8.5	6.55	3.85	5.75	6.32	2.45	.....	1.4	1.48	1.67
14	4.8	6.9	7.35	6.92	3.8	4.05	12.4	2.55	1.5	1.35	1.45	1.7
15	4.7	6.1	6.6	7.1	3.8	3.5	8.9	2.95	.....	1.32	1.57	1.67
16	4.5	5.55	5.9	7.1	3.8	3.35	4.75	3.2	.....	1.32	1.55	1.67
17	4.4	18.35	5.2	6.9	3.8	3.15	2.82	3.4	.....	1.42	1.42	1.67
18	4.4	22.0	4.7	6.5	3.8	2.85	2.7	4.3	8.4	1.7	3.6	1.67
19	4.4	19.2	4.3	6.5	3.32	6.0	2.6	7.02	4.1	2.42	4.47	1.65
20	4.4	12.3	4.2	6.4	2.95	9.18	2.55	.....	2.35	2.15	2.3	1.7
21	4.5	6.55	4.65	6.3	2.9	9.05	2.5	.....	1.85	1.65	1.72	1.67
22	4.85	5.55	15.45	6.3	2.9	5.95	2.25	.....	1.7	1.18	1.72	1.57
23	4.65	5.25	21.05	6.3	2.8	4.3	1.95	.....	1.6	1.5	1.72	1.52
24	4.45	4.85	23.15	6.3	2.75	3.7	1.9	.....	1.45	1.4	1.55	1.55
25	4.2	4.7	21.7	6.3	2.98	3.2	1.8	.....	1.38	1.35	1.58	1.4
26	4.2	4.45	11.7	6.3	3.1	2.85	1.7	.....	1.35	1.48	1.57	1.4
27	4.2	4.3	7.85	9.8	3.32	2.7	1.6	1.4	1.35	1.52	1.58	1.55
28	4.1	4.65	6.4	8.7	4.65	2.6	1.6	.....	1.35	1.45	1.58	6.95
29	4.1	.....	5.8	7.15	8.2	5.68	1.5	.....	1.35	1.42	1.62	5.0
30	4.0	.....	11.0	5.45	9.25	7.75	1.55	.....	1.35	1.3	1.72	2.0
31	4.0	.....	12.05	.....	9.3	.....	1.9	.....	.....	1.48	.....	1.62
1904.												
1	1.95	2.15	2.4	2.25	2.3	3.2	3.1	4.67	1.25	1.28	.35	1.38
2	1.85	1.8	2.2	2.25	1.8	4.9	2.9	4.6	2.37	.72	.68	1.48
3	2.1	2.05	2.15	2.2	1.4	5.45	2.47	5.0	4.75	.2	.98	1.95
4	1.75	1.92	2.3	2.0	1.7	3.55	1.95	3.77	4.02	.42	1.02	2.65
5	1.62	2.1	2.25	1.75	1.45	2.45	1.35	2.0	2.79	.92	1.02	3.98
6	*a*.55	2.25	2.35	1.65	1.4	1.8	.92	1.67	2.1	.95	.72	5.18
7	.62	2.22	3.5	1.75	1.9	2.65	.87	1.57	1.3	.67	.42	4.62
8	1.45	6.1	4.55	1.8	1.8	3.15	1.57	4.8	.95	.37	.68	3.68
9	2.07	6.05	4.95	1.7	1.65	2.55	1.05	7.25	1.72	.15	1.12	2.7
10	1.9	3.8	4.2	1.9	1.8	1.95	.92	11.15	1.32	.02	1.18	1.92

a Ice January 6, 1904.

Daily gage height, in feet, of Dan River at South Boston, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
11	2.05	2.95	3.25	1.95	1.8	1.8	1.32	9.7	1.05	— .05	1.2	1.52
12	2.17	2.7	2.65	1.7	1.8	3.55	1.55	6.15	.92	.62	1.02	1.42
13	2.07	2.05	2.6	1.5	1.5	4.85	1.6	3.75	1.47	.63	1.78	1.68
14	2.0	1.9	2.5	1.4	1.5	2.63	1.42	2.65	3.97	.65	2.88	1.55
15	1.82	2.15	2.45	1.4	2.4	1.73	1.22	1.82	10.75	.68	2.38	1.58
16	1.55	2.3	2.4	1.4	2.4	1.43	1.22	1.52	9.05	.28	1.68	1.68
17	1.45	1.55	2.25	1.45	3.7	1.4	.87	1.27	3.27	.02	1.58	1.72
18	1.42	1.6	2.1	1.4	4.05	1.33	.65	1.37	1.82	.25	1.48	1.68
19	1.55	2.05	2.05	1.35	8.0	1.3	.92	1.4	1.07	.7	1.42	1.2
20	1.27	4.2	2.1	1.35	4.4	1.23	.67	1.52	1.37	.62	.88	1.38
21	1.45	4.0	1.8	1.3	2.7	2.5	.68	1.37	1.37	.52	.48	1.68
22	1.7	8.5	1.65	1.3	2.25	2.05	.77	3.77	1.37	1.42	.58	1.58
23	2.85	11.05	2.1	1.3	1.7	1.78	2.15	3.37	1.37	.68	1.62	1.5
24	3.0	8.05	5.45	1.3	1.6	1.48	4.67	2.27	1.37	.38	1.52	1.62
25	2.9	4.55	9.7	1.3	1.55	1.28	6.3	1.5	1.12	.35	1.5	1.62
26	2.1	3.8	5.3	1.35	1.5	1.02	2.5	1.37	1.13	1.18	1.4	1.95
27	1.95	3.05	4.05	1.6	1.35	.85	2.05	1.27	1.32	1.05	.82	2.35
28	1.75	3.15	3.8	2.35	1.3	1.32	2.1	1.05	1.32	.85	.38	2.1
29	.82	2.55	3.55	3.25	1.15	1.95	2.97	.72	1.28	.68	1.18	1.98
30	.88	.....	2.8	2.8	1.1	2.77	4.17	.85	1.22	.45	1.42	1.78
31	1.08	.....	2.45	.....	1.0	.....	4.52	1.07	.....	.28	.....	1.75
1905.												
1	1.69	1.17	4.55	1.7	2.05	7.48	1.45	2.48	1.35	1.28	1.4	1.55
2	1.59	1.25	4.07	1.62	1.82	3.68	1.5	1.95	3.3	.8	1.4	1.4
3	1.87	1.15	3.75	1.58	2.68	2.98	1.6	2.1	6.98	1.3	1.42	1.48
4	1.92	.95	3.55	1.62	4.95	2.6	2.72	1.98	4.65	1.3	1.25	2.8
5	1.65	.95	3.29	3.12	3.22	2.18	3.5	2.4	3.4	1.3	*a*1.15	5.25
6	3.35	1.22	2.85	7.52	2.48	1.8	8.35	2.78	3.05	1.3	*a*1.05	4.85
7	12.57	1.45	2.49	8.68	3.62	1.78	8.4	2.6	2.25	1.4	*a* .95	3.5
8	9.29	1.39	2.52	5.2	5.48	2.02	6.7	2.3	1.75	1.22	.85	2.25
9	5.17	1.45	2.59	3.92	4.0	2.28	4.95	2.75	1 45	1.3	1.35	2.05
10	3.17	1.39	3.65	2.82	2.85	1.68	2.78	6.92	1.25	.8	1.32	2.65
11	2.92	2.09	6.49	2.58	2.55	1.75	1.98	10.8	1.3	1.15	1.32	4.75
12	5.7	3.29	5.92	5.68	5.3	1.62	3.5	8.35	1.5	4.1	1.15	4.30
13	9.35	6.29	5.32	7.88	10.12	1.42	10.25	5.75	1.55	3.25	.85	3.0
14	7.85	8.82	4.52	8.5	7.72	1.35	10.5	4.38	1.18	2.3	.88	3.15
15	4.6	6.62	3.7	11.6	6.05	1.3	8.68	4.0	1.02	1.7	1.65	3.4
16	2.99	4.02	3.0	11.62	9.58	1.18	5.8	8.88	1.3	1.05	1.35	4.55
17	2.02	2.85	2.68	6.65	10.05	1.48	3.3	4.7	1.05	1.4	1.4	4.3
18	1.97	2.75	2.38	4.52	7.02	1.65	2.48	4.35	1.2	1.52	1.42	4.95
19	2.25	2.89	2.28	2.8	4.68	1.78	2.05	2.08	1.05	1.35	1.55	3.58
20	2.29	4.09	2.22	2.82	3.08	1.4	1.82	2.35	1.2	1.25	1.0	4.80
21	2.07	14.47	2.28	2.55	2.52	1.82	1.98	1.95	1.02	1.5	1.32	6.85
22	1.85	15.59	2.2	2.32	2.22	1.55	2.72	1.75	1.1	1.02	1.5	13.92
23	1.67	10.45	2.08	2.15	2.05	1.28	3.55	2.5	.98	1.45	1.4	11.40
24	1.42	7.99	1.98	2.08	1.95	1.52	4.75	4.45	1.05	1.25	1.48	7.95
25	1.17	5.75	2.42	1.95	2.0	1.75	4.52	4.82	1.05	1.1	1.42	6.8
26	1.02	8.09	2.35	1.72	4.22	1.95	3.5	4.45	1.2	1.05	1.7	4.9
27	.89	7.29	3.38	4.18	14.9	1.95	2.15	3.8	1.3	1.65	1.65	4.45
28	.95	5.59	2.78	4.7	12.08	1.28	1.82	2.88	1.15	1.6	1.45	6.3
29	.95	.....	2.3	2.98	6.12	1.32	4.95	1.88	1.08	1.22	1.42	15.3
30	.99	.....	1.95	2.38	5.05	1.28	5.8	1.48	1.3	1.28	1.45	10.8
31	.99	.....	1.8	.....	7.32	.....	5.42	1.38	.....	1.55	.....	7.05

*a*Gage heights interpolated November 5, 6 and 7, 1905.

Rating table for Dan River at South Boston, Va., from August 27, 1900, to December 31, 1902.

Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.	Gage Height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.3	700	2.4	1,860	5.0	4,000	7.6	6,600
0.4	750	2.6	2,000	5.2	4,200	7.8	6,800
0.5	800	2.8	2,150	5.4	4,400	8.0	7,000
0.6	850	3.0	2,300	5.6	4,600	8.5	7,550
0.7	900	3.2	2,450	5.8	4,800	9.0	8,100
0.8	950	3.4	2,600	6.0	5,000	9.5	8,700
1.0	1,050	3.6	2,760	6.2	5,200	10.0	9,300
1.2	1,150	3.8	2,930	6.4	5,400	10.5	9,900
1.4	1,250	4.0	3,100	6.6	5,600	11.0	10,500
1.6	1,360	4.2	3,280	6.8	5,800	11.5	11,100
1.8	1,480	4.4	3,460	7.0	6,000	12.0	11,700
2.0	1,600	4.6	3,640	7.2	6,200	12.5	12,400
2.2	1,730	4.8	3,820	7.4	6,400	13.0	13,100

The above table is strictly applicable only for open channel conditions. It is fairly well defined.

Rating table for Dan River at South Boston, Va., from January 1, 1903, 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	400	1.70	1,635	3.40	2,989	6.20	5,453
0.10	451	1.80	1,713	3.50	3,070	6.40	5,644
0.20	510	1.90	1,791	3.60	3,152	6.60	5,838
0.30	574	2.00	1,870	3.70	3,234	6.80	6,034
0.40	642	2.10	1,949	3.80	3,317	7.00	6,234
0.50	713	2.20	2,028	3.90	3,400	7.20	6,434
0.60	786	2.30	2,107	4.00	3,484	7.40	6,638
0.70	861	2.40	2,186	4.20	3,653	7.60	6,845
0.80	937	2.50	2,265	4.40	3,824	7.80	7,055
0.90	1,014	2.60	2,345	4.60	3,997	8.00	7,275
1.00	1,091	2.70	2,425	4.80	4,172	8.50	7,830
1.10	1,168	2.80	2,505	5.00	4,349	9.00	8,415
1.20	1,245	2.90	2,585	5.20	4,528	9.50	9,030
1.30	1,323	3.00	2,665	5.40	4,709	10.00	9,700
1.40	1,401	3.10	2,746	5.60	4,892	10.50	10,400
1.50	1,479	3.20	2,827	5.80	5,077	11.00	11,100
1.60	1,557	3.30	2,908	6.00	5,264	11.50	11,815

The above table is strictly applicable only for open channel conditions. It is based upon discharge measurements made during 1903 to 1905, inclusive. It is fairly well defined. The table has been extended below gage height 0.75 foot.

Estimated monthly discharge of Dan River at South Boston, Va.

(Drainage area, 2,750 square miles.)

