DEPARTMENT OF THE INTERIOR
Hubert Work, Secretary

U. S. GEOLOGICAL SURVEY
George Otis Smith, Director

WATER-SUPPLY PAPER 561

SURFACE WATER SUPPLY OF THE UNITED STATES

1923

PART I. NORTH ATLANTIC SLOPE DRAINAGE BASINS

NATHAN C. GROVER, Chief Hydraulic Engineer
C. H. PIERCE, A. W. HARRINGTON
O. W. HARTWELL, and A. H. HORTON
District Engineers

Prepared in cooperation with the States of
MAINE, NEW HAMPSHIRE, VERMONT, MASSACHUSETTS
NEW YORK, and NEW JERSEY

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SURFACE WATER SUPPLY OF NORTH ATLANTIC SLOPE DRAINAGE BASINS, 1923

AUTHORIZATION AND SCOPE OF WORK

This volume is one of a series of 14 reports presenting records of measurements of flow made on streams in the United States during the year ending September 30, 1923.

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

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

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

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

Annual appropriations for the fiscal years ending June 30, 1895–1924

1895	$12,500.00
1896	20,000.00
1897 to 1900, inclusive	50,000.00
1901 to 1902, inclusive	100,000.00
1903 to 1906, inclusive	200,000.00
1907	150,000.00
1908 to 1910, inclusive	100,000.00
1911 to 1917, inclusive	150,000.00
1918	175,000.00
1919	148,244.10
1920	175,000.00
1921–1923, inclusive	180,000.00
1924	170,000.00

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on pages 5 and 6.

Measurements of stream flow have been made at about 5,600 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1923, 1,590 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time. Information in regard to publications relating to water resources is presented in the appendix to this report.

DEFINITION OF TERMS

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

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

"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.

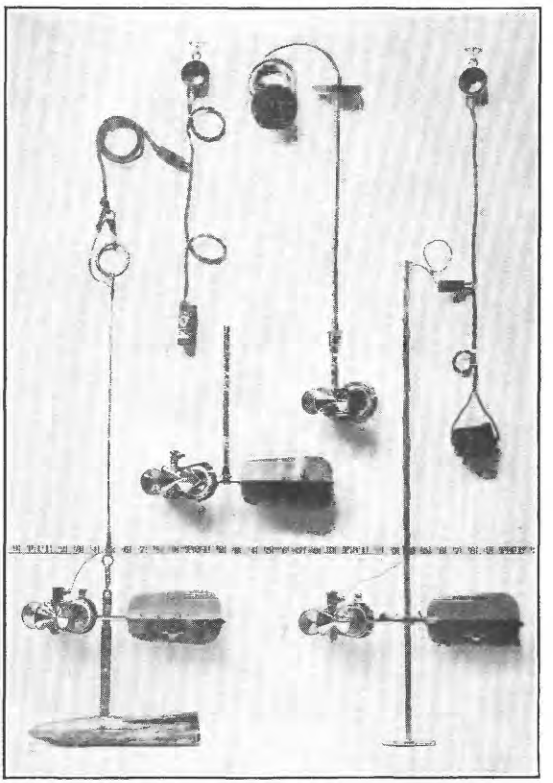
"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

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

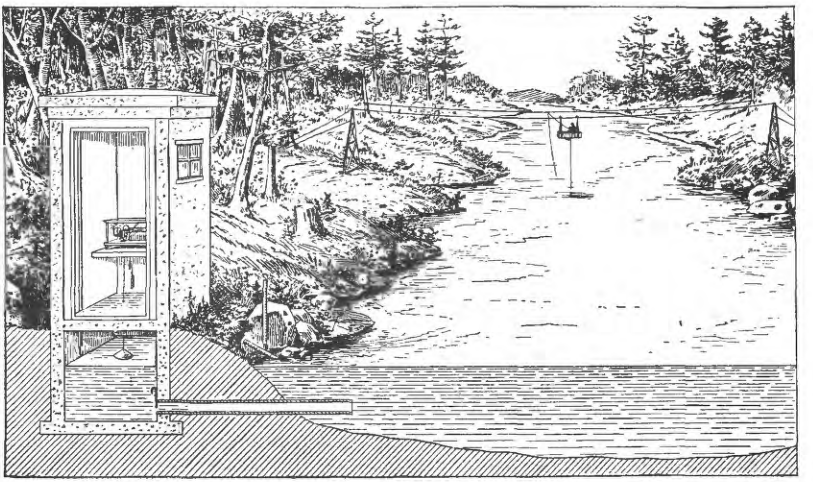
The following terms not in common use are here defined:

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

"Control," a term used to designate the section or sections of the stream channel below the gage which determine the stage-discharge