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet. per sq. mi.	Depth in inches.
1900.					
September	7,605	700	1,430	0.52	0.58
October	6,500	1,200	1,842	.67	.77
November	4,600	1,360	1,804	.66	.74
December	15,110	2,075	2,785	1.01	1.16
1901.					
January	21,960	1,860	3,387	1.23	1.42
February	2,675	1,600	2,042	.74	.77
March	25,000	1,600	3,504	1.27	1.46
[a]April	38,800	2,375	6,382	2.32	2.59
May	45,600	2,300	7,297	2.65	3.06
June	3,100	1,925	2,292	.83	.93
July	44,200	2,150	6,132	2.23	2.58
August	36,600	1,860	9,866	3.59	4.14
September	5,100	2,150	2,902	1.06	1.18
October	4,100	1,860	2,353	.86	.99
November	3,730	1,730	2,032	.74	.83
December	51,200	2,000	6,875	2.50	2.89
The year	51,200	1,600	4,589	1.67	22.84

[a]Discharge April 6, 1901, approximate.

Estimated monthly discharge of Dan River at South Boston, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1902.					
January	30,000	2,675	4,738	1.72	1.98
February	26,760	2,930	7,105	2.58	2.69
March	26,120	3,730	7,269	2.64	3.04
April	8,640	3,730	4,834	1.76	1.96
May	4,450	3,100	3,876	1.41	1.63
June	20,610	2,150	3,535	1.29	1.44
July	3,775	1,075	1,713	.62	.71
August	1,480	1,050	1,197	.44	.51
September	3,415	900	1,545	.56	.62
October	7,550	1,250	3,158	1.15	1.33
November	2,525	1,420	1,842	.67	.75
December	13,460	2,150	4,186	1.52	1.75
The year	30,000	900	3,750	1.36	18.41
1903.					
January	27,160	2,665	5,628	2.05	2.36
February	38,300	3,400	9,408	3.42	3.56
March	42,570	3,653	9,545	3.47	4.00
April	21,110	4,755	7,521	2.73	3.05
May	8,780	2,465	3,869	1.41	1.63
June	16,400	2,345	5,456	1.98	2.21
July	15,500	1,479	4,190	1.52	1.75
August 1–19 and 27	6,254	1,401	2,774	1.01	.751
September 2, 14 and 18–30	7,715	1,362	2,090	.760	.424
October	3,358	1,168	1,553	.565	.651
November	3,884	1,362	1,811	.659	.735
December	6,184	1,386	1,803	.656	.756

Estimated monthly discharge of Dan River at South Boston, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1904					
January	2,665	750	1,663	0.605	0.697
February	11,170	1,518	3,235	1.18	1.27
March	9,290	1,596	2,847	1.04	1.20
April	2,868	1,323	1,663	.605	.675
May	7,275	1,091	1,999	.727	.838
June	4,755	976	2,147	.781	.871
July	5,548	824	1,877	.683	.788
August	11,310	876	2,898	1.05	1.21
September	10,750	1,029	2,248	.818	.913
October	1,417	375	783	.285	.329
November	2,569	608	1,233	.448	.500
December	4,510	1,245	1,953	.710	.819
The year	11,310	375	2,045	.744	10.11
1905.					
January	13,370	1,006	3,004	1.09	1.26
February	18,270	1,052	4,563	1.66	1.73
March	5,730	1,713	2,635	.958	1.10
April	11,990	1,541	3,992	1.45	1.62
May	17,160	1,729	4,845	1.76	2.03
June	6,720	1,230	1,867	.679	.758
July	10,400	1,440	3,927	1.43	1.65
August	10,820	1,385	3,382	1.23	1.42
September	6,214	1,076	1,709	.621	.693
October	3,568	937	1,463	.532	.613
November	1,635	976	1,337	.486	.542
December	17,720	1,401	5,020	1.83	2.11
The year	18,270	937	3,145	1.14	15.53

DAN RIVER AT CLARKSVILLE, VA.

This station was established October 28, 1895, and discontinued February 26, 1898. It was located at the Southern Railway bridge about 1,000 feet above the mouth of the river. A wire gage was attached to the inside of the guard rail in the fourth panel of the third span from the right bank. The length of the wire from the end of the weight to the marker was 33.17 feet. Reference is made to the description of the station on Roanoke River at Clarksville, for information relative to the diversion of water from the Dan to the Roanoke at a point above this gaging station.

Discharge measurements of Dan River at Clarksville, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1895.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec-feet.*
October 2	C. C. Babb	591	1.31	0.38	773
October 28	....do	719	1.44	0.65	1,032
December 5	....do	865	1.60	1.12	1,382
1896.					
April 22	E. W. Myers	1,209	1.89	2.43	2,291
[a]May 5	....do	1,465	1.83	2.30	2,694
May 26	....do	1,465	1.47	2.30	2,155
July 15	....do	1,932	2.39	3.50	4,626
September 15	A. P. Davis	953	1.50	1.70	1,433
1897.					
February 25	E. W. Myers	7,443	3.49	12.33	26,020
March 18	....do	2,867	2.70	4.20	7,755
September 29	....do	797	1.07	0.10	856
1898.					
January 8	E. W. Myers	1,138	1.76	1.05	2,009

[a]For measurement of May 5, 1896, the channel had cut badly, averaging almost all way across a cut of 1 foot

Daily gage height, in feet, of Dan River at Clarksville, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1895.												
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.0	1.2
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.38	1.1
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.7	1.1
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.5	1.1
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.32	1.15
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.15	1.0
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.05	1.0
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.0	1.0
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.05	.9
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.05	1.35
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.23	1.35
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.3	1.35
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.09	1.25
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.58	1.15
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.32	1.05
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.23	1.02
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.19	1.05
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.10	1.02
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.19	1.2
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.05	1.1
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.09	1.15
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.05	2.55
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.05	4.28
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.08	3.88
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.0	2.15
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.15	1.8
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.15	1.62
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.65	1.2	1.6
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.65	1.8	1.95
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.7	1.4	2.0
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.63	.....	3.92
1896.												
1	4.75	2.5	.....	9.8	3.15	1.75	1.55	1.45	.95	8.65	1.5	4.06
2	4.02	2.5	.....	10.75	4.2	1.7	1.45	1.4	.93	9.5	1.55	5.35
3	3.42	3.35	.....	10.3	4.95	1.6	1.4	1.35	1.05	4.0	1.57	4.18
4	2.7	6.85	.....	6.3	4.0	1.5	1.35	1.3	1.9	2.25	2.0	3.08
5	2.3	6.0	.....	4.52	2.91	2.0	1.4	1.28	2.05	2.0	3.15	2.7
6	1.9	7.45	.....	3.9	2.79	2.65	1.55	1.25	1.5	1.85	7.23	2.58
7	2.05	9.56	.....	3.85	2.65	2.5	4.55	1.23	3.5	1.78	5.4	2.5
8	2.02	7.95	.....	3.5	2.5	2.0	7.2	1.2	2.35	1.7	3.0	2.42
9	2.38	6.28	.....	3.3	2.35	2.0	10.57	1.18	2.0	1.6	2.6	2.33
10	2.4	5.95	.....	3.05	2.25	2.5	14.7	1.18	1.5	1.55	2.3	2.25
11	2.35	4.93	.....	3.04	2.2	2.35	14.5	1.4	1.35	1.55	2.1	2.15
12	2.23	3.95	.....	3.03	2.15	2.25	9.4	2.18	1.15	1.5	2.0	2.09
13	2.05	3.45	.....	2.98	2.1	2.2	6.15	2.3	1.1	1.48	2.1	2.04
14	2.03	4.23	.....	2.75	2.07	2.15	3.75	2.45	1.08	1.48	2.05	1.98
15	2.03	4.0	2.43	2.7	2.0	2.15	3.1	2.5	1.1	1.55	2.03	2.08
16	1.88	3.85	2.4	2.65	1.55	2.13	3.0	2.65	1.1	1.5	2.01	2.25
17	1.9	3.5	2.98	2.6	1.5	2.1	2.92	2.0	1.15	1.49	2.0	2.68
18	3.22	2.93	3.21	2.55	1.55	2.0	2.8	1.5	1.12	1.45	1.78	2.4
19	3.18	2.75	3.33	2.5	1.65	1.9	2.7	1.25	1.1	1.4	1.75	2.25
20	3.0	2.6	4.62	2.45	2.15	1.85	2.5	1.2	1.2	1.4	1.72	2.18
21	2.65	2.45	5.05	2.38	2.71	2.0	2.38	1.18	1.45	1.38	1.69	2.12
22	2.45	2.3	3.85	2.43	3.65	2.1	2.32	1.15	2.0	1.35	1.69	2.05

Daily gage height, in feet, of Dan River at Clarksville, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1896.												
23	3.65	2.5	3.25	2.43	4.9	2.25	2.23	1.15	2.28	1.42	1.68	1.98
24	6.4	2.63	3.02	2.35	3.7	3.0	2.1	1.15	1.25	1.45	1.67	1.92
25	8.15	2.7	3.25	2.43	2.7	3.55	1.95	1.12	1.1	1.5	1.66	1.88
26	6.22	2.6	3.33	3.0	2.03	4.0	1.88	1.2	1.05	1.47	1.65	1.84
27	4.3	2.49	3.0	2.93	2.85	4.2	1.7	1.3	1.0	1.45	1.64	1.82
28	3.48	2.52	2.8	2.53	3.5	3.2	1.65	1.15	.98	1.45	1.63	1.8
29	3.09	2.6	2.8	2.43	2.85	2.55	1.6	1.1	2.25	1.45	1.85	1.77
30	2.82	.....	3.92	2.3	2.35	2.05	1.55	1.0	6.0	1.44	2.55	1.75
31	2.32	.....	8.15	.....	1.8	.....	1.5	.95	.....	1.47	.....	1.75
1897.												
1	1.75	2.7	2.9	1.98	1.72	1.6	1.1	.71	.23	.05	1.55	2.75
2	1.75	3.2	2.75	1.95	2.85	1.56	1.03	.67	.2	.05	1.92	2.35
3	1.74	4.05	2.67	2.0	5.3	1.55	.98	.55	.15	.03	2.45	2.05
4	1.74	2.7	2.35	2.15	4.8	1.63	.95	.48	.15	.01	2.05	1.9
5	1.75	1.85	3.55	2.35	3.25	1.7	.9	.42	.0	—.03	1.6	1.85
6	1.77	2.35	4.65	2.85	3.1	1.08	.87	.38	.0	—.05	1.2	1.65
7	1.75	6.35	4.75	3.15	3.7	1.06	.83	.35	.0	—.09	.98	1.4
8	1.71	12.29	4.6	3.45	3.45	1.04	.98	.35	.0	—1.5	.85	1.18
9	1.68	9.2	4.47	3.25	3.05	1.04	.9	.37	.0	—.2	.68	1.05
10	1.65	4.75	3.98	4.1	2.75	1.03	.85	.73	.0	+.05	.55	.85
11	1.62	3.15	4.03	3.72	3.25	1.02	.8	.79	.0	.05	.42	.7
12	1.6	2.7	4.78	3.45	3.95	1.0	.7	.68	.0	1.1	.35	.65
13	1.58	3.95	4.9	3.15	4.25	.98	1.75	.65	.0	1.95	.25	.6
14	1.65	3.35	5.7	2.95	4.98	.98	1.3	.48	.0	1.25	.25	.65
15	1.68	3.15	4.95	2.7	5.3	.96	1.18	.42	.0	1.1	.18	.85
16	1.65	3.7	4.1	2.45	4.65	.95	.9	.48	.0	.95	.14	.95
17	1.68	4.05	3.45	2.17	4.15	.94	.75	.55	.0	1.65	.1	1.25
18	2.5	3.25	4.3	2.05	3.75	.92	.88	.75	.0	2.1	.05	1.55
19	3.45	2.85	3.95	1.98	3.15	.9	1.98	.85	.0	2.48	.25	1.4
20	4.05	3.35	3.62	1.9	2.85	.95	1.85	.95	.0	3.0	.23	1.1
21	3.5	4.1	3.4	1.86	2.25	.9	2.25	1.08	.0	1.55	.23	1.7
22	2.65	6.7	3.22	1.78	1.9	.88	1.48	.7	.0	.75	.22	2.35
23	2.05	8.45	3.03	1.75	1.88	.9	1.25	.89	.0	1.1	.2	4.1
24	1.85	11.52	2.7	1.75	1.85	.95	1.17	.75	.0	.88	.18	3.45
25	1.75	12.8	2.55	1.72	1.83	.93	.98	.58	.05	.65	.3	2.65
26	1.55	4.64	2.35	1.68	1.79	.9	.79	.42	.25	.85	.35	2.18
27	1.25	3.25	2.28	1.63	1.77	.88	.7	.35	.4	1.15	.58	1.8
28	.85	3.05	2.25	1.6	1.73	.95	.68	.3	.25	2.25	2.1	1.45
29	1.15	.....	2.15	1.57	1.66	.88	1.15	.28	.1	2.85	5.4	1.2
30	1.25	.....	2.08	1.55	1.63	.8	1.08	.28	.08	2.1	3.35	1.1
31	2.1	.....	2.03	.....	1.6	.....	.77	.25	.....	1.85	.....	.95
1898.												
1	.7	.87	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	.68	.72	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	.65	.69	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	.78	.65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	.95	.58	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	1.05	.55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	1.0	.62	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	1.0	.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	1.0	.9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	.8	1.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Daily gage height, in feet, of Dan River at Clarksville, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	.7	1.12										
12	1.1	1.02										
13	.89	.88										
14	.89	.76										
15	.7	.7										
16	.65	.6										
17	.75	.55										
18	1.45	.53										
19	1.05	.59										
20	.95	.55										
21	.8	.68										
22	.74	.75										
23	.68	.88										
24	1.25	.95										
25	2.7	1.02										
26	3.92	.95										
27	2.45	*a*										
28	2.05											
29	1.7											
30	1.28											
31	.95											

*a*Station discontinued February 26, 1898.