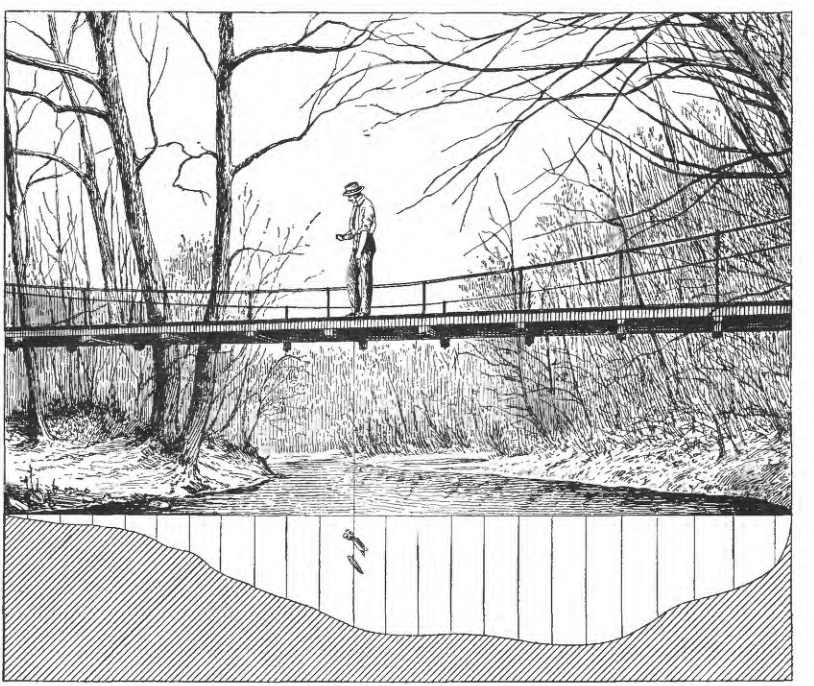


A. PRICE CURRENT METERS



B. TYPICAL GAGING STATION

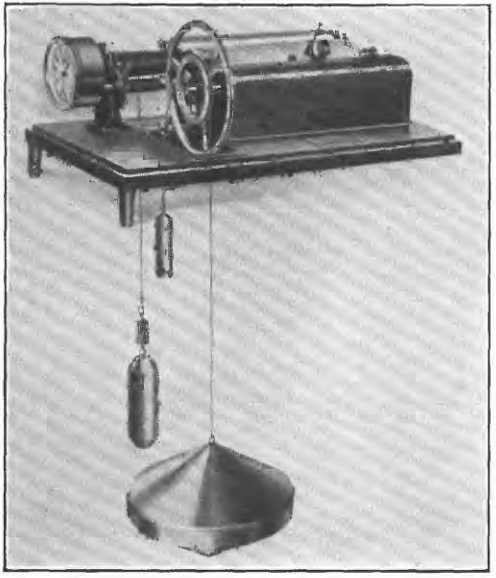
A



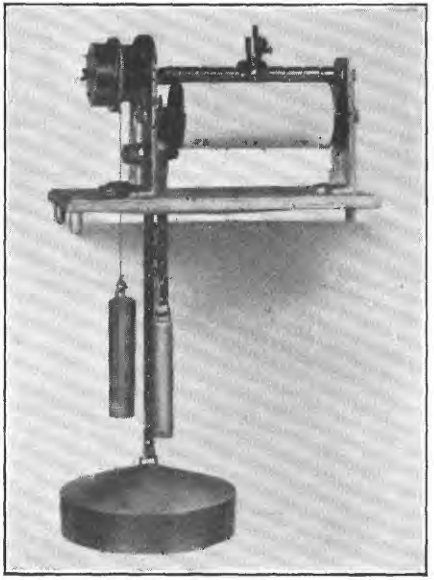
B

TYPICAL GAGING STATIONS

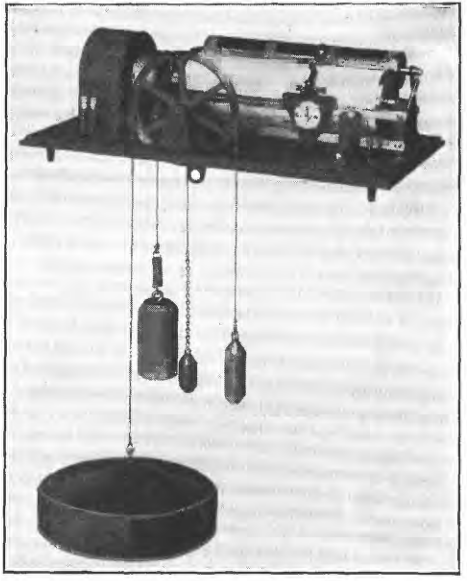
A, **For wading measurement;** *B*, **for bridge measurement**



A



B



C

WATER-STAGE RECORDERS

A, Au; *B*, Gurley; *C*, Stevens

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

The "point of zero flow" for a gaging station is that point on the gage—the gage height—at which water ceases to flow over the control.

EXPLANATION OF DATA

The data presented in this report cover the year ending September 30, 1923. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consists of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff or chain gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter. (See Pls. I–III.) The general methods are outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements rating tables are prepared that give the discharge for any stage. The application of the daily gage heights to these rating tables gives the daily discharge from which the monthly and yearly mean discharge is computed.

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

If the base data are insufficient to determine the daily discharge tables giving daily gage height and records of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanence of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

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The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuations the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the mean daily discharge may be obtained by averaging discharge at regular intervals during the day or by using the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet per second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 2, are based.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS

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

A paragraph in the description of the station gives information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage height to the rating table to obtain the daily discharge.

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

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and run-off in inches may be subject to gross errors caused by the inclusion of large noncontributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river

above the station. "Second feet per square mile" and "run-off in inches" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off in inches" published in the earlier reports by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

Many gaging stations on streams in the irrigated areas of the United States are situated above most of the diversions from those streams, and the discharge recorded does not show the water supply available for further development, as prior appropriations below the stations must first be satisfied. To give an idea of the amount of prior appropriations, a paragraph on diversions is presented in each station description. The figures given can not be considered exact but represent the best information available.

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

COOPERATION

Records in Maine were obtained in cooperation with the Maine Water Power Commission, Edward P. Ricker, chairman, and George C. Danforth, chief engineer, and Public Utilities Commission of Maine, Charles E. Gurney, chairman, and William M. Black, chief engineer.

In Vermont the work was carried on in cooperation with the State, the cooperating State official being George A. Reed, State engineer.

The work in New Hampshire was done in cooperation with the Public Service Commission of New Hampshire, William T. Gunnison, Thomas W. D. Worthen, and John W. Storrs, commissioners.

In Massachusetts the work was carried on in cooperation with the department of public works, division of waterways and public lands, William F. Williams, chairman, Richard K. Hale, commissioner (waterways).

Work in New York was carried on in cooperation with the State and at certain stations in cooperation with the following organizations: Hudson River Regulating District (Hudson River at North Creek, N. Y., and Schroon River at Riverbank, N. Y.); Indian River Co. (Indian Lake reservoir, Indian River near Indian Lake, N. Y., Hudson River at Hadley, N. Y., and Sacandaga River at Hadley, N. Y.); Adirondack Power & Light Corporation (Hudson River at Spier Falls, N. Y., and Hoosic River near Eagle Bridge, N. Y.); West

Virginia Pulp & Paper Co. (Hudson River at Mechanicville, N. Y.); Mr. I. C. Blandy (Batten Kill at Battenville, N. Y.); Utica Gas & Electric Co. (West Canada Creek at Hinckley, N. Y., and West Canada Creek at Kast Bridge, N. Y.); Rensselaer Polytechnic Institute (Poesten Kill near Troy, N. Y.); United Hudson Electric Corporation (Wallkill River at Pellets Island Mountain, N. Y.).

The work in New Jersey was carried on in cooperation with the State department of conservation and development, H. B. Kümmel, director, and H. T. Critchlow, hydraulic engineer.

Financial assistance in New Jersey was rendered by the Warren Manufacturing Co., New Milford; Taylor Wharton Iron & Steel Co., High Bridge; city of Morristown (William H. Frapwell, commissioner of streets and sewers); and Tintern Manor Water Co., Long Branch.

Financial assistance in New England was rendered by Orono Pulp & Paper Co., New England Power Co., Turners Falls Power & Electric Co., Connecticut Valley Lumber Co., Holyoke Water Power Co., International Paper Co., Eastern Connecticut Power Co., Keene Gas & Electric Co., Profile Falls Power Co., Connecticut Power Co., Proprietors of Locks and Canals on Merrimack River, Mascoma River Improvement Co., Worcester Electric Light Co., W. H. McElwain Co., Upper Connecticut River & Lake Improvement Co., Central Maine Power Co., Cumberland County Power & Light Co., St. Croix Paper Co., and Thomas W. Clark.

Financial assistance was rendered in Virginia by the Spottsylvania Power Co. and in West Virginia by the Potomac Edison Co.

DIVISION OF WORK

The data for stations in New England were collected and prepared for publication under the direction of C. H. Pierce, district engineer. M. R. Stackpole, assistant engineer, had immediate supervision of the work in Maine. The other assistants in New England were W. E. Amstrong, Lillian H. McCarthy, H. F. Hill, jr., and E. W. Downs.

Data for stations in New York were collected and prepared for publication under the direction of Arthur W. Harrington, district engineer, assisted by E. B. Shupe, J. L. Lamson, B. F. Howe, A. E. Johnson, and Agnes D. Buchanan.

Data for stations in New Jersey were collected and prepared for publication under the direction of O. W. Hartwell, district engineer, assisted by Otto Lauterhahn, J. W. Bones, and Miss M. G. Tracy.

Data for stations in Maryland, Virginia, and West Virginia were collected and prepared for publication under the direction of A. H. Horton, district engineer, assisted by J. J. Dirzulaitis and W. C. Wiggins.

The manuscript was assembled and reviewed by J. J. Dirzulaitis

GAGING-STATION RECORDS

ST. JOHN RIVER BASIN

ST. JOHN RIVER AT VAN BUREN, MAINE

LOCATION.—At international bridge at Van Buren, Aroostook County, 14 miles above Grand Falls.

DRAINAGE AREA.—8,270 square miles.

RECORDS AVAILABLE.—May 4, 1908, to September 30, 1923.

GAGE.—Gage painted vertically on second pier from Van Buren end of bridge. Gage read by W. H. Scott.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Control practically permanent; banks high, rocky, cleared, and not subject to overflow except at very high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 29.0 feet May 2 (discharge, by extension of rating curve, 134,000 second-feet); minimum discharge estimated at 720 second-feet March 18 (stage-discharge relation affected by ice).

1908–1923: Maximum discharge, that of May 2, 1923; minimum discharge, that of March 18, 1923.

ICE.—Stage-discharge relation seriously affected by ice, usually from December to April.

REGULATION.—The little storage which is used for log driving probably does not materially affect the flow.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve well defined. Gage read to tenths once daily, occasionally twice daily. Daily discharge ascertained by applying rating table to daily gage height with corrections for effect of ice during winter. Records good.

Discharge measurements of St. John River at Van Buren, Maine, during the year ending Sept. 30, 1923

[Made by M. R. Stackpole]

Date	Gage height	Discharge
	Feet	*Sec.-ft.*
Jan. 11	[a]2.45	1,370
Mar. 21	[a]2.30	775

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of St. John River at Van Buren, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,540	3,070	1,900	1,050	960	760	800	120,000	22,200	8,470	2,440	6,160
2	1,430	2,910	1,850	1,150	960	780	800	133,000	20,500	8,220	3,070	6,810
3	1,330	2,910	1,800	1,250	960	780	840	124,000	18,800	7,970	3,410	6,370
4	1,230	3,070	1,750	1,300	920	760	820	110,000	17,900	7,260	2,910	5,530
5	1,230	2,750	1,700	1,300	900	740	840	101,000	16,900	6,590	2,750	4,520
6	1,330	2,590	1,650	1,300	860	760	840	98,600	15,700	6,590	2,150	3,580
7	1,330	2,590	1,600	1,250	920	760	880	97,200	16,300	6,160	2,440	2,910
8	1,330	2,750	1,600	1,200	920	760	940	92,700	16,600	5,740	2,150	2,910
9	1,540	2,440	1,550	1,200	900	760	1,000	86,800	15,100	5,530	2,010	3,070
10	1,880	2,440	1,500	1,250	900	760	1,100	84,200	13,900	5,120	1,880	2,590
11	2,150	2,440	1,450	1,370	880	780	1,150	83,000	13,300	4,720	1,880	2,590
12	3,240	2,150	1,400	1,400	820	780	1,200	75,000	12,800	4,520	2,010	2,750
13	4,920	1,880	1,350	1,400	840	780	1,250	67,200	12,200	4,130	1,760	2,910
14	5,530	2,290	1,300	1,400	860	760	1,250	52,500	11,400	3,940	2,150	2,910
15	5,530	2,290	1,200	1,300	860	760	1,350	46,500	10,800	3,580	2,590	2,910
16	4,720	2,150	1,200	1,200	860	780	1,450	42,500	10,000	3,580	2,590	2,750
17	3,940	2,440	1,150	1,100	840	740	1,700	44,000	9,500	3,760	2,750	2,150
18	3,580	2,590	1,150	1,100	840	720	2,000	55,500	8,720	3,580	2,590	2,150
19	3,070	2,590	1,150	1,100	820	740	2,300	64,800	8,470	3,410	2,290	2,150
20	2,910	2,590	1,150	1,050	820	760	3,000	58,600	8,470	3,070	2,010	2,010
21	2,750	2,750	1,150	1,050	840	775	3,800	50,500	8,470	3,070	2,010	2,010
22	2,440	2,590	1,150	1,050	840	740	4,800	45,500	9,240	3,240	2,290	2,290
23	2,290	2,150	1,150	1,000	840	780	6,800	44,500	11,400	2,440	2,910	2,750
24	2,440	2,010	1,150	1,000	820	760	7,500	42,500	9,760	2,750	4,130	2,440
25	2,590	2,010	1,150	1,000	820	800	9,000	38,600	8,220	2,440	7,260	3,070
26	2,590	1,950	1,150	1,000	840	760	10,000	35,900	7,490	2,440	7,030	4,920
27	3,070	1,950	1,150	1,000	780	780	19,000	35,000	7,030	2,440	5,530	5,120
28	4,520	1,950	1,150	1,000	800	780	35,400	32,300	7,260	2,440	5,530	5,120
29	4,520	1,950	1,100	1,000	-------	800	48,500	29,000	7,490	2,440	5,530	5,320
30	3,680	1,900	1,050	1,000	-------	840	82,300	25,900	8,470	2,010	5,530	4,720
31	3,580	-------	1,050	980	-------	820	-------	23,600	-------	2,440	5,530	-------

NOTE.—Stage-discharge relation affected by ice Nov. 26 to Apr. 27; discharge for this period determined from gage heights corrected for effect of ice by means of two discharge measurements and records at Grand Falls.

Monthly discharge of St. John River at Van Buren, Maine, for the year ending Sept. 30, 1923

[Drainage area, 8,270 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	5,530	1,230	2,840	0.343	0.40
November	3,070	1,880	2,400	.290	.32
December	1,909	1,050	1,350	.163	.19
January	1,400	980	1,150	.139	.16
February	960	780	865	.105	.11
March	840	720	770	.093	.11
April	82,300	800	8,420	1.02	1.14
May	133,000	23,600	65,800	7.96	9.18
June	22,200	7,030	12,100	1.46	1.63
July	8,470	2,010	4,330	.524	.60
August	7,260	1,760	3,260	.394	.45
September	6,810	2,010	3,580	.433	.48
The year	133,000	720	9,000	1.09	14.77

ST. CROIX RIVER BASIN

ST. CROIX RIVER NEAR BAILEYVILLE, MAINE

LOCATION.—A short distance below power house of St. Croix Paper Co. at Grand Falls, Baileyville Township, 3½ miles east of Baileyville station of Maine Central Railroad, Washington County.

DRAINAGE AREA.—1,320 square miles (measured on map compiled by Maine Water Power Commission).

RECORDS AVAILABLE.—November 25, 1919, to September 30, 1923.

GAGE.—Friez water-stage recorder on right bank referenced to gage datum by a hook gage inside the well; an inclined staff is used for auxiliary readings. Recorder inspected by an employee of St. Croix Paper Co.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNEL AND CONTROL.—Bed covered with gravel and boulders; control for low and medium stages formed by series of riffles near the gage; control for high stages not clearly defined.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 13.90 feet at 10 a. m. May 1 (discharge, by extension of rating curve, 23,300 second-feet); minimum stage recorded, 1.18 feet at 11 a. m. March 4 (discharge, by extension of rating curve, 186 second-feet).

1919–1923: Maximum stage recorded, that of May 1, 1923; minimum stage recorded, that of March 4, 1923.

ICE.—River remains open throughout winter; stage-discharge relation probably not affected by ice or by logs.

REGULATION.—About 30 billion cubic feet of storage has been developed in lake and ponds above the station. Variations in use of water at the power plant a short distance above the gage cause fluctuations in stage.

ACCURACY.—Stage-discharge relation shifted during the high water in May Rating curves used fairly well defined between 500 and 10,000 second-feet Operation of water-stage recorder satisfactory except for short periods as indicated in footnote to daily discharge table. Daily discharge ascertained by application of rating table to mean daily gage heights as determined by inspection of recorder sheets. Records good.