BANISTER RIVER NEAR HOUSTON, VA.

This river, which drains a total area of 520 square miles, has its headwaters in Pittsylvania County, Va., flows southwestward through this and Halifax counties, and is tributary to Dan River at a point about 5 miles below South Boston. The basin is hilly and generally in farming lands, with small forest areas.

The gaging station was established September 28, 1904, by R. H. Bolster, and is located at a covered highway bridge 1¼ miles below the railway station at Houston, Va., and about one-fourth of a mile below the mouth of Terrible Creek. A standard chain gage is attached to the upstream side of the bridge near the left pier; the length of the chain is 33.53 feet. A staff gage at the mouth of Terrible Creek has been set to read the same as the chain gage at 2.4 feet above gage datum. Observations are made from the staff gage except in high water, at which time the chain gage is used. A high-water gage from 19 to 30 feet is painted on the northeast corner of Mr. Yates' mill. The datum of the gage is referred to bench marks as follows: No. 1 is a chiseled cross on the top of the left abutment, upstream side of the bridge; elevation 25.27 feet. No. 2 is the top of foundation at northeast corner of Mr. Yates' mill, directly under

the high-water gage; elevation 19.09 feet. No. 3 is a nail in a 10-inch tree 50 feet northeast of bridge over Terrible Creek; elevation 16.48 feet. The channel is straight for about 1,000 feet above and below the station. Both banks are low and liable to overflow. The bed of the stream is of gravel and sand and probably changes somewhat. There is one channel, broken by one pier at low water and by two piers at medium stages. The gage is read twice daily by J. A. Yates. This station was discontinued December 31, 1905.

Discharge measurements of Banister River near Houston, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1904.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
September 28....	R. H. Bolster.....	126	1.44	2.31	181
October 22.....	....do.....	131	1.24	2.30	162
1905.					
March 13.....	A. H. Horton.....	441	2.05	5.95	903
September 8.....	Bolster and Winter.....	158	1.20	2.17	189

(a) *Daily gage height, in feet, of Banister River near Houston, Va.*

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
1										2.05	2.12	2.32
2										2.0	2.22	2.32
3										2.0	2.2	3.08
4										2.0	2.25	3.15
5										2.05	2.52	3.8
6										2.0	2.48	6.08
7										2.0	2.32	4.6
8										2.0	2.28	3.4
9										1.9	2.28	3.05
10										2.0	2.2	2.9
11										1.95	2.25	2.75
12										2.0	2.25	2.65
13										1.95	2.92	2.68
14										1.95	4.05	2.4
15										1.95	3.1	2.38
16										1.9	2.65	2.48
17										2.0	2.48	2.68

aGage heights from September 28 to November 26, 1904, refer to the bridge gage. For the remainder of the year they refer to the gage at the mouth of Terrible Creek.

Daily gage height, in feet, of Banister River near Houston, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.9	2.35	2.85
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.05	2.35	2.72
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.0	2.3	2.85
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.35	2.3	2.8
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.3	2.35	2.62
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.15	2.38	2.78
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.1	2.38	2.98
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.0	2.32	3.65
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.2	2.32	3.35
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.2	2.3	3.5
28	.....	.....	.....	.....	.....	.....	.....	.....	2.15	2.12	2.3	3.88
29	.....	.....	.....	.....	.....	.....	.....	.....	2.7	2.15	2.3	3.55
30	.....	.....	.....	.....	.....	.....	.....	.....	2.28	2.1	2.32	2.95
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.1	.....	2.98
1905.												
1	2.88	2.85	5.95	3.3	3.05	7.7	2.05	2.15	1.85	1.58	2.1	2.05
2	2.9	3.0	5.5	3.0	2.85	5.5	2.2	2.1	3.5	1.52	2.0	2.0
3	2.9	2.95	4.88	2.95	3.35	3.75	2.4	4.55	5.25	1.98	1.95	3.55
4	3.5	2.85	4.6	2.92	4.15	3.25	2.6	2.5	3.9	1.90	2.0	4.6
5	2.6	2.85	4.3	4.5	3.65	3.05	2.55	3.6	2.8	1.75	2.05	3.3
6	3.45	2.22	4.1	8.92	3.18	2.9	3.65	2.2	2.25	1.7	2.05	2.45
7	12.95	2.95	3.9	6.6	3.15	2.7	4.6	2.05	2.1	1.65	2.1	2.25
8	9.55	3.25	3.72	4.95	3.0	2.75	4.0	2.32	1.98	1.72	2.05	2.42
9	6.3	2.85	4.9	4.15	2.98	2.6	2.95	2.75	1.95	1.52	2.05	4.4
10	4.4	3.1	6.35	3.85	2.75	2.45	2.85	5.05	1.85	1.45	2.05	8.85
11	4.0	3.65	7.1	3.7	2.6	2.45	2.35	4.95	1.95	2.62	2.0	5.55
12	6.55	4.25	6.0	9.45	4.1	2.4	3.75	4.62	2.0	4.05	1.98	3.98
13	9.15	8.15	5.9	10.95	5.2	2.45	6.9	3.45	2.0	2.78	2.05	3.2
14	6.58	7.25	5.2	8.45	5.95	2.3	6.55	3.2	1.92	2.22	1.95	3.0
15	4.5	5.35	4.32	8.35	4.35	2.3	4.75	5.05	1.68	2.0	2.1	3.25
16	3.55	4.05	4.05	7.0	5.55	2.22	2.95	4.75	1.65	1.9	2.1	3.85
17	3.65	3.95	3.68	5.25	5.75	2.52	2.5	3.3	2.05	1.85	2.05	4.92
18	3.95	3.85	3.6	4.6	4.55	2.5	2.4	2.6	2.22	1.95	2.1	5.15
19	3.62	3.95	3.5	4.2	3.35	2.3	2.25	2.4	2.05	1.95	2.05	4.4
20	3.52	7.0	3.4	3.85	3.0	2.25	2.1	2.2	2.2	2.1	2.25	3.88
21	3.38	12.95	3.75	3.7	2.8	2.15	2.05	2.15	1.98	2.1	2.35	12.75
22	3.22	14.35	3.7	3.55	2.7	2.05	4.9	2.1	1.85	2.05	2.3	16.45
23	3.25	10.4	3.42	3.4	2.6	2.0	4.85	2.0	1.8	1.95	2.1	9.8
24	3.15	7.55	3.2	3.28	2.6	3.7	3.35	1.9	1.7	2.0	2.18	6.5
25	2.9	8.05	4.8	3.2	2.5	4.6	2.8	2.35	1.65	2.05	2.15	5.0
26	2.32	9.3	4.3	3.1	2.8	2.95	2.5	2.85	1.65	2.68	2.12	4.15
27	2.55	8.0	4.85	3.55	8.75	2.55	2.1	2.35	1.65	2.7	2.1	3.85
28	2.95	6.2	4.3	3.4	7.2	2.3	3.15	2.2	1.6	2.5	2.08	3.6
29	2.95	.....	3.7	3.2	5.8	2.15	3.1	2.0	1.58	2.25	2.05	11.1
30	2.95	.....	3.55	3.2	7.5	2.1	2.7	1.9	1.52	2.2	2.1	8.05
31	2.88	.....	3.4	.....	5.55	.....	2.4	1.8	.....	2.1	.....	6.3

KANAWHA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Kanawha River rises in Watauga, Ashe, and Alleghany counties, North Carolina, flows northwestward through Virginia and West Virginia, and joins the Ohio River at Point Pleasant, W. Va. In its upper course it is known as New River. The headwaters lie in the Appalachian Mountains among the high ridges which form the divides between the drainage basin of this river and that of Yadkin River on the east and of Holston River on the west. The upper tributaries drain narrow valleys of the mountainous region of North Carolina; their slopes are generally steep and their beds are rough. The main river cuts the Alleghany fronts just below Pearisburg, Va.; thence the course of the river lies through a narrow valley of West Virginia, over a rough bed with many falls and rapids. The basin is as beautiful and picturesque as any in the eastern part of the United States. The country on its lower courses, through which the Chesapeake and Ohio Railroad passes, is noted for its scenic beauty. Below the junction with the Gauley the river is known as the Kanawha.

The principal tributaries of New River are Little River, which empties near Radford, Va., and the Greenbrier, which rises in the eastern part of West Virginia and joins the New at Hinton, W. Va.

NEW RIVER NEAR OLDTOWN, VA.

This station was established to aid in the hydrographic investigations undertaken by the United States Geological Survey in the southern Appalachian area. It was established July 31, 1900, and located at Austin's Ferry about 2 miles west of Oldtown, Va.

A wire gage was fixed in an overhanging tree on the left bank, about 50 yards upstream from the ferry. The scale was so placed that the zero mark was next the bank, the distance from the index on the wire to the end of the weight being 16.1 feet. The initial point for soundings was on the right bank, and measurements of discharge were made from the ferry-boat. The channel above and below the station is straight and the current swift. The right bank is high and rocky and is never submerged, but the left bank is lower, and at times floods cover it for a considerable distance. The bed of the stream is rocky and sandy.

Since the gage rod at this station was so placed that the zero mark was next to the bank the gage readings were reversed, a rise in the water surface being indicated by a decrease in the gage readings, and vice versa. This is true of all figures for gage heights for this station published in Water-Supply Papers Nos. 48 and 65. Rectification of this condition was made by subtracting all observed gage heights from 7.3 feet, this being the length of the gage, and also the gage height which corresponded to the lowest stage of the stream. Gage heights, as printed herewith, above 7.3 feet are estimated by the observer. The only exception to this rule is the height of the flood of May 22, 1901, which was determined by direct levelling. This was the greatest flood since 1878, when the river rose some 4 or 5 feet higher.

Owing to the inaccessibility of this station, only one measurement of the flow was made during 1902 and 1903, though daily records of the stage of the surface were maintained. The station was discontinued March 31, 1903.

Discharge measurements of New River near Oldtown, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1900.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
July 31	N. C. Curtis	.....	.....	0.70	1,541
October 29	....do	.....	.....	1.00	2,293
1901.					
June 29	N. C. Curtis	.....	.....	4.45	6,916
1903.					
February 6	E. W. Myers	1,579	2.24	1.70	3,533