Discharge measurements of St. Croix River near Baileyville, Maine, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
May 12	M. R. Stackpole	6.00	7,740	July 15	M. R. Stackpole	1.90	1,170
12	do	5.98	7,740	16	do	2.40	1,840
July 15	do	1.46	560	Aug. 25	Stackpole and Grover	2.38	1,700
15	do	1.65	829				

Daily discharge, in second-feet, of St. Croix River near Baileyville, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,080	1,240	1,510	1,300	1,500	1,260	800	22,900	2,050	1,860	1,820	1,300
2	1,260	1,170	1,440	1,540	1,550	1,290	1,250	19,700	2,120	2,340	1,980	1,530
3	1,370	1,340	1,200	1,510	1,550	1,260	1,220	16,500	1,340	2,640	1,510	1,520
4	1,370	1,170	994	1,520	1,030	674	1,100	14,500	1,730	2,190	1,780	1,660
5	1,330	1,230	1,080	1,650	1,240	763	1,170	12,700	2,000	1,880	1,430	2,200
6	1,350	1,190	1,100	1,710	1,350	1,150	1,240	11,600	1,680	1,820	1,770	2,270
7	1,380	1,450	1,130	1,230	1,450	1,230	1,290	10,300	1,990	1,890	1,660	2,270
8	1,120	1,470	1,130	1,570	1,500	1,330	770	9,700	1,610	1,380	2,230	2,140
9	1,290	1,480	1,190	1,580	1,500	1,430	929	9,130	1,890	1,580	1,740	2,020
10	1,540	1,360	994	1,590	1,350	1,430	1,380	9,130	1,350	1,820	2,170	2,060
11	1,450	1,260	1,220	1,680	1,050	806	1,690	8,370	1,840	1,700	1,660	2,050
12	1,580	1,200	1,430	1,690	1,450	1,090	2,500	7,800	1,770	1,840	1,080	2,030
13	1,640	1,400	1,330	1,640	1,300	1,290	3,260	7,620	1,770	1,790	1,580	2,020
14	1,510	1,300	1,510	1,410	1,450	1,060	3,430	7,260	1,650	1,610	2,070	2,020
15	1,450	1,450	1,360	1,480	1,450	1,240	3,260	6,540	1,720	1,200	1,990	2,030
16	1,500	1,550	1,400	1,610	1,350	1,200	4,440	6,540	1,780	1,570	1,690	1,650
17	1,550	1,650	968	1,520	1,300	1,160	4,060	6,360	1,390	1,510	1,750	1,910
18	1,550	1,680	1,220	1,600	1,050	947	3,340	5,460	1,600	1,580	1,740	1,960
19	1,540	1,310	1,440	1,500	1,250	903	3,260	4,830	1,850	1,430	1,310	2,050
20	1,540	1,500	1,250	1,540	1,150	1,010	3,340	4,400	1,840	1,510	1,470	2,420
21	1,540	1,520	1,350	994	1,120	1,010	3,970	4,480	1,740	1,340	1,750	2,340
22	1,240	1,650	1,250	1,160	1,310	1,130	4,630	3,800	1,690	1,340	1,700	2,170
23	1,340	1,540	1,250	1,340	1,260	1,160	6,150	3,160	1,780	1,660	1,700	1,360
24	1,400	1,540	1,160	1,380	1,310	1,130	6,150	3,020	1,230	1,890	1,700	2,060
25	1,480	1,550	929	1,410	1,050	782	6,540	2,860	1,550	1,780	1,720	2,270
26	1,330	1,230	1,360	1,350	1,250	1,090	6,740	2,720	1,700	1,730	1,230	2,200
27	1,430	1,410	1,370	1,350	1,250	1,050	7,340	2,200	1,650	1,730	1,520	2,030
28	1,450	1,610	1,260	1,050	1,240	1,130	7,740	2,640	1,750	1,680	1,750	2,270
29	1,130	1,510	1,250	1,550	-------	1,200	11,000	2,560	1,770	1,660	1,770	2,270
30	1,050	1,410	1,300	1,450	-------	1,150	19,200	1,750	1,890	1,960	1,620	1,530
31	1,050	-------	1,300	1,550	-------	1,190	-------	1,740	-------	2,050	1,750	-------

NOTE.—Daily discharge Oct. 6, Nov. 12–15, Dec. 20–23, 29, 30, Jan. 18, 19, 26–31, Feb. 1–3, 6–20, 25–27, Mar. 27, 29, 30, Apr. 1 and 2 estimated by comparison with output, in kilowatt-hours of hydroelectric station just above.

Monthly discharge of St. Croix River near Baileyville, Maine, for the year ending Sept. 30, 1923

[Drainage area, 1,320 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,640	1,050	1,380	1.05	1.21
November	1,680	1,170	1,410	1.07	1.19
December	1,510	929	1,250	.947	1.09
January	1,710	994	1,470	1.11	1.28
February	1,550	1,030	1,310	.992	1.03
March	1,430	674	1,110	.841	.97
April	19,200	770	4,110	3.11	3.47
May	22,900	1,740	7,490	5.67	6.54
June	2,120	1,230	1,720	1.30	1.45
July	2,640	1,200	1,740	1.32	1.52
August	2,230	1,080	1,700	1.29	1.49
September	2,420	1,300	1,990	1.51	1.68
The year	22,900	674	2,230	1.69	22.92

NOTE.—The monthly discharge in second-feet per square mile and the run-off in inches do not represent the natural flow from the basin because of artificial storage. (See "Regulation.")

PENOBSCOT RIVER BASIN

WEST BRANCH OF PENOBSCOT RIVER AT MILLINOCKET, MAINE

LOCATION.—At Quakish Lake dam and Millinocket mill of Great Northern Paper Co., Millinocket, Penobscot County.

DRAINAGE AREA.—1,910 square miles (measured on map compiled by Maine Water Power Commission).

RECORDS AVAILABLE.—January 11, 1901, to September 30, 1923.

GAGES.—Water-stage recorder at Quakish Lake dam and gages in forebay and tailrace at mill.

CHANNEL AND CONTROL.—Crest of concrete dam.

DISCHARGE.—Flow computed by considering the flow over the dam, the flow through the wheels, and the water used through the log sluices and filters. The wheels were rated at Holyoke, Mass., before being placed in position and were tested later by numerous tube-float and current-meter measurements. Ratings for four new wheels installed in 1917 are based on acceptance test on one unit after installation, the discharge at various gate openings being measured by the use of Pitot tubes. When the flow of the river is less than 3,500 second-feet, all the water generally flows through the wheels of the mill.

ICE.—Determination of discharge not seriously affected by ice. Ferguson Pond, just above entrance to canal, eliminates effect from anchor ice.

REGULATION.—Dams at outlet of North Twin and Ripogenus lakes store water on a surface of about 73 square miles, with a capacity of about 45 billion cubic feet. Except for a short time during the high-water period, run-off is regulated by storage. Records corrected for storage.

COOPERATION.—Records furnished by engineers of Great Northern Paper Co.

Monthly discharge of West Branch of Penobscot River at Millinocket, Maine, for the year ending Sept. 30, 1923

[Drainage area, 1,910 square miles]

Month	Discharge in second-feet			Corrected run-off in inches
	Observed mean	Corrected for storage		
		Mean	Per square mile	
October	2,680	902	0.472	0.54
November	2,840	1,760	.921	1.03
December	2,820	278	.146	.17
January	2,700	516	.270	.31
February	2,280	501	.262	.27
March	1,590	980	.513	.59
April	1,220	6,260	3.28	3.66
May	2,980	12,200	6.39	7.37
June	2,760	1,860	.974	1.09
July	2,720	1,410	.738	.85
August	2,790	775	.406	.47
September	2,690	824	.431	.48
The year	2,510	2,370	1.24	16.83

WEST BRANCH OF PENOBSCOT RIVER NEAR MEDWAY, MAINE

LOCATION.—Just above Nichatou Rapids, half a mile above mouth of East Branch of Penobscot River and village of Medway, Penobscot County, and 2 miles below East Millinocket.

DRAINAGE AREA.—2,120 square miles (measured on maps compiled by Maine Water Power Commission).

RECORDS AVAILABLE.—February 20, 1916, to September 30, 1923.

GAGES.—Gurley seven-day water-stage recorder on left bank; inspected by Scott Nadeau.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNEL AND CONTROL.—Bed fairly smooth at measuring section; covered with rocks and boulders above and below gage. Channel divides a few hundred feet below gage, but practically entire flow passes to left of Nichatou Island. Control formed by Nichatou Island and head of Nichatou Rapids; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 8.49 feet at 2 p. m. May 1 (stage-discharge relation affected by backwater from East Branch of Penobscot River). Maximum stage not affected by backwater 5.82 feet at 3 p. m. May 5 (discharge, 7,530 second-feet); minimum stage determined by levels at 10 a. m. August 12, 0.27 foot (estimated discharge, 100 second-feet).

1916–1923: Maximum stage recorded, 9.88 feet at 1 p. m. June 18, 1917 (discharge, by extension of rating curve, about 20,000 second-feet); minimum discharge estimated by observation as 100 second-feet August 12, 1923, when gates in dam above were closed.

ICE.—Ice forms along both banks, but the main channel remains open; stage-discharge relation not seriously affected.

REGULATION.—Flow at ordinary stages completely regulated by dams and storage reservoirs above station.

ACCURACY.—Stage-discharge relation shifts slightly at times of high water. Three rating curves used; well defined between 1,000 and 8,000 second-feet. Daily discharge ascertained by application of rating table to mean daily gage heights determined by inspection of recorder sheets, except for days of large fluctuations in stage when the mean of 12 two-hour periods was used. Records good.

Discharge measurements of West Branch of Penobscot River near Medway, Maine, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 6	M. R. Stackpole	4.06	2,880	June 10	M. R. Stackpole	3.56	2,540
May 4	do	4.72	4,700	Aug. 11	do	3.90	2,920
28	do	3.94	3,230	24	Stackpole and Grover	3.92	2,960
June 10	do	1.39	580				

Daily discharge, in second-feet, of West Branch of Penobscot River near Medway, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,840	3,160	3,900	3,330	3,330	2,280		6,100	3,740	1,990	3,050	3,210
2	3,000	3,160	3,700	4,000	3,420	2,160		5,600	3,650	3,290	3,130	2,660
3	3,160	3,080	3,240	3,900	3,240	2,280	1,100	5,370	2,790	3,560	3,050	1,420
4	3,240	3,510	3,420	3,900	2,480	1,800		4,760	3,040	2,640	3,210	2,660
5	3,330	3,160	3,420	3,800	3,160	2,480		5,500	3,290	3,200	1,850	3,300
6	3,420		3,510	3,800	3,160	2,220	1,160	3,830	3,380	3,740	2,740	3,050
7	3,330		3,600	3,330	3,160	2,280	1,320	1,940	3,290	3,650	2,890	2,890
8	2,840	3,200	3,510	3,330	3,080	2,220	1,160	2,360	3,290	3,120	2,890	2,890
9	2,920		3,420	3,800	2,690	2,340	1,160	3,650	3,200	3,380	2,970	1,650
10	3,160		3,000	3,600	2,840	2,480	1,370	4,540	2,570	3,560	3,380	3,050
11	3,160	3,160	3,160	3,600	2,220	1,860	1,240	4,430	2,720	3,470	2,890	2,820
12	3,330	3,160	3,420	3,600	2,920	2,410	1,370	4,320	3,040	3,560	1,470	2,820
13	3,330	3,160	3,600	3,510	3,160	2,220	1,370	3,830	3,120	3,120	2,740	2,740
14	3,510	3,240	3,800	3,000	3,080	2,410	1,650	3,650	3,380	3,200	2,970	2,740
15	3,080	3,330	3,800	3,000	3,000	2,040	1,750	4,220	3,120	1,850	2,890	2,970
16	2,690	3,330	3,700	3,510	2,920	1,920	1,300	4,650	3,040	2,660	2,970	1,950
17	3,160	3,330	2,690	3,510	2,920	1,920	1,240	4,320	2,500	2,890	3,380	2,820
18	2,840	3,240	2,840	3,510	1,750	1,750	1,320	3,920	2,870	2,970	2,900	2,890
19	2,620	3,080	3,420	3,510	2,620	1,650	1,600	3,830	3,120	2,970	1,500	2,970
20	2,760	3,080	3,330	3,510	3,080	1,750	1,200	3,560	3,200	2,890	2,800	2,970
21	2,620	3,600	3,420	2,410	2,920	1,700	1,160	3,200	3,560	2,820	2,900	3,130
22	2,160	3,600	3,420	3,240	2,220	1,700	1,550	4,220	3,120	1,800	2,900	3,050
23	2,690	3,900	3,330	3,510	2,280	1,550	2,220	4,220	3,200	2,380	3,000	1,900
24	3,000	4,000	3,420	3,160	2,280	1,280	2,760	4,120	2,570	2,820	3,300	2,820
25	2,840	4,000	2,760	3,800	1,980	1,000	2,920	4,020	2,950	2,890	2,890	2,970
26	3,240	3,800	3,080	3,510	2,550	1,280	3,330	3,920	3,120	3,050	1,500	3,050
27	3,160	3,240	3,240	3,240	2,220	1,240	4,000	2,790	3,290	3,050	2,660	3,130
28	3,240	3,420	3,700	2,840	2,160	1,280	4,400	2,950	3,380	2,890	2,820	3,050
29	3,160	3,700	4,000	3,080	-------	1,200	5,000	3,920	3,560	2,380	2,890	2,970
30	3,080	3,900	4,000	3,240	-------	1,200	6,500	3,920	3,380	2,660	2,970	1,750
31	3,160	-------	3,420	3,330	-------	1,200	-------	3,740	-------	2,970	2,740	-------

NOTE.—Discharge Nov. 6–10, Mar. 25, 29, 31, Apr. 1–5, 16, and Apr. 29 to May 2 estimated from weekly record of discharge at Dolby paper mills. Discharge estimated Aug. 18–24 and 26.

Monthly discharge of West Branch of Penobscot River near Medway, Maine, for the year ending Sept. 30, 1923

[Drainage area, 2,120 square miles]

Month	Discharge in second-feet					Corrected run-off in inches
	Observed			Corrected for storage		
	Maximum	Minimum	Mean	Mean	Per square mile	
October	3,510	2,160	3,030	1,250	0.590	0.68
November	4,000	3,080	3,380	2,300	1.08	1.20
December	4,000	2,690	3,430	888	.419	.48
January	4,000	2,410	3,430	1,250	.590	.68
February	3,420	1,750	2,740	961	.453	.47
March	2,480	----------	1,840	1,230	.580	.67
April	----------	----------	1,980	7,020	3.31	3.69
May	----------	1,940	4,050	13,300	6.27	7.23
June	3,740	2,500	3,150	2,250	1.06	1.18
July	3,740	1,800	2,950	1,640	.774	.89
August	3,380	1,470	2,780	765	.361	.42
September	3,300	1,420	2,740	874	.412	.46
The year	----------	----------	2,960	2,820	1.33	18.05

PENOBSCOT RIVER AT WEST ENFIELD, MAINE

LOCATION.—At steel highway bridge 1,000 feet below mouth of Piscataquis River and 3 miles west of Enfield railroad station, Penobscot County.