Daily gage height, in feet, of New River near Oldtown, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1900.												
1	.....	.....	.....	.....	.....	.....	.....	.6	.5	.4	.7	1.0
2	.....	.....	.....	.....	.....	.....	.....	.6	.4	.5	.7	.9
3	.....	.....	.....	.....	.....	.....	.....	.5	.3	.6	1.9	.8
4	.....	.....	.....	.....	.....	.....	.....	.5	.2	.7	2.2	1.5
5	.....	.....	.....	.....	.....	.....	.....	.4	.2	.9	1.7	2.7
6	.....	.....	.....	.....	.....	.....	.....	.4	.2	.9	1.3	1.8
7	.....	.....	.....	.....	.....	.....	.....	.4	.2	.8	1.0	1.5
8	.....	.....	.....	.....	.....	.....	.....	.3	.2	.7	.9	1.4
9	.....	.....	.....	.....	.....	.....	.....	.3	.1	.6	.8	1.4
10	.....	.....	.....	.....	.....	.....	.....	.2	.1	.6	.8	1.2
11	.....	.....	.....	.....	.....	.....	.....	.2	.1	.5	.8	1.2
12	.....	.....	.....	.....	.....	.....	.....	.1	.1	.4	.7	1.1
13	.....	.....	.....	.....	.....	.....	.....	.0	.1	.4	.6	1.0
14	.....	.....	.....	.....	.....	.....	.....	.1	.5	.5	.7	1.0
15	.....	.....	.....	.....	.....	.....	.....	.6	1.6	.4	.7	.8
16	.....	.....	.....	.....	.....	.....	.....	.5	3.4	.4	.6	.8
17	.....	.....	.....	.....	.....	.....	.....	.3	1.5	.4	.5	.8
18	.....	.....	.....	.....	.....	.....	.....	.3	.8	.3	.5	.7
19	.....	.....	.....	.....	.....	.....	.....	.2	.5	.3	.5	.7
20	.....	.....	.....	.....	.....	.....	.....	.4	.4	.3	.5	.6
21	.....	.....	.....	.....	.....	.....	.....	.4	.5	.3	.5	.6
22	.....	.....	.....	.....	.....	.....	.....	.4	.5	.3	.6	.8
23	.....	.....	.....	.....	.....	.....	.....	.7	.5	.3	.6	.8
24	.....	.....	.....	.....	.....	.....	.....	.6	.6	a8.2	.7	.8
25	.....	.....	.....	.....	.....	.....	.....	.6	.5	3.0	.7	.5
26	.....	.....	.....	.....	.....	.....	.....	.4	.3	1.9	4.9	.6
27	.....	.....	.....	.....	.....	.....	.....	.3	.5	1.4	2.7	.6
28	.....	.....	.....	.....	.....	.....	.....	.3	.4	1.2	1.5	.6
29	.....	.....	.....	.....	.....	.....	.....	.3	.4	1.0	1.3	.5
30	.....	.....	.....	.....	.....	.....	.....	1.0	.5	1.0	1.1	1.0
31	.....	.....	.....	.....	.....	.....	.....	.7	.....	.8	.....	.9
1901.												
1	.9	.8	.9	1.6	1.6	2.2	3.2	1.2	4.1	2.1	.8	.8
2	.8	.7	.8	2.5	1.4	2.0	2.2	1.1	3.1	3.1	.8	.8
3	.7	.6	.7	6.1	1.4	1.9	1.9	.9	2.6	2.3	.8	1.1
4	.7	1.0	.8	3.8	1.3	1.8	1.9	.9	2.4	1.9	.9	1.5
5	.6	.8	.7	2.6	1.2	1.7	1.9	.9	2.9	1.7	.9	1.5
6	.6	.8	.7	2.1	1.2	1.6	1.8	a13.0	2.1	1.5	.9	1.0
7	.7	.8	.6	2.0	1.3	2.5	2.0	4.9	2.0	1.5	.8	.9
8	.7	.9	.6	1.7	1.4	2.2	1.9	2.9	1.9	1.5	.8	.8
9	.8	1.0	.5	1.6	1.5	1.7	1.6	2.0	1.9	1.4	.8	.8
10	.8	1.0	.9	1.4	1.6	1.6	1.5	1.7	1.7	1.3	.7	1.5
11	1.0	.9	1.4	1.3	1.6	1.6	1.5	1.8	1.7	1.3	.7	1.3
12	3.0	1.0	1.3	1.2	1.5	1.5	1.4	1.9	1.6	1.2	.7	1.1
13	2.4	.9	1.0	1.1	1.2	1.4	1.3	4.3	1.6	2.4	.7	1.0
14	1.8	.7	.9	1.9	1.1	2.4	2.6	6.1	1.5	3.3	.6	2.0
15	1.4	.8	.8	1.8	1.1	4.6	1.4	4.2	1.5	1.9	.6	a10.0
16	1.1	.8	.8	1.5	1.0	3.8	1.6	5.2	1.6	1.6	.6	4.1
17	1.1	.8	.7	1.4	1.5	4.6	1.6	6.2	1.9	1.4	.6	3.0
18	.9	.8	.7	1.2	1.3	3.5	2.4	5.2	2.0	1.2	.5	1.9
19	.8	.7	.6	1.2	1.6	2.9	2.3	4.1	1.9	1.1	.5	1.7
20	.7	.7	.7	.....	1.4	2.4	2.4	3.6	1.7	1.2	.5	1.5
21	1.0	.6	1.1	6.1	1.3	3.0	1.4	3.9	1.5	1.1	.4	1.6
22	1.0	.6	1.0	3.7	16.7	3.8	1.3	3.1	1.4	1.0	.4	1.5

a Estimated.

Daily gage height, in feet, of New River near Oldtown, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901.												
23	.9	*b*.7	.8	2.8	6.1	6.1	1.2	6.1	1.4	1.0	1.4	1.4
24	.9	.....	.7	2.6	3.9	4.6	1.1	3.8	1.2	1.0	1.4	2.5
25	.8	.....	1.0	2.4	3.1	3.0	1.0	3.0	1.1	1.0	1.2	2.3
26	.8	.....	4.0	2.3	2.7	2.8	1.0	2.8	1.1	.9	1.1	2.0
27	.7	.....	3.0	2.2	4.4	2.6	1.1	3.1	2.2	.9	1.0	1.7
28	.7	1.1	1.9	2.1	3.6	2.3	1.2	5.9	2.0	.9	1.0	1.9
29	.6	.....	1.5	2.0	3.3	2.5	1.0	3.7	5.1	.9	.9	*a*10.0
30	.7	.....	2.0	1.8	2.7	2.1	1.0	3.0	2.8	.8	.7	6.0
31	.8	.....	2.0	.....	2.4	.....	.9	3.1	.....	.8	.....	3.8
1902.												
1	3.0	2.3	6.2	2.1	1.0	.6	1.9	.5	.3	.4	.4	1.0
2	2.7	2.5	7.3	1.8	1.0	.7	1.6	.7	.3	.4	.4	1.1
3	2.0	2.3	2.8	1.7	1.0	.7	1.4	.7	.5	.6	.4	1.4
4	2.0	1.9	2.4	1.6	.9	.7	1.1	.7	1.0	.5	.4	1.5
5	1.7	1.9	2.0	1.9	.9	.6	1.0	.6	.8	.8	.4	1.5
6	1.9	1.7	1.9	1.7	1.0	.6	.8	.6	.8	1.0	.5	1.4
7	1.8	1.5	1.9	1.6	1.0	.6	.9	1.4	.4	.7	.6	1.2
8	1.7	1.4	1.8	1.9	1.1	.9	1.1	.8	.4	.6	.7	1.1
9	1.5	1.1	1.8	1.7	1.0	1.0	1.2	.7	1.0	.4	.6	.9
10	1.5	.9	2.0	1.6	.9	1.0	.8	.5	2.0	.4	.5	.9
11	1.4	1.0	1.9	1.5	.8	.9	.8	.5	.9	.4	.5	.9
12	1.3	1.2	1.7	1.5	.9	.9	.7	.4	.6	.9	.4	.8
13	1.1	1.2	1.7	1.4	.8	.6	.7	2.0	.5	1.0	.4	.8
14	1.1	1.1	1.6	1.4	.8	2.1	.8	1.1	.4	.9	.3	.9
15	1.0	1.0	1.5	1.5	1.0	1.9	1.0	.5	.4	.7	.3	.8
16	.4	1.1	1.9	1.5	1.1	3.1	.8	.7	.4	.5	.3	1.0
17	1.3	1.1	2.4	1.4	1.0	2.8	.8	.9	.4	.5	.3	1.6
18	1.2	1.2	2.1	1.3	1.0	1.7	.6	.8	.4	.4	.8	1.3
19	1.2	2.0	1.9	1.2	1.5	1.4	.6	.6	.4	.4	1.1	1.2
20	1.1	1.9	1.7	1.5	1.0	1.2	.6	.5	.4	.4	.7	1.0
21	1.0	2.2	1.6	1.5	1.1	1.1	.5	.5	.5	.4	.6	1.0
22	1.2	1.9	1.5	1.4	.9	1.0	.5	.6	.5	.2	.5	1.2
23	1.1	1.5	1.4	1.3	.9	.9	.6	.6	.4	.2	.5	1.1
24	1.1	1.4	1.4	1.2	1.0	.8	.5	.4	.4	.2	.5	1.0
25	1.2	3.6	1.3	1.2	1.0	.8	.5	.4	.5	.2	.6	.8
26	1.2	3.9	1.2	1.1	1.2	.9	.4	.4	.8	.2	1.0	.6
27	1.0	2.6	1.2	1.0	1.0	2.6	.4	.4	.6	.4	1.2	*c*1.0
28	2.0	*a*11.0	1.4	1.0	.9	3.9	.4	.4	.5	.9	1.0	.....
29	1.7	.....	1.9	1.0	.9	4.1	.5	.4	.5	1.1	.8	.....
30	1.9	.....	7.3	1.0	.7	2.2	.7	.3	.4	.7	.7	.....
31	3.0	.....	7.3	.....	.7	.....	.6	.3	.....	.5	.....	.....
1903.												
1	1.6	1.2	4.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	2.9	1.1	2.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	3.9	1.2	2.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	2.4	1.4	1.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	1.9	3.0	1.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	1.5	1.8	1.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	1.3	1.5	1.5	.....	.....	.....	.....	.....	.....	.....	.....	.....

*a*Estimated.
*b*Frozen February 24 to 27, 1901.
*c*Frozen December 28 to 31, 1902.

Daily gage height, in feet, of New River near Oldtown, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
8	1.1	1.9	1.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	.9	1.9	1.7	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	.9	1.8	1.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
11	.9	1.7	2.4	.....	.....	.....	.....	.....	.....	.....	.....	.....
12	.9	2.8	2.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	.9	2.4	2.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	.9	1.9	1.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	.9	1.6	1.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
16	.9	1.5	1.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
17	.9	5.4	1.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	.9	3.2	1.4	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	.9	2.2	1.2	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	.9	2.1	1.2	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	.9	1.8	1.4	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	.9	1.5	1.7	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	.9	1.4	4.7	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	.9	1.2	4.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	.9	1.1	3.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	1.0	1.1	2.4	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	1.1	1.2	2.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	1.3	2.9	1.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	1.4	.....	5.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	1.5	.....	3.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	1.3	.....	2.2	.....	.....	.....	.....	.....	.....	.....	.....	.....

NEW RIVER AT RADFORD, VA.

This station is located at the highway bridge near the Norfolk and Western Railway station, and was established by D. C. Humphreys August 1, 1898. The gage used at first was erected by the United States Weather Bureau. It consists of a vertical board, graduated to feet and tenths, and is attached to the iron framework connecting the pair of iron concrete cylinders which form the first pier from the right bank. On account of the inaccessibility of the Weather Bureau gage, a wire gage was put in on February 23, 1900, the datum being the same as that of the old gage. On December 1, 1903, the old wire gage was replaced by a standard chain gage and the gage datum was lowered 3.41 feet. The length of the chain from the end of the weight to the marker is 87.00 feet. The observer is C. L. Gillaspie, toll collector, who reads the gage once each day. The channel is straight for several hundred feet above and below the station and is one unbroken channel 570 feet wide at ordinary stages. At extreme high water its width is about 1,200 feet, broken by 5 piers and several trestle bents. (See foot note to discharge measurements.)

The bottom is of solid rock and gravel and is smooth and regular. On the left bank there is a steep, rocky bluff. The right bank is high and is subject to overflow only in extreme floods, all the water passing under the bridge which is about 85 feet above low water. The discharge measurements are made from the upstream side of the bridge. The initial point for soundings is on the right bank of the river 50 feet from the first pier.

The bench marks described below are all referred to the datum of the chain gage. Bench mark No. 1 is the bottom of the lowest horizontal brace connecting the first two cylinders from the right bank; elevation 7.29 feet. Bench mark No. 2 is the top of the lowest horizontal brace on the west side of the bridge 2.5 feet south of the northwest post of the bent nearest the river on the right bank; elevation 22.65 feet. Bench mark No. 3 is the northwest corner of the top of the stone under the 7th post from the right bank on the west side of the bridge; elevation 18.54 feet.

Discharge measurements of New River at Radford, Va.

Date.	Hydrographer.	Area of section.	Mean velocity.	[a]Gage height.	Discharge.
1898.		*Sq. feet.*	*Ft. per sec.*	*Feet.*	*Sec.-feet.*
July 21	D. C. Humphreys	1,444	1.26	3.61	1,812
July 29	....do	2,085	2.20	4.67	4,623
1899.					
June 29	D. C. Humphreys	2,000	2.49	4.53	4,980
August 11	....do	1,419	1.53	3.61	2,172
1900.					
[b]February 23	D. C. Humphreys	2,891	4.04	5.96	11,680
[b]February 24	....do	2,456	3.46	5.51	8,500
March 30	....do	2,575	2.99	5.19	7,709
June 27	....do	2,450	2.82	5.03	6,900
July 28	....do	2,022	2.59	4.66	5,256
August 22	....do	1,451	.94	3.41	1,365
December 20	....do	1,580	1.88	4.11	2,975

[a]All gage heights refer to datum established December 1, 1903.
[b]Partly measured and partly estimated.

Discharge measurements of New River at Radford, Va.—Con.