DRAINAGE AREA.—6,600 square miles.

RECORDS AVAILABLE.—November 5, 1901, to September 30, 1923.

GAGES.—Friez water-stage recorder on left bank, downstream side of left abutment, used since December 11, 1912; standard chain gage on upstream side of bridge, used prior to that date; gages set to same datum. Gage inspected by Maxine Swett.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Channel at gage broken by four bridge piers; straight above and below gage. Banks high and rocky and not subject to overflow. Control is at Passadumkeag Rips, about 5 miles below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 25.15 feet from 8 a. m. to noon May 1 (discharge, by extension of rating curve, 153,000 second-feet); minimum stage during year from water-stage recorder, 1.47 feet at 5 p. m. September 10 (discharge, 2,230 second-feet).

1902–1923: Maximum stage recorded that of May 1, 1923; minimum stage recorded, 1.0 foot October 29, 1905 (discharge, 1,470 second-feet).

ICE.—Stage-discharge relation usually affected by ice from December to April; discharge ascertained by comparison with records at Sunkhaze Rips which were collected by Thomas W. Clark.

REGULATION.—Flow largely controlled by storage, principally in the lakes tributary to the West Branch. Records not corrected for storage.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice and occasionally by logs. Rating curve well defined. Operation of water-stage recorder satisfactory throughout the year. Daily discharge ascertained by applying rating table to average gage heights taken from recorder sheets; at times of serious fluctuations in stage the daily discharge is ascertained by using the average discharge of 12 two-hour periods Gage heights corrected for effect of ice and log jams. Records good.

COOPERATION.—Gage-height record furnished by Thomas W. Clark, hydraulic engineer, Old Town, Maine. Occasional discharge measurements made by students of the University of Maine, under the direction of Prof. A. C. Lyon.

Discharge measurements of Penobscot River at West Enfield, Maine, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
May 10	M. R. Stackpole	10.60	36,400
Aug. 31	Stackpole and Clark	2.66	4,590

Daily discharge, in second-feet, of Penobscot River at West Enfield, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4,390	5,420	7,040	5,200	6,900	4,600	4,700	152,000	10,200	5,650	6,260	4,620
2	3,840	5,300	6,390	6,400	6,800	4,600	4,600	130,000	10,000	4,500	6,140	4,730
3	4,060	5,300	5,300	8,500	6,500	4,500	4,400	101,000	9,420	5,420	5,890	4,170
4	4,280	5,300	5,200	9,400	6,400	4,400	5,100	87,100	8,260	5,300	5,650	3,040
5	4,280	5,080	5,000	9,100	5,500	3,800	5,900	76,700	8,400	4,840	5,650	3,630
6	4,390	4,960	4,300	8,700	5,900	4,000	7,000	68,700	8,680	5,300	4,280	4,390
7	4,730	4,620	4,300	8,700	6,600	4,100	8,700	56,600	8,400	6,260	4,960	4,280
8	4,960	4,840	4,600	8,300	6,500	4,500	11,300	46,100	8,400	6,260	5,190	4,060
9	5,420	5,890	5,400	8,400	6,100	4,600	15,000	40,700	8,400	5,420	5,080	3,840
10	5,770	7,580	5,200	8,400	5,500	4,800	18,000	37,400	8,830	6,020	5,080	2,940
11	6,020	7,980	4,800	8,300	5,300	4,700	21,300	36,500	7,980	6,020	5,420	4,060
12	6,780	7,440	5,000	8,300	4,700	4,200	22,000	29,600	7,580	6,020	4,730	3,950
13	7,170	7,300	5,300	8,300	5,300	4,600	22,200	26,000	7,840	5,890	4,280	4,170
14	6,910	6,910	5,100	8,100	5,200	4,700	23,000	22,800	7,170	5,540	5,080	3,950
15	6,260	6,910	5,500	7,000	5,200	4,800	23,500	21,000	6,650	5,420	4,960	4,060
16	5,770	7,300	5,700	7,200	5,100	4,700	22,000	19,300	6,520	4,730	4,960	4,060
17	5,420	7,300	5,300	7,200	5,300	4,700	20,600	20,600	6,020	5,650	4,730	3,330
18	5,540	7,040	4,700	7,000	5,300	4,600	21,000	19,900	5,770	5,650	4,960	4,060
19	5,190	6,390	4,400	6,900	4,500	4,600	21,500	17,800	5,650	5,420	4,060	4,280
20	4,840	6,390	4,700	6,500	5,200	4,400	23,500	15,600	5,770	5,420	3,430	4,060
21	4,840	7,040	4,800	6,600	5,400	4,800	25,500	14,400	5,890	5,420	3,950	4,280
22	4,390	7,710	4,800	5,900	5,000	4,800	30,200	14,300	5,770	5,190	4,280	4,390
23	4,060	7,840	5,200	6,800	4,300	4,800	36,800	14,300	5,540	4,280	4,500	4,170
24	4,730	7,840	5,000	7,400	4,300	4,800	36,800	13,900	5,540	4,960	4,730	3,230
25	5,770	7,300	4,800	7,400	4,200	4,500	38,300	13,000	4,840	5,420	4,390	3,740
26	6,390	6,520	4,700	8,000	4,100	4,500	39,200	12,000	5,300	5,540	4,060	3,950
27	6,390	6,520	4,300	7,600	4,500	4,800	42,500	11,000	6,520	5,540	3,330	4,060
28	6,140	5,600	4,300	7,300	4,500	5,100	47,500	10,200	7,170	5,540	4,060	4,060
29	5,770	5,900	4,300	6,500	-------	5,100	70,300	10,200	6,650	5,540	4,390	3,950
30	5,540	6,260	4,500	6,900	-------	4,700	128,000	10,500	6,140	5,540	4,500	3,630
31	5,420	-------	4,800	6,900	-------	5,100	-------	10,300	-------	6,140	4,500	-------

NOTE.—Stage-discharge relation affected by ice Nov. 28, 29, and Dec. 4 to Apr. 20; discharge for these periods computed from gage heights corrected for effect of ice and by comparison with data at Sunkhaze furnished by Thomas W. Clark.

Monthly discharge of Penobscot River at West Enfield, Maine, for the year ending Sept. 30, 1923

[Drainage area, 6,600 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	7,170	3,840	5,340	0.809	0.93
November	7,980	4,620	6,460	.979	1.09
December	7,040	4,300	4,990	.756	.87
January	9,400	5,200	7,520	1.14	1.31
February	6,900	4,100	5,360	.812	.85
March	5,100	3,800	4,610	.698	.80
April	128,000	4,400	26,700	4.05	4.52
May	152,000	10,200	37,400	5.67	6.54
June	10,200	4,840	7,180	1.09	1.22
July	6,260	4,280	5,480	.830	.96
August	6,260	3,330	4,760	.721	.83
September	4,730	2,940	3,970	.602	.67
The year	152,000	2,940	10,000	1.52	20.59

NOTE.—The monthly discharge in second-feet per square mile and the run-off in inches do not represent the natural flow from the basin because of artificial storage. (See "Regulation.")

EAST BRANCH OF PENOBSCOT RIVER AT GRINDSTONE, MAINE

LOCATION.—At Bangor & Aroostook Railroad bridge half a mile south of railroad station at Grindstone, Penobscot County, one-eighth mile above Grindstone Falls and 9½ miles above confluence with West Branch at Medway.

DRAINAGE AREA.—1,070 square miles; includes approximately 240 square miles of Chamberlain Lake drainage area (measured on maps compiled by Maine Water Power Commission).