Date.	Hydrographer.	Area of section.	Mean velocity.	Gage height.	Discharge.
1901.		*Sq. feet.*	*Ft. per sec*	*Feet.*	*Sec-feet.*
July 20	D. C. Humphreys	2,445	3.37	5.56	8,245
March 29	do	2,576	3.92	5.41	10,100
August 8	do	3,570	4.77	7.42	17,030
1902.					
July 12	D. C. Humphreys	1,593	1.77	3.01	2,820
August 22	do	1,497	1.49	2.73	2,233
1903.					
March 21	E. C. Murphy	2,327	2.24	4.86	5,214
September 23	Paul and Sawyer	1,452	1.45	3.54	2,106
November 30	W. C. Sawyer	1,277	.95	3.21	1,212
1904.					
June 18	F. H. Brundage	1,965	1.83	4.07	3,610
September 16	R. H. Bolster	1,520	1.08	3.40	1,635
September 29	do	1,432	.86	3.24	1,240
October 18	do	1,378	.73	3.14	1,005
1905.					
March 18	A. H. Horton	1,910	1.76	3.98	3,353
September 11	R. H. Bolster	1,810	1.44	3.88	2,615

NOTE.—The 5 circular piers at this station are a few feet below the measuring section for low water measurements, but are included in the measuring section for high water measurements owing to the meter being carried down stream by the swiftness of the current. The measurements for 1904 and 1905 have been recomputed for one unbroken channel. Measurements June 27, 1900, and August 8, 1901, have been recomputed for a channel broken by five piers. No other measurements have been corrected, the results having been computed on the basis of a channel broken by five piers.

Daily gage height (a), in feet, of New River at Radford, Va.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1898.												
1	.....	.....	.....	.....	.....	.....	.....	4.3	4.0	3.9	4.4	4.2
2	.....	.....	.....	.....	.....	.....	.....	3.9	3.9	4.0	4.3	4.1
3	.....	.....	.....	.....	.....	.....	.....	3.8	3.9	4.1	4.4	4.3
4	.....	.....	.....	.....	.....	.....	.....	3.9	5.4	4.2	4.3	4.2
5	.....	.....	.....	.....	.....	.....	.....	6.8	7.3	7.3	4.2	6.0
6	.....	.....	.....	.....	.....	.....	.....	5.2	5.2	7.2	4.3	5.4
7	.....	.....	.....	.....	.....	.....	.....	4.9	4.4	6.4	4.2	5.3
8	.....	.....	.....	.....	.....	.....	.....	4.4	4.2	5.2	4.4	5.2
9	.....	.....	.....	.....	.....	.....	.....	4.3	4.1	4.3	4.1	4.7
10	.....	.....	.....	.....	.....	.....	.....	4.4	4.0	4.2	4.0	4.6
11	.....	.....	.....	.....	.....	.....	.....	4.8	3.9	4.4	4.0	4.5
12	.....	.....	.....	.....	.....	.....	.....	5.3	3.9	4.3	4.3	4.4
13	.....	.....	.....	.....	.....	.....	.....	5.2	3.8	4.2	4.2	4.3
14	.....	.....	.....	.....	.....	.....	.....	5.2	4.0	4.0	4.1	4.2
15	.....	.....	.....	.....	.....	.....	.....	4.4	4.1	3.9	4.0	4.3
16	.....	.....	.....	.....	.....	.....	.....	4.1	4.0	4.0	3.9	4.4
17	.....	.....	.....	.....	.....	.....	.....	3.9	3.9	4.2	4.3	4.3
18	.....	.....	.....	.....	.....	.....	.....	4.0	3.8	4.3	4.4	4.2
19	.....	.....	.....	.....	.....	.....	.....	3.9	3.8	10.0	4.6	4.6
20	.....	.....	.....	.....	.....	.....	.....	4.2	3.7	6.3	4.6	4.4
21	.....	.....	.....	.....	.....	.....	.....	4.3	3.6	5.9	4.4	4.6
22	.....	.....	.....	.....	.....	.....	.....	4.2	3.7	13.3	4.5	4.7
23	.....	.....	.....	.....	.....	.....	.....	4.2	9.7	7.4	4.4	5.1
24	.....	.....	.....	.....	.....	.....	.....	4.0	9.2	6.3	4.3	5.3
25	.....	.....	.....	.....	.....	.....	.....	3.9	5.2	5.4	4.2	4.7
26	.....	.....	.....	.....	.....	.....	.....	4.2	4.4	5.3	4.3	4.6
27	.....	.....	.....	.....	.....	.....	.....	4.3	4.3	5.2	4.2	4.3
28	.....	.....	.....	.....	.....	.....	.....	4.4	4.2	5.0	4.3	4.2
29	.....	.....	.....	.....	.....	.....	.....	4.3	4.1	4.6	4.2	4.1
30	.....	.....	.....	.....	.....	.....	.....	4.2	4.0	5.0	4.1	4.2
31	.....	.....	.....	.....	.....	.....	.....	4.0	.....	4.9	.....	4.3
1899.												
1	4.4	4.1	6.4	5.8	4.8	4.5	4.2	*b*3.8	*b*4.4	*b*3.2	*b*3.8	*b*3.1
2	4.5	4.1	6.0	5.4	4.7	4.4	3.8	3.8	4.4	3.1	4.4	3.6
3	4.4	4.4	5.4	5.3	4.7	4.3	3.8	3.7	4.4	3.1	4.4	3.6
4	4.6	5.4	9.4	5.0	4.8	4.2	3.7	3.4	4.5	3.0	3.9	3.5
5	4.9	7.6	13.9	5.4	4.7	4.1	3.7	3.2	4.4	3.0	3.7	3.3
6	5.2	9.1	10.4	5.3	4.4	4.0	3.8	3.4	4.1	3.0	3.6	3.2
7	7.4	8.4	8.4	5.2	4.5	3.8	3.9	3.4	3.5	3.0	3.4	3.1
8	6.0	7.6	7.4	7.5	4.6	3.8	3.8	3.2	3.4	2.9	3.2	3.0
9	5.2	6.5	6.3	7.2	5.3	3.7	3.7	3.4	3.1	3.2	3.1	3.0
10	5.1	6.4	5.9	6.3	5.2	3.7	3.6	3.3	2.9	3.4	3.1	3.0
11	5.0	5.8	5.6	5.4	5.4	3.8	3.7	3.3	2.9	3.4	3.1	3.0
12	4.6	5.4	5.4	5.3	5.3	5.2	3.7	3.4	3.1	3.4	3.1	3.2
13	4.9	5.1	5.3	5.2	5.4	7.3	3.8	3.4	3.1	3.3	3.0	7.9
14	4.8	4.7	5.1	5.1	5.5	6.0	3.6	3.7	3.0	3.3	3.0	5.4
15	4.9	4.3	7.2	5.2	5.2	5.4	3.5	3.8	3.0	3.3	3.0	4.4
16	5.0	4.6	8.9	5.0	5.1	5.1	3.4	3.8	3.0	3.2	3.0	4.3
17	5.1	6.9	7.1	4.9	4.7	4.5	3.4	3.7	3.1	3.1	3.0	4.2
18	4.6	6.6	6.2	4.8	4.5	4.3	3.4	3.7	3.1	3.1	3.0	4.2
19	4.5	7.0	11.1	5.0	4.4	4.2	3.4	3.6	4.4	3.1	3.0	4.1

a All gage heights reduced to datum established December, 1903.

b Gage heights August to December, 1899 taken partly from Weather Bureau records and partly from U. S. G. S. records. They are subject to large errors.

Daily gage height(a), in feet, of New River at Radford, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1899.												
20	4.5	6.2	11.3	4.9	4.4	4.3	3.4	3.6	5.0	3.0	2.9	4.3
21	4.3	6.4	7.5	4.8	4.3	4.1	3.5	3.6	4.4	3.0	2.9	4.4
22	4.2	6.4	7.2	4.7	4.2	4.0	3.5	3.6	4.3	3.1	3.0	4.3
23	4.4	6.3	6.4	4.7	4.5	3.9	3.5	3.5	4.2	3.2	3.0	4.0
24	4.4	5.4	6.2	4.5	4.9	3.9	3.4	3.5	4.0	3.2	3.0	4.0
25	4.3	5.3	6.0	4.4	4.8	4.0	3.4	3.4	3.9	3.2	3.2	3.9
26	4.4	5.4	5.9	5.4	4.5	4.3	3.4	3.4	3.9	3.3	3.2	3.8
27	4.4	8.0	5.4	5.9	4.2	4.6	4.4	3.4	3.8	3.3	3.2	3.7
28	4.3	7.4	6.5	5.4	4.2	4.4	4.3	3.7	3.7	3.2	3.4	3.7
29	4.4	.....	6.4	5.2	4.1	4.4	4.2	4.4	3.8	3.2	3.2	3.6
30	4.2	.....	6.6	5.0	4.2	4.3	3.9	4.4	3.7	3.3	3.2	3.4
31	4.2	.....	6.3	.....	4.3	.....	3.8	4.1	.....	3.4	.....	3.2
1900.												
1	b3.2	3.7	9.15	5.3	4.6	4.2	c4.4	3.8	3.1	3.0	4.3	5.0
2	3.2	4.2	9.4	4.6	4.5	4.1	4.2	3.7	3.1	3.0	4.2	4.6
3	3.2	4.3	6.5	4.6	4.4	4.4	4.0	3.6	3.0	3.4	4.2	4.4
4	3.2	4.2	5.4	4.5	4.7	4.4	4.1	3.7	3.1	3.4	4.4	6.7
5	3.2	4.2	5.3	4.6	4.6	4.3	4.3	3.7	3.1	3.4	4.8	7.4
6	3.2	4.1	5.2	4.5	4.4	4.3	4.1	3.4	2.6	3.5	4.6	6.4
7	3.1	4.4	5.1	4.4	4.4	4.2	3.9	3.4	2.7	3.5	4.4	5.4
8	3.1	4.6	5.4	4.4	4.3	4.3	3.8	3.2	2.7	3.6	4.3	5.4
9	3.0	4.3	5.5	4.3	4.4	4.2	3.7	3.0	2.8	3.6	4.2	5.5
10	2.9	4.4	5.3	4.4	4.7	4.2	3.9	2.7	3.0	3.7	4.2	5.4
11	2.7	4.3	6.0	5.3	4.4	4.1	3.8	2.5	3.1	3.6	4.1	4.7
12	4.4	4.6	5.9	5.2	4.4	4.1	3.8	3.4	2.9	3.4	4.0	4.8
13	6.4	6.3	5.3	4.6	4.4	4.2	3.7	2.9	3.0	3.4	4.0	4.4
14	5.3	8.2	5.1	4.4	4.3	4.4	3.5	2.6	3.0	3.6	3.9	4.4
15	5.0	6.2	5.0	4.3	4.3	4.5	3.6	2.7	4.4	3.7	4.0	4.3
16	4.6	5.1	4.7	4.2	4.2	4.6	3.7	2.8	6.25	3.7	3.9	4.3
17	4.3	4.9	5.0	4.2	4.2	5.0	3.7	2.6	5.8	3.6	3.8	4.2
18	4.2	4.8	4.9	4.1	4.2	4.6	3.5	2.6	4.6	3.5	3.8	4.2
19	4.4	4.7	4.6	7.4	4.3	5.4	3.4	2.7	3.9	3.4	3.7	4.1
20	6.05	4.3	7.25	6.0	4.2	4.4	3.4	2.7	3.6	3.4	3.7	4.1
21	5.3	4.4	7.8	5.7	4.4	4.5	3.5	2.8	3.8	3.4	3.8	4.0
22	5.2	6.4	6.6	6.1	4.3	4.4	3.6	3.4	3.9	3.7	3.9	4.0
23	5.0	6.3	5.7	6.3	4.3	4.6	3.6	3.4	3.9	5.6	3.9	4.2
24	4.7	5.6	5.5	5.7	4.2	4.4	3.8	3.5	3.8	26.4	3.8	4.1
25	4.6	5.5	5.2	5.3	5.4	4.5	3.9	3.6	3.7	8.0	3.9	4.4
26	4.4	5.3	5.3	5.1	5.3	5.4	4.0	3.6	3.6	5.7	11.2	4.3
27	4.3	4.4	5.9	5.0	4.4	5.0	4.3	3.4	3.4	4.7	7.7	4.1
28	3.7	6.0	6.0	4.8	4.5	5.4	5.5	3.4	3.4	4.6	5.8	4.2
29	3.6	.....	5.5	4.7	4.4	5.0	4.2	3.4	3.1	4.4	5.3	4.1
30	3.6	.....	5.4	4.6	4.3	5.0	4.3	3.2	3.0	4.7	5.2	4.0
31	3.7	.....	5.3	.....	4.3	.....	3.9	3.2	.....	4.6	.....	4.1
1901.												
1	4.2	3.9	3.8	5.1	5.1	6.8	6.4	4.5	7.0	6.4	3.7	3.6
2	4.1	3.8	3.7	5.4	4.9	6.3	7.0	4.5	6.8	5.9	3.7	3.5
3	4.2	4.0	3.7	14.4	4.9	5.9	6.2	4.4	6.4	5.3	3.7	3.7
4	4.1	4.1	3.6	9.4	4.8	5.3	5.6	4.3	6.4	4.9	3.8	4.8

a All gage heights reduced to datum established December, 1903.
b River frozen January 1 to 9, 1900.
c Gage heights July 1 to 28, 1900, subject to error