RECORDS AVAILABLE.—October 23, 1902, to September 30, 1923.

GAGE.—Chain attached to railroad bridge; read by R. D. Porter.

DISCHARGE MEASUREMENTS.—Made from railroad bridge or by wading.

CHANNEL AND CONTROL.—Practically permanent; stream confined by abutments of bridge and broken by one pier at ordinary stages; velocity of current medium at moderate and high stages but sluggish at low water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.5 feet at 7.10 p. m. April 30 (discharge by extension of rating curve, 35,100 second-feet); minimum stage recorded, 4.20 feet September 18–20 (discharge 225 second-feet). Minimum discharge estimated at 185 second-feet March 10–13, when stage-discharge relation was affected by ice.

1902–1923: Maximum stage recorded, that of April 30, 1923; minimum open-water stage recorded, 3.8 feet October 29–31, 1905 (discharge, 140 second-feet). Estimated minimum discharge of 30 second-feet occurred February 28, 1904, when stage-discharge relation was affected by ice.

ICE.—Ice forms to a considerable thickness at the gage and down to the head of Grindstone Falls, and although the falls usually remain open during the greater part of the winter, the stage-discharge relation is somewhat affected.

REGULATION.—Dams maintained at outlets of a number of lakes and ponds near source of river are regulated for log driving; during the summer and fall gates are generally left open. The basin of the East Branch since about 1840 includes about 240 square miles of territory draining into Chamberlain Lake that formerly drained into the St. John River basin, the diversion being made through what is known as the Telos canal. Records not corrected for storage and diversions.

ACCURACY.—Stage-discharge relation occasionally affected by backwater from log jams at station and at Grindstone Falls immediately below, and by ice during winter. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying rating table to mean daily gage heights, with corrections for effect of ice during the winter. Records good.

Discharge measurements of East Branch of Penobscot River at Grindstone, Maine during the year ending Sept. 30, 1923

[Made by M. R. Stackpole]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Nov. 9	4.75	493	Mar. 20	[a] 5.40	243
Jan. 10	[a] 5.40	612	May 5	10.20	10,800
Feb. 7	[a] 5.15	328	29	5.94	1,600

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of East Branch of Penobscot River at Grindstone, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	295	400	620	360	400	200	230	30,900	1,420	890	1,160	620
2	270	400	655	620	400	195	220	19,400	1,740	975	1,110	550
3	270	400	620	920	380	195	220	13,900	1,420	850	1,110	520
4	252	400	620	780	380	195	220	12,000	1,160	810	1,110	270
5	243	370	690	660	370	195	280	11,100	1,540	655	1,020	249
6	238	400	430	640	360	190	290	9,620	1,480	1,300	975	256
7	243	400	370	640	328	190	370	8,790	1,250	1,300	930	248
8	320	370	320	620	300	190	700	7,220	1,300	1,300	850	252
9	520	490	320	620	300	190	860	6,490	1,480	1,360	770	261
10	490	550	320	612	360	185	1,000	7,990	1,200	1,420	770	295
11	460	620	320	600	300	185	1,050	7,470	1,200	1,480	520	320
12	585	550	320	580	290	185	1,100	5,790	1,110	1,480	370	295
13	550	585	320	560	280	185	1,100	5,560	1,200	1,300	345	295
14	550	730	310	540	270	190	1,150	5,100	690	1,300	370	270
15	550	730	310	520	270	195	1,150	4,870	730	1,300	370	295
16	430	655	310	520	260	195	1,150	4,870	930	1,480	345	345
17	460	620	310	520	250	200	1,150	5,100	1,020	1,480	345	400
18	430	620	300	500	250	210	1,150	4,650	770	1,360	370	225
19	400	620	300	500	250	230	1,350	3,670	810	1,300	370	225
20	430	655	300	470	250	243	1,600	3,490	1,020	1,250	345	225
21	345	655	300	520	240	220	1,900	3,160	850	1,300	370	295
22	345	655	300	540	230	200	2,100	2,850	850	1,300	490	460
23	400	620	300	540	230	220	4,200	3,000	975	1,670	520	430
24	770	490	300	520	220	260	5,590	2,700	930	1,600	430	320
25	690	585	300	500	220	300	5,590	2,550	980	1,600	400	320
26	550	490	300	480	210	320	5,340	1,740	975	1,540	400	345
27	520	520	270	460	210	320	6,650	2,020	770	1,740	400	370
28	520	620	270	450	200	310	8,400	1,950	930	1,670	400	320
29	490	655	270	430	-------	270	18,000	1,670	890	1,600	770	320
30	490	655	260	430	-------	260	33,700	1,480	850	1,540	730	345
31	460	-------	250	430	-------	250	-------	1,360	-------	1,600	655	-------

NOTE.—Stage-discharge relation affected by ice Dec. 9 to Apr. 23; discharge for this period computed from gage heights corrected for effect of ice by means of three discharge measurements, observer's notes, and weather records. Discharge estimated May 2.

Monthly discharge of East Branch of Penobscot River at Grindstone, Maine, for the year ending Sept. 30, 1923

[Drainage area, 1,070 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	770	238	438	0.409	0.47
November	730	370	550	.514	.57
December	690	250	361	.337	.39
January	920	300	549	.513	.59
February	400	200	284	.265	.28
March	320	185	222	.207	.24
April	33,700	220	3,590	3.36	3.75
May	30,900	1,360	6,530	6.10	7.03
June	1,740	690	1,080	1.01	1.13
July	1,740	655	1,350	1.26	1.45
August	1,160	345	617	.577	.67
September	620	225	331	.309	.34
The year	33,700	185	1,330	1.24	16.91

MATTAWAMKEAG RIVER AT MATTAWAMKEAG, MAINE

LOCATION.—At Maine Central Railroad bridge at Mattawamkeag, Penobscot County, half a mile above mouth of river.

DRAINAGE AREA.—1,500 square miles.

RECORDS AVAILABLE.—August 26, 1902, to September 30, 1923.

GAGE.—Chain fastened to railroad bridge; read by W. T. Mincher.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Practically permanent; channel at bridge broken by two piers.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 19.55 feet at 8 a. m. May 1 (discharge, by extension of rating curve, 43,900 second-feet); minimum stage recorded, 3.52 feet September 30 (discharge, 162 second-feet).

1902–1923: Maximum stage recorded, that of May 1, 1923; minimum discharge of 86 second-feet occurred on October 4–12, 1905; September 19 and October 6, 1906; September 24–29, 1908; and October 14–17, 1910.

ICE.—Stage-discharge relation usually affected by ice for several months of each winter.

REGULATION.—Dams are maintained at outlets of several large lakes and ponds, but the stored water is used only for log driving.

ACCURACY.—Stage-discharge relation occasionally affected by backwater from log jams and during winter by ice. Rating curve well defined below 15,000 second-feet. Gage read to quarter-tenths twice daily except during the winter, when it was read once daily. Daily discharge ascertained by applying rating table to mean daily gage heights, with corrections for ice and other obstructions. Records good.