Daily gage height (a), in feet, of New River at Radford, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901.												
5	4.0	4.4	3.6	6.4	4.7	5.1	5.7	4.4	6.0	4.5	3.8	4.6
6	3.9	4.3	3.4	5.6	4.6	4.9	5.5	15.5	5.6	4.4	3.7	4.3
7	3.8	4.2	3.1	5.4	4.6	5.3	5.7	15.4	5.3	4.3	3.7	4.0
8	3.9	4.1	2.8	5.0	4.6	6.4	5.7	9.3	5.2	4.3	3.7	3.9
9	3.8	4.4	2.9	4.9	4.7	5.3	5.4	7.7	5.0	4.3	3.7	3.8
10	3.8	4.7	2.9	4.6	5.3	5.1	5.0	5.5	4.9	4.3	3.7	3.8
11	4.0	4.9	5.3	4.5	6.1	4.9	4.9	6.6	4.9	4.2	3.6	3.7
12	7.4	4.7	5.2	4.4	5.4	4.8	4.8	7.4	4.9	4.2	3.6	3.8
13	6.4	4.4	4.6	4.4	5.1	4.9	4.7	8.7	4.8	4.3	3.6	3.8
14	5.5	4.2	4.2	4.3	4.7	5.85	8.0	10.9	4.8	6.4	3.6	4.1
15	5.1	4.2	4.2	6.4	4.6	9.6	6.9	9.4	4.8	5.0	3.6	22.9
16	4.8	4.2	4.1	5.4	4.4	8.4	5.7	8.25	4.9	4.8	3.5	10.9
17	4.5	4.1	4.0	5.0	4.5	9.8	5.4	8.55	5.2	4.6	3.5	7.4
18	4.4	4.1	3.9	4.8	4.6	8.2	5.7	10.1	4.9	4.4	3.5	6.4
19	4.1	4.1	3.9	4.6	5.3	6.9	6.4	7.9	4.8	4.3	3.5	5.4
20	3.8	4.0	3.9	21.85	5.1	6.2	5.7	6.8	4.8	4.3	3.4	4.9
21	4.1	4.0	3.9	14.7	5.15	6.3	5.6	6.4	4.6	4.2	3.4	4.4
22	4.5	3.9	4.4	8.6	26.3	6.1	5.3	6.9	4.6	4.2	3.4	4.4
23	4.3	3.8	4.2	7.9	15.6	11.8	4.7	10.1	4.4	4.0	3.4	4.3
24	4.2	3.6	4.1	6.6	9.4	8.3	4.6	8.4	4.4	4.0	4.6	4.2
25	4.1	3.3	4.0	6.3	7.2	7.4	4.5	6.9	4.4	3.9	4.4	5.2
26	4.0	4.0	5.35	6.1	8.7	6.5	4.5	6.5	4.4	3.9	4.2	4.9
27	4.0	4.0	8.4	5.9	9.9	6.4	4.4	6.4	4.3	3.9	4.1	4.9
28	4.0	3.9	6.9	5.7	10.1	5.8	4.4	11.1	4.3	3.9	3.9	5.4
29	4.2	.....	5.5	5.4	8.9	6.1	4.4	10.4	8.65	3.8	3.8	19.65
30	4.1	.....	4.9	5.3	7.7	6.3	4.4	7.4	7.0	3.8	3.6	19.4
31	4.1	.....	5.1	.....	7.0	.....	4.4	7.0	.....	3.8	.....	13.4
1902.												
1	7.4	6.6	15.4	5.2	4.1	b4.1	b5.8	b4.7	b3.3	b3.5	3.2	4.1
2	6.4	6.7	9.4	5.0	4.1	4.0	5.4	4.7	3.2	3.5	3.4	4.0
3	5.6	7.4	7.6	4.9	4.1	4.0	5.0	4.6	3.2	3.6	3.5	4.0
4	5.4	7.2	6.4	4.9	4.1	3.9	4.8	4.6	3.5	3.6	3.5	4.2
5	5.2	5.9	6.4	5.4	4.0	3.8	4.5	4.6	3.7	3.6	3.6	4.8
6	5.2	4.7	5.9	5.6	4.0	3.7	4.5	4.5	3.7	4.3	3.6	4.6
7	5.0	4.6	5.6	5.4	4.0	3.7	4.5	4.6	3.7	4.2	3.6	4.4
8	4.9	4.4	5.2	5.3	4.0	3.7	4.4	4.6	3.6	4.2	3.5	4.4
9	4.9	4.4	5.2	5.3	3.9	3.8	4.2	4.7	3.5	4.0	3.5	4.3
10	4.8	4.6	5.0	5.2	3.9	3.8	4.1	4.6	3.5	4.0	3.5	4.1
11	4.6	4.5	5.0	5.2	3.8	3.8	4.1	4.5	4.0	3.9	3.6	4.0
12	4.6	4.4	5.0	5.0	3.8	3.9	4.1	4.5	3.9	3.9	3.6	3.9
13	4.5	4.3	4.9	5.0	3.7	3.9	4.1	4.4	3.7	3.9	3.6	3.7
14	4.5	4.3	4.9	4.9	3.6	3.9	4.2	4.4	3.7	3.8	3.5	3.6
15	4.5	4.2	4.9	4.9	3.6	4.1	4.2	4.4	3.6	3.7	3.5	3.6
16	4.5	4.2	4.9	4.8	3.6	4.8	4.3	4.5	3.5	3.6	3.6	3.7
17	4.4	4.3	6.4	4.7	3.6	7.7	4.2	4.3	3.5	3.5	3.6	3.8
18	4.4	4.3	6.0	4.7	3.5	6.8	4.1	4.1	3.4	3.5	3.6	3.8
19	4.4	4.4	5.8	4.6	3.5	6.1	3.9	3.9	3.3	3.5	3.8	4.4
20	4.3	4.4	5.4	4.6	3.4	5.7	4.0	3.7	3.3	3.4	3.7	4.2
21	4.3	4.5	5.0	4.6	4.4	5.1	4.1	3.6	3.3	3.4	3.7	4.2
22	4.4	4.6	4.9	4.4	4.2	4.9	4.1	3.7	3.4	3.4	3.6	4.1
23	4.4	5.4	4.8	4.4	4.2	4.7	4.3	3.6	3.4	3.3	3.6	4.1

a All gage heights reduced to datum established December, 1903.

b Gage heights June 1 to October 31, 1902, have been increased .9 in addition to the 3.4 correction for change of datum. The plotting of the two 1902 measurements and the gage heights June 1 to October 31, as given in the observer's book indicate that the gage wire was .9 too short over this period. The gage heights for the remainder of the year are uncertain.

Daily gage height (a), in feet, of New River at Radford, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1902.												
24	4.4	6.4	4.8	4.4	4.0	4.7	4.3	3.5	3.5	3.3	3.6	4.0
25	4.4	9.4	4.6	4.3	3.7	4.6	4.4	3.5	3.5	3.3	3.6	4.0
26	4.5	9.9	4.5	4.3	3.6	4.5	4.5	3.5	3.5	3.4	4.3	4.0
27	4.6	6.6	4.4	4.3	3.6	4.4	4.5	3.4	3.5	3.5	4.6	3.9
28	5.0	15.4	4.4	4.2	3.5	7.8	4.5	3.4	3.4	3.5	4.4	3.9
29	5.4	.....	5.9	4.2	3.4	6.6	4.5	3.4	3.4	3.7	4.2	3.9
30	6.4	.....	5.9	4.2	3.3	6.3	4.6	3.4	3.4	3.9	4.2	3.8
31	6.8	.....	5.4	.....	3.2	.....	4.6	3.4	.....	4.0	.....	3.8
b1903.												
1	3.9	4.3	9.7	6.5	4.8	5.0	5.2	4.6	4.2	3.2	3.4	3.4
2	4.0	4.3	7.9	5.8	4.6	4.9	4.8	5.8	4.1	3.2	3.5	3.5
3	8.1	4.3	6.6	5.3	4.6	4.9	4.4	5.2	3.8	3.2	3.5	3.4
4	6.8	4.3	5.7	6.3	4.6	4.8	4.2	4.9	3.7	3.2	3.5	3.4
5	6.2	5.9	4.9	7.4	4.5	4.8	4.2	4.7	3.6	3.4	3.8	3.5
6	5.8	5.4	4.7	6.4	4.5	4.7	5.4	4.4	3.7	3.3	4.0	3.5
7	5.3	5.2	4.6	6.9	4.4	5.4	5.0	4.2	3.5	3.4	3.7	3.5
8	5.0	5.0	4.6	6.6	4.4	5.3	4.7	4.1	3.6	4.65	3.7	3.4
9	4.8	4.8	4.4	6.8	4.4	5.3	4.4	3.9	3.5	4.8	3.6	3.4
10	4.6	4.7	4.9	6.4	4.4	5.2	4.4	3.9	4.1	4.2	3.5	3.3
11	4.4	4.6	5.2	5.8	4.4	5.0	4.2	3.9	3.6	3.9	3.6	3.1
12	4.2	6.2	5.4	5.4	4.4	5.0	4.9	3.8	3.6	3.8	3.5	3.0
13	4.2	5.8	5.3	4.9	4.3	4.9	4.8	3.8	3.5	3.7	3.5	3.1
14	4.0	5.3	5.2	5.8	4.3	4.9	4.8	4.2	3.5	3.6	3.6	3.2
15	4.0	4.9	5.0	6.2	4.2	4.8	5.4	4.5	3.4	3.4	3.4	3.1
16	3.9	4.7	5.0	6.3	4.2	4.7	4.8	4.4	3.5	3.3	3.4	3.0
17	3.9	12.2	4.8	5.4	4.2	4.6	4.6	4.3	6.8	3.4	3.5	3.0
18	3.9	7.7	4.6	5.0	4.1	4.4	4.4	4.3	4.8	4.3	3.8	3.0
19	3.9	6.6	4.4	5.0	4.1	4.3	4.4	4.1	4.1	4.1	3.9	2.9
20	3.8	5.4	4.4	4.9	4.0	4.2	4.2	4.2	4.0	3.7	3.9	3.0
21	4.0	4.9	4.3	4.9	4.0	4.0	4.1	4.1	3.6	3.6	3.8	3.2
22	4.8	4.7	5.4	4.8	3.9	3.9	4.0	4.0	3.7	3.5	3.6	3.4
23	4.6	4.7	12.4	4.8	3.9	4.1	3.9	4.0	3.5	3.5	3.7	3.7
24	4.4	4.6	12.5	4.8	4.0	4.0	3.8	3.9	3.5	3.4	3.4	3.7
25	4.4	4.4	7.6	4.9	4.0	4.0	3.8	3.9	3.5	3.4	3.6	3.6
26	4.3	4.4	6.3	4.9	4.2	3.9	3.8	3.8	3.4	3.4	3.5	3.6
27	4.3	4.4	5.9	5.7	4.3	4.8	3.8	3.7	3.4	3.3	3.6	3.6
28	4.3	5.8	5.2	5.3	4.4	7.7	3.7	3.7	3.4	3.3	3.1	3.4
29	4.4	.....	5.4	5.0	4.4	6.4	3.7	3.6	3.4	3.4	3.1	3.3
30	4.8	.....	10.4	4.9	4.6	5.9	3.7	3.7	3.3	3.5	3.2	3.3
31	4.6	.....	7.4	.....	5.0	.....	4.0	4.1	.....	3.6	.....	3.3
1904.												
1	3.5	3.4	4.2	4.1	4.0	4.8	4.7	3.7	3.3	3.2	3.1	3.2
2	3.7	3.6	4.3	4.0	3.8	6.5	4.3	4.0	3.7	3.1	3.1	3.2
3	3.6	3.5	4.2	4.0	3.7	5.7	4.1	4.3	3.8	3.1	3.2	3.2
4	3.4	3.6	4.2	4.0	3.7	2.9	3.9	4.4	3.8	3.1	3.2	3.4
5	3.4	3.7	4.2	3.9	4.5	2.9	4.0	4.3	3.6	3.1	3.2	3.4
6	3.3	3.7	4.1	3.9	4.4	3.3	4.1	4.6	3.5	3.1	3.3	3.7
7	3.3	4.0	4.0	3.9	4.1	4.1	4.1	4.0	3.3	3.1	3.6	4.1
8	3.4	4.8	7.4	3.8	4.0	4.2	3.9	3.9	3.3	3.1	3.4	3.7

a All gage heights refer to datum established December, 1903.

b All gage heights January 1 to December 1, 1903, reduced to datum established December 1, 1903. All gage heights prior to September 1, 1903, subject to errors of several tenths, owing to inaccuracy in reading the gage.

Daily gage height, in feet, of New River at Radford, Va.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
9	3.4	4.8	5.5	3.8	4.0	4.3	3.8	4.1	3.4	3.1	3.3	3.6
10	3.4	4.5	5.0	4.2	5.5	4.0	4.0	4.2	3.3	3.1	3.2	3.5
11	3.4	4.2	4.6	4.1	4.8	3.8	4.3	4.7	3.3	3.1	3.1	3.5
12	3.5	3.5	4.4	4.0	4.4	4.0	4.0	4.6	3.3	3.1	3.1	3.5
13	3.5	3.5	4.4	4.0	4.1	4.2	3.8	4.2	3.3	3.0	3.5	3.4
14	3.5	3.2	4.3	3.9	3.9	4.0	3.6	4.0	3.3	3.0	3.7	3.4
15	3.5	3.5	4.2	4.0	3.9	3.9	3.6	3.9	3.3	3.0	3.6	3.3
16	3.5	3.6	4.0	3.8	4.1	4.3	3.6	3.9	3.3	3.0	3.5	3.2
17	3.4	3.8	3.8	3.7	4.1	4.0	3.5	3.9	3.3	3.0	3.5	3.2
18	3.4	3.8	3.8	3.7	4.2	4.0	3.5	3.8	3.3	3.0	3.4	3.4
19	3.4	3.7	3.3	3.6	6.3	4.0	3.4	3.7	3.3	3.0	3.4	3.2
20	3.5	3.3	3.7	3.6	5.2	4.5	3.4	3.6	3.3	3.0	3.4	3.1
21	3.5	3.5	3.7	3.5	4.9	4.1	3.3	3.6	3.2	3.0	3.3	3.1
22	3.8	4.5	3.7	3.5	4.7	3.9	3.3	3.6	3.2	3.0	3.3	3.1
23	5.4	5.3	3.6	3.5	4.5	3.8	3.5	3.7	3.2	3.0	3.2	3.1
24	4.8	4.9	3.9	3.5	4.3	3.7	3.6	3.6	3.2	3.0	3.2	3.3
25	4.3	4.4	4.9	3.5	3.9	3.6	3.7	3.5	3.2	3.0	3.2	3.5
26	3.8	3.9	4.7	3.5	4.0	3.7	3.8	3.5	3.2	3.1	3.2	3.6
27	3.6	3.9	4.7	3.7	4.0	3.9	3.8	3.5	3.2	3.1	3.2	3.5
28	3.4	3.8	4.6	3.9	3.9	3.7	3.9	3.5	3.2	3.1	3.2	3.6
29	3.2	4.1	4.4	4.0	3.8	5.9	4.0	3.4	3.2	3.1	3.2	3.5
30	2.9	.....	4.2	3.9	3.6	5.4	4.5	3.4	3.2	3.1	3.2	3.4
31	3.1	.....	4.0	.....	3.6	.....	4.1	3.3	.....	3.1	.....	3.3
1905.												
1	3.5	3.4	4.5	3.7	3.5	3.8	3.3	3.9	3.6	3.5	3.5	3.2
2	3.5	3.4	4.9	3.6	3.5	3.7	3.2	3.1	3.7	3.5	3.5	3.2
3	3.5	3.8	4.9	3.7	3.4	3.6	3.7	3.1	5.0	3.5	3.5	3.5
4	3.5	3.7	4.7	3.7	3.5	3.6	3.7	3.8	4.9	3.5	3.5	5.7
5	*a*3.0	3.7	4.7	3.6	3.5	3.3	3.5	3.5	5.2	3.4	3.4	4.8
6	*a*3.2	4.1	4.9	4.1	3.8	3.2	5.5	3.5	4.5	3.4	3.4	4.0
7	3.5	3.8	4.6	4.6	3.9	3.2	5.0	4.6	4.4	3.3	3.4	3.8
8	3.6	3.7	4.6	4.2	3.9	3.1	4.1	5.3	4.3	3.3	3.4	3.8
9	3.5	4.0	4.7	4.1	3.8	3.2	4.0	5.2	4.0	3.3	3.4	3.7
10	3.5	3.8	5.5	4.0	3.7	3.2	3.8	5.2	3.9	3.3	3.4	3.8
11	3.6	4.0	5.8	3.8	4.6	3.1	3.5	5.9	3.8	3.3	3.5	4.1
12	3.9	3.8	5.2	3.9	6.0	3.2	6.45	6.0	3.9	3.3	3.5	4.1
13	5.2	3.8	4.7	4.2	8.1	3.2	21.6	6.1	3.8	3.3	3.5	4.1
14	5.7	4.5	4.6	4.1	7.1	3.1	10.6	5.8	3.7	3.3	3.5	3.8
15	4.4	4.8	4.4	4.3	8.2	3.2	7.2	5.3	3.8	3.7	3.5	3.8
16	4.2	4.4	4.2	4.1	8.8	3.2	6.7	5.3	3.7	3.7	3.4	3.8
17	3.8	3.9	4.0	4.0	7.4	3.3	4.8	4.8	3.6	3.5	3.4	3.8
18	3.8	3.9	4.0	3.8	6.6	3.5	4.7	4.4	3.7	3.4	3.3	3.9
19	3.7	3.7	3.8	3.6	5.0	3.5	4.6	4.4	3.6	3.4	3.3	4.0
20	4.0	3.9	3.9	3.7	4.8	3.5	4.5	4.4	3.5	3.4	3.3	4.0
21	3.8	4.2	3.8	3.7	4.2	3.5	4.4	4.2	3.5	3.4	3.3	5.6
22	4.0	4.5	3.9	3.6	4.0	3.5	4.4	3.8	3.4	3.4	3.3	6.2
23	3.7	7.8	3.8	3.6	4.0	3.3	5.3	3.8	3.4	3.4	3.3	6.1
24	3.7	5.3	3.8	3.6	3.7	3.7	5.0	3.8	3.4	3.4	3.3	5.7
25	3.6	5.2	3.7	3.5	3.8	3.7	4.7	3.6	3.4	3.4	3.3	4.9
26	*b*3.5	5.2	3.8	3.6	3.8	3.4	4.4	4.1	3.4	3.5	3.3	4.4
27	*b*3.4	5.4	3.7	3.4	3.9	3.4	4.0	3.8	3.4	3.7	3.3	4.2
28	*b*3.5	4.8	3.8	3.5	4.1	3.4	4.0	3.7	3.4	3.8	3.3	4.0
29	*b*3.4	.....	3.6	3.5	4.0	3.3	4.9	3.7	3.4	3.8	3.3	4.0
30	3.9	.....	3.7	3.4	3.7	3.3	4.8	3.7	3.4	3.6	3.3	3.9
31	3.5	.....	3.6	.....	4.0	.....	4.1	3.7	.....	3.6	.....	3.9

a Water thrown from gage by ice January 5 and 6, 1905.
b Gage reading to surface of ice January 26 to 29, 1905.

Rating table for New River at Radford, Va., from August 1, 1898, 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.*
2.50	*a*120	4.10	3,590	5.70	9,540	7.60	17,900
2.60	*a*170	4.20	3,900	5.80	9,950	7.80	18,890
2.70	*a*250	4.30	4,220	5.90	10,360	8.00	19,920
2.80	*a*360	4.40	4,550	6.00	10,770	8.20	20,990
2.90	*a*510	4.50	4,900	6.10	11,190	8.40	22,100
3.00	700	4.60	5,260	6.20	11,610	8.60	23,250
3.10	920	4.70	5,630	6.30	12,040	8.80	24,440
3.20	1,150	4.80	6,000	6.40	12,470	9.00	25,650
3.30	1,390	4.90	6,380	6.50	12,900	9.20	26,870
3.40	1,640	5.00	6,770	6.60	13,340	9.40	28,100
3.50	1,900	5.10	7,160	6.70	13,780	9.60	29,340
3.60	2,160	5.20	7,550	6.80	14,230	9.80	30,580
3.70	2,430	5.30	7,940	6.90	14,680	10.00	31,820
3.80	2,710	5.40	8,340	7.00	15,130		
3.90	3,000	5.50	8,740	7.20	16,030		
4.00	3,290	5.60	9,140	7.40	16,950		

The above table is strictly applicable only for open channel conditions. It is based upon 7 discharge measurements made June 27, 1900, August 8, 1901, and 1904 to 1905. It is well defined between gage heights 3.0 feet and 7.5 feet. The table has been extended beyond these limits. Above gage height 7.5 feet the rating table is based upon the extension of the area and velocity curves, and is only approximate.

a All gage heights less than 3.0 feet and all estimates less than 700 second-feet, are probably incorrect, being due to errors of gage. Between 500 and 700 second-feet is about the minimum flow at Radford except under unusual conditions.

Estimated monthly discharge of New River at Radford, Va.

(Drainage area, 2,725 square miles.)

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1898.					
August	14,230	2,710	4,747	1.74	2.01
September	29,960	2,160	5,842	2.14	2.39
October	53,700	3,000	9,378	3.44	3.97
November	5,260	3,000	4,117	1.51	1.68
December	10,770	3,590	5,228	1.92	2.21

Estimated monthly discharge of New River at Radford, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1899.					
January	16,950	3,900	5,887	2.16	2.49
February	26,260	3,590	11,550	4.24	4.42
March	57,950	7,160	17,130	6.29	7.25
April	17,420	4,550	8,041	2.95	3.29
May	8,740	3,590	5,697	2.09	2.41
June	16,490	2,430	4,799	1.76	1.96
July	4,550	1,640	2,452	.900	1.04
*August	4,550	1,150	2,192	.804	.927
*September	6,770	510	2,717	.997	1.11
*October	1,640	510	1,107	.406	.468
*November	4,550	510	1,376	.505	.563
*December	19,400	700	3,146	1.15	1.33
The year	57,950	510	5,508	2.02	27.26
1900.					
*a*January	12,470	*c*250	3,933	1.44	1.66
February	20,990	2,430	6,937	2.55	2.66
March	28,100	5,260	10,290	3.78	4.36
April	16,950	3,590	6,703	2.46	2.74
May	8,340	3,900	4,730	1.74	2.01
June	8,340	3,590	5,094	1.87	2.09
*b*July	8,740	1,640	3,082	1.13	1.30
August	2,710	*c*120	1,242	.456	.526
September	11,820	*c*170	2,220	.815	.909
October	173,800	700	9,014	3.31	3.82
November	39,530	2,430	5,731	2.10	2.34
December	16,950	3,290	5,758	2.11	2.43
The year	173,800	*c*120	5,394	1.98	26.84

*Estimates August to December, 1899 liable to considerable error, owing to inaccurate gage readings.
*a*River frozen January 1 to 9, 1900. No correction made in estimates.
*b*Estimates for July, 1900, liable to considerable error owing to inaccuracy of gage.
*c*See rating table foot note.

Estimated monthly discharge of New River at Radford, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet. per sq. mi.	Depth in inches.
1901.					
January	16,950	2,710	4,642	1.70	1.96
February	6,380	1,390	3,696	1.36	1.42
March	22,100	*a*360	4,703	1.73	1.99
April	126,300	4,220	17,200	6.31	7.04
May	172,700	4,550	18,360	6.74	7.77
June	43,500	6,000	13,850	5.08	5.67
July	19,920	4,550	8,496	3.12	3.60
August	69,760	4,220	21,730	7.97	9.19
September	23,540	4,220	8,055	2.96	3.30
October	12,470	2,710	4,952	1.82	2.10
November	5,260	1,640	2,500	.917	1.02
December	137,000	1,900	18,420	6.76	7.79
The year	172,700	*a*360	10,550	3.87	52.84
***b*1902.**					
January	16,950	4,220	6,771	2.48	2.86
February	69,010	3,900	10,990	4.03	4.20
March	69,010	4,550	10,820	3.97	4.58
April	9,140	3,900	6,041	2.22	2.48
May	4,550	1,150	2,707	.993	1.14
June	18,890	2,430	6,234	2.29	2.56
July	9,950	3,000	4,666	1.71	1.97
August	5,630	1,640	3,729	1.37	1.58
September	3,290	1,150	1,919	.704	.785
October	4,220	1,390	2,391	.877	1.01
November	5,260	1,150	2,452	.900	1.00
December	6,000	2,160	3,450	1.27	1.46
The year	69,010	1,150	5,181	1.90	25.63

*a*See rating table foot note.

*b*1902 estimates liable to considerable error, owing to an uncorrected gage at this station during most of the year. See foot note under 1902 gage heights.

Estimated monthly discharge of New River at Radford, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi	Depth in inches.
*a*1903.					
January	20,450	2,710	5,621	2.06	2.38
February	46,180	4,220	8,609	3.16	3.29
March	48,210	4,220	12,480	4.58	5.28
April	16,950	6,000	9,392	3.45	3.85
May	6,770	3,000	4,342	1.59	1.83
June	18,390	3,000	6,382	2.34	2.61
July	8,340	2,430	4,578	1.68	1.94
August	9,950	2,160	3,949	1.45	1.67
September	14,230	1,390	2,793	1.02	1.14
October	6,000	1,150	2,232	.819	.944
November	3,290	920	2,081	.764	.852
December	2,430	510	1,453	.533	.615
The year	48,210	510	5,326	1.96	26.40
1904.					
January	8,340	510	2,184	.801	.923
February	7,940	1,150	3,208	1.18	1.27
March	16,950	1,390	4,478	1.64	1.89
April	3,900	1,900	2,775	1.02	1.14
May	12,040	2,160	4,149	1.52	1.75
June	12,900	510	3,940	1.45	1.62
July	5,630	1,390	2,876	1.06	1.22
August	5,630	1,390	3,010	1.10	1.27
September	2,710	1,150	1,484	.545	.608
October	1,150	700	835	.306	.353
November	2,430	920	1,402	.514	.573
December	3,590	920	1,643	.603	.695
The year	16,950	510	2,665	.978	13.31

*a*Estimates January to August, 1903 liable to slight error owing to inaccuracy in gage readings. These errors in reading, although involving several tenths on the gage, are probably sufficiently compensating to reduce the errors of the monthly estimates to a small per cent.

Estimated monthly discharge of New River at Radford, Va.—Con.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per sq. mi.	Depth in inches.
1905.					
aJanuary	9,540	1,640	2,777	1.02	1.18
February	18,890	1,640	4,509	1.65	1.72
March	9,950	2,160	4,435	1.63	1.88
April	5,260	1,640	2,763	1.01	1.13
May	24,440	1,640	6,344	2.33	2.69
June	2,710	920	1,588	.583	.650
July	123,800	1,150	10,210	3.75	4.32
August	11,190	920	4,766	1.75	2.02
September	7,550	1,640	2,885	1.06	1.18
October	2,710	1,390	1,805	.662	.763
November	1,900	1,390	1,610	.591	.659
December	11,610	1,150	4,312	1.58	1.82
The year	123,800	920	4,000	1.47	20.01

aJanuary 5 and 6, 1905, water thrown from gage by ice. Estimates corrected. January 26 to 29, 1905, river frozen. No correction made in estimates.

DISCUSSION OF PRECIPITATION AND RUN-OFF COMPARISONS.

In order to compare the run-off at the various gaging stations in Virginia with the rainfall over the drainage areas above these stations, the precipitation data collected by the United States Weather Bureau have been used.

Although the rainfall stations are few in some drainages, they are quite uniformly distributed and represent the conditions. It is assumed that for any one month the mean rainfall over a given area is the mean of the monthly rainfall in the various stations in that area.

In this comparison the following facts must be kept in mind: First: Run-off is a resultant quantity, and is the quantity of water left after evaporation, vegetation, seepage, etc., in the area have been satisfied. Second: A rain gage shows only the rain that falls on a few square inches of surface. There should be many rain gages in order to ascertain the average precipitation over a watershed, and as maximum precipitation often occurs in comparatively small

areas, it may not be recorded. Third: Ground and surface storage modify the relation between precipitation and run-off. The run-off for a month in early spring may be much larger than the precipitation for that month on account of melting snow that falls during the winter months. Again in the early fall when the groundwater is low, a small rainfall yields a much smaller run-off than it would during the springtime when the ground is nearly saturated with water. Fourth: Heavy rainfall frequently occurs at the end of a month, and as the run-off data is computed for the calendar months, the results from such a rainfall may appear in the following month's record. Fifth: Snowfall data are not available, therefore it has been impossible to allow for the snow storage, which accounts for the high percentages usually obtained for the late winter and early spring. To fully account for this storage a cube of snow should be melted at the end of each month in order to determine the amount of water stored during that time. The quantity available for run-off during the following month would be the amount determined plus the precipitation during the following month minus the amount left in snow storage at the end of that month.

These and other causes make the monthly ratios of run-off to rainfall appear quite erratic. A month is too short a period for the comparison of these quantities. A year is a better period but not entirely satisfactory, especially the calendar year, as the snow and groundwater storage are not in the same conditions at the end of each year. A year beginning with the first of October makes a much better period as the storage at that time is generally a minimum, and the conditions more nearly uniform for various years.

The State of Virginia comprises part or all of the following drainage basins: Potomac, Minor Chesapeake, Minor South Atlantic, James, Chowan, Roanoke and Ohio. In these basins, gaging stations for which the records are suitable for comparing with the rainfall, have been maintained as follows:

Potomac River.....Potomac River at Point of Rocks.
" " .....Shenandoah River at Millville.
" " .....Shenandoah River (South Branch) at Front Royal.
" " .....Shenandoah River (North Branch) at Riverton.
James River.....James River at Buchanan.
" " .....James River (North Fork) at Glasgow.
" " .....James River at Cartersville.
Roanoke River.....Roanoke River at Roanoke.
" " .....Roanoke River at Randolph.

With the exception of the Potomac drainage area which extends into Maryland and West Virginia, the drainage areas above these stations lie practically all within the State of Virginia.

Since 1891 the United States Weather Bureau has maintained ninety-seven rainfall stations in Virginia, as shown by the following list, and on Plate II; and in the Potomac drainage outside of Virginia, eleven stations have been maintained in Maryland, and seven stations in West Virginia. These stations have been grouped into the areas above the various stations (see following table) and the data at them used for determining the mean precipitation over these various areas. These values have been compared with the run-off in depth of inches and tables showing the run-off in per cent. of rainfall and also the loss in rainfall have been prepared. These values have been inserted in the tables of monthly estimated means accompanying the various gaging stations.

List of Rainfall Stations in Virginia.

No.	Station.	County.	Drainage.	Elevation in feet.	Date.	
					Estab.	Disc.
1	Abingdon	Washington	Tennessee		1891	1895
2	Alexandria	Alexandria	Potomac	30	1893	
3	Ashland	Hanover	York	220	1892	
4	Avon	Nelson	James		1891	1896
5	Ballsville	Powhatan	James		1898	1898
6	Barboursville	Orange	York		1896	
7	Bedford City	Bedford	Roanoke	900	1891	
8	Bigstone Gap	Wise	Tennessee	1,966	1891	
9	Birdsnest	Northampton	Atlantic	40	1891	
10	Blacksburg	Montgomery	Roanoke	2,100	1891	
87	Bluemont	Loudoun	Potomac		1902	1902
11	Bolar	Bath	James		1891	1891
12	Bonair	Chesterfield	James		1900	1901
88	Boykins	Southampton	Chowan		1902	
94	Bristol	Washington	Tennessee		1903	
13	Buchanan	Botetourt	James		1893	1895
14	Buckingham	Buckingham	James	550	1894	
15	Burkes Garden	Tazewell	Kanawha	258	1896	
16	Callaville	Brunswick	Chowan	570	1894	
17	Cape Charles	Northampton	Atlantic		1891	
18	Cape Henry	Princess Anne	Atlantic	20	1891	
19	Casanova	Fauquier	Potomac		1891	1891
20	Charlottesville	Albemarle	James	482	1891	
21	Christiansburg	Montgomery	Roanoke	2,160	1891	1901
22	Clarksville	Mecklenburg	Roanoke		1891	
23	Clifton Forge	Allegheny	James	1,047	1896	1902
25	Colemans Falls	Bedford	James		1898	1898
24	Columbia	Fluvanna	James		1893	
26	Dale Enterprise	Rockingham	Potomac	1,350	1891	
27	Danville	Pittsylvania	Roanoke	431	1891	
97	Dinwiddie	Dinwiddie	Chowan		1904	
29	Doswell	Hanover	York		1897	1901
28	Dwale	Dickenson	Sandy (Big)		1897	1899
95	Elk Knob	Lee	Tennessee		1903	
30	Emporia	Greensville	Chowan		1892	1893
31	Falls Church	Alexandria	Potomac		1893	1894
32	Farmville	Prince Edward	James	316	1897	
33	Fontella	Bedford	James		1899	1901
34	Fort Monroe	Elizabeth City	Atlantic		1891	1892

List of Rainfall Stations in Virginia.—Con.

No.	Station.	County.	Drainage.	Elevation in feet.	Date. Estab.	Date. Disc.
35	Fort Myer	Alexandria	Potomac		1891	1892
36	Fredericksburg	Spottsylvania	Rappahannock	47	1893	
37	Freeling	Dickenson	Sandy (Big)		1900	1902
41	Grahams Forge	Wythe	Kanawha	2,387	1894	
42	Guineys	Caroline	York	100	1896	1898
38	Hampton	Elizabeth City	Atlantic		1893	
39	Hot Springs	Bath	James	2,195	1892	
40	Houston	Halifax	Roanoke		1894	1894
98	Howardsville	Albemarle	James		1904	
43	Irwin	Goochland	James	159	1893	1896
89	Lacrosse	Mecklenburg	Roanoke		1902	
44	Leesburg	Loudoun	Potomac	321	1897	1899
45	Lexington	Rockbridge	James	946	1891	
46	Lincoln	Loudoun	Potomac		1901	
47	Lynchburg	Campbell	James	685	1891	
96	McDowell	Highland	James		1903	
48	Maidens	Goochland	James		1897	1898
49	Manassas	Prince William	Potomac	317	1895	
50	Marion	Smyth	Tennessee	2,124	1891	
51	Meadowdale	Highland	James		1899	1901
90	Mendota	Washington	Tennessee		1902	1902
52	Miller School	Albemarle	James		1899	1900
53	Monterey	Highland	James	3,008	1895	1898
54	Mossing Ford	Charlotte	Roanoke		1891	1892
55	Newport News	Warwick	Atlantic		1899	
56	Norfolk	Norfolk	Atlantic	57	1891	
57	Nottoway	Nottoway	Chowan	421	1891	1897
58	Petersburg	Dinwiddie	James	11	1891	
59	Radford	Montgomery	Kanawha	1,773	1896	1902
60	Richmond	Henrico	James	172	1891	
61	Riverton	Warren	Potomac		1893	1902
62	Roanoke	Roanoke	Roanoke		1901	
63	Rockymount	Franklin	Roanoke	33	1894	
64	Rural Retreat	Wythe	Kanawha		1896	1896
65	Salem	Roanoke	Roanoke	1,200	1891	1902
66	Saltville	Smyth	Tennessee	1,739	1895	1897
67	Saluda	Middlesex	Chesapeake		1893	1894
91	Saxe	Charlotte	Roanoke		1902	
68	Scottsburg	Halifax	Roanoke		1899	1900
92	Shenandoah	Shenandoah	Potomac		1902	
70	Speers Ferry	Scott	Tennessee		1896	
71	Spottsville	Surry	James	15	1891	
72	Stanardsville	Greene	James		1891	
73	Stanleyton	Page	Potomac	1,064	1896	1897
74	Staunton	Augusta	Potomac	1,380	1891	
75	Stephens City	Frederick	Potomac		1892	
77	Sunbeam	Southampton	Chowan	60	1895	1900
76	Swords Creek	Russell	Tennessee		1897	1897
79	Tobaccoville	Powhatan	James		1898	1900
78	Woodstock	Shenandoah	Potomac	927	1891	
80	Warsaw	Richmond	Atlantic	200	1893	
81	Warrenton	Fauquier	Potomac	265	1894	1900
82	West Point	King William	York		1898	
93	Wilkersons	Westmoreland	Potomac		1902	
85	Whittles Depot	Pittsylvania	Roanoke	2,370	1894	1895
83	Williamsburg	James City	James		1900	
84	Wytheville	Wythe	Kanawha	2,370	1891	
86	Yancey Mills	Albemarle	James		1891	1891

List of Rainfall Stations in Potomac Drainage in Maryland and West Virginia.

Station	County	State	Elevation in feet	Date.	
				Estab.	Disc.
Bayard	Grant	West Virginia	.....	1902	.....
Bloomery	Hampshire	West Virginia	700	1894	1897
Boeltcherville	Alleghany	Maryland	900	1898	.....
Boonsboro	Washington	Maryland	.....	1898	.....
Burlington	Mineral	West Virginia	800	1894	.....
Chewsville	Washington	Maryland	.....	1898	.....
Cumberland	Alleghany	Maryland	650	1891	.....
Flintstone	Alleghany	Maryland	.....	1896	1898
Frostburg	Allegany	Maryland	.....	1898	.....
Greenspring	Washington	Maryland	500	1895	.....
Hagerstown	Washington	Maryland	550	1891	.....
Hancock	Washington	Maryland	474	1895	.....
Harpers Ferry	Jefferson	West Virginia	277	1891	.....
Magnolia	Morgan	West Virginia	.....	1900	.....
Oldfields	Hardy	West Virginia	800	1896	.....
Sharpsburg	Washington	Maryland	420	1894	.....
Uppertract	Pendleton	West Virginia	.....	1897	.....
Westernport	Allegany	Maryland	1,000	1894	.....

NO INDEX.

As a substitute for an index the reader is referred to Contents which will supply that desideratum.