Discharge measurements of Mat'. wamkeag River at Mattawamkeag, Maine, during the yea. ending Sept. 30, 1923

[Made v M. R. Stackpole]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Jan. 3	[a] 5.70	1,080	May 9	10.98	16,400
Feb. 6	[a] 6.07	930	Aug. 13	3.78	329
Mar. 19	[a] 6.30	583			

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Mattawamkeag River at Mattawamkeag, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	390	760	1,100	660	960	330	700	42,800	1,640	500	428	275
2	350	760	1,070	960	960	370	640	37,200	1,570	468	585	275
3	342	710	1,070	1,080	960	390	600	33,800	1,570	420	585	275
4	310	660	1,020	1,200	940	390	580	31,500	1,570	345	542	262
5	310	570	980	1,250	940	360	660	30,200	1,440	345	484	262
6	310	525	960	1,250	930	390	960	25,900	1,440	345	460	262
7	350	525	920	1,250	860	390	1,250	22,300	1,640	310	428	242
8	310	525	900	1,250	820	390	1,850	18,300	1,190	289	382	242
9	350	860	900	1,200	800	390	2,400	14,800	1,310	289	345	242
10	615	1,500	860	1,200	800	390	3,100	12,700	1,190	289	345	242
11	700	1,960	840	1,200	760	410	4,200	10,500	1,250	242	331	242
12	1,050	1,830	820	1,150	740	420	4,400	8,640	1,140	289	310	223
13	1,150	1,830	800	1,150	740	430	4,900	7,350	1,080	289	317	198
14	1,150	1,700	780	1,150	720	440	5,200	6,140	970	262	275	198
15	1,200	1,500	760	1,100	700	480	4,400	5,020	920	289	289	198
16	980	1,570	740	1,050	700	520	6,500	4,200	870	382	310	180
17	900	1,570	700	1,000	700	560	9,400	4,200	770	390	289	180
18	860	1,500	680	1,000	680	580	10,000	4,200	722	360	262	180
19	800	1,440	660	1,000	660	583	7,860	4,200	675	331	275	180
20	760	1,440	620	960	660	580	6,140	3,610	675	331	275	180
21	660	1,440	600	960	660	580	6,370	3,420	675	310	262	198
22	570	1,640	560	960	640	620	8,120	3,420	680	310	242	242
23	552	1,640	560	960	640	660	9,420	3,230	680	289	275	242
24	615	1,440	540	960	640	660	10,500	3,040	680	275	262	242
25	760	1,250	500	960	620	700	11,300	2,870	620	262	262	223
26	860	1,190	480	960	560	740	12,200	2,530	675	275	262	210
27	1,070	1,150	460	960	480	740	13,300	2,380	675	289	262	210
28	1,020	1,100	460	960	410	740	14,800	2,380	675	310	275	204
29	960	1,150	440	960	-------	740	21,600	2,090	585	338	242	180
30	860	1,200	440	960	-------	740	38,800	1,960	500	382	242	162
31	810	-------	480	960	-------	740	---------	1,700	-------	382	242	-------

NOTE.—Stage-discharge relation affected by ice Nov. 27 to Dec. 1 and Dec. 5 to Apr. 18; discharge for these periods computed from gage heights corrected for effect of ice by means of three discharge measurements, observer's notes, and weather records. Stage-discharge relation affected by fish trap Oct. 11–20, and by logs June 22–25; discharge for these periods computed from gage heights corrected for effect of weir and logs.

Monthly discharge of Mattawamkeag River at Mattawamkeag, Maine, for the year ending Sept. 30, 1923

[Drainage area, 1,500 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,200	310	707	0.471	0.54
November	1,960	525	1,230	.820	.91
December	1,100	440	732	.488	.56
January	1,250	660	1,050	.700	.81
February	960	410	739	.493	.51
March	740	330	531	.354	.41
April	38,800	580	7,400	4.93	5.50
May	42,800	1,700	11,500	7.67	8.84
June	1,640	500	1,000	.667	.74
July	500	242	329	.219	.25
August	585	242	334	.223	.26
September	275	162	222	.148	.17
The year	42,800	162	2,160	1.44	19.50

PISCATAQUIS RIVER NEAR FOXCROFT, MAINE

LOCATION.—At highway bridge known as Lows Bridge, halfway between Guilford and Foxcroft, Piscataquis County, three-quarters of a mile above mouth of Black Stream and 3 miles below Mill Stream.

DRAINAGE AREA.—286 square miles.

RECORDS AVAILABLE.—August 17, 1902, to September 30, 1923.

GAGE.—Staff attached to left abutment of bridge; read by A. F. D. Harlow.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Practically permanent; banks are high and are overflowed only during extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.5 feet at 5 p. m. April 29 (discharge, by extension of rating curve, 21,200 second-feet); minimum stage recorded, 1.2 feet June 19, 21, and September 11 (discharge 9 second-feet).

1902–1923: Maximum discharge recorded, 21,700 second-feet[1] on September 29, 1909 (by extension of rating curve); minimum discharge, 5 second-feet August 6, 1905, and November 22, 1908 (water held back by dams).

ICE.—Stage-discharge relation affected by ice during winter.

REGULATION.—The stream is used to develop power at two manufacturing plants at the dam in Guilford; distribution of flow somewhat affected by operation of wheels.

ACCURACY.—Stage-discharge relation occasionally affected by backwater from log jams and by ice during winter. Rating curve well defined below 5,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying rating table to mean daily gage heights, with corrections for effect of ice during the winter. Records fair.

Discharge measurements of Piscataquis River near Foxcroft, Maine, during the year ending Sept. 30, 1923

[Made by M. R. Stackpole]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Jan. 4	a 5.15	956	Mar. 23	a 3.98	201
Feb. 8	a 3.94	249	July 13	2.18	102

a Stage-discharge relation affected by ice.

[1] Estimates revised since publication of earlier reports.

Daily discharge, in second-feet, of Piscataquis River near Foxcroft, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	31	205	222	120	175	105	190	11,000	380	64	190	19
2	51	190	175	380	190	105	190	5,690	240	64	132	20
3	51	175	145	900	190	105	160	3,420	175	64	114	19
4	46	64	120	880	200	64	175	3,200	330	64	36	20
5	51	120	120	420	220	100	280	2,760	330	64	31	20
6	58	160	110	410	175	86	500	2,650	500	64	46	20
7	58	190	80	280	190	64	720	2,100	1,150	66	92	19
8	58	120	110	380	140	76	920	2,100	840	72	102	19
9	605	205	105	380	175	145	1,450	1,700	1,330	51	31	15
10	605	305	100	260	170	175	1,550	2,000	720	51	32	14
11	280	205	100	145	200	145	1,500	1,700	720	51	31	28
12	280	240	100	110	190	145	1,450	1,510	640	51	31	64
13	280	280	130	130	175	150	1,350	1,420	380	58	102	58
14	280	175	110	80	160	145	1,250	1,330	380	40	205	58
15	240	205	90	72	155	175	1,200	1,330	380	19	145	51
16	240	240	64	64	155	145	1,150	1,420	330	19	135	15
17	190	205	90	120	155	155	1,150	1,420	175	19	38	28
18	175	190	145	185	155	240	1,330	1,420	80	15	31	28
19	160	175	105	165	155	240	1,700	1,420	28	28	28	28
20	160	205	120	170	155	240	2,430	1,420	72	28	100	15
21	64	305	110	190	130	240	3,420	1,510	24	38	110	19
22	51	305	92	175	145	240	4,830	1,600	40	28	36	15
23	80	355	92	175	110	135	4,470	1,060	40	28	52	15
24	222	222	72	160	110	240	3,530	800	40	33	47	19
25	500	230	145	160	90	300	3,200	640	40	24	25	17
26	380	240	190	160	90	260	2,980	570	40	47	24	15
27	260	250	160	175	90	200	2,980	570	132	41	24	15
28	222	200	90	145	105	200	4,830	640	280	41	40	15
29	205	145	72	175	-------	175	14,600	800	120	84	40	15
30	205	132	100	175	-------	175	18,600	970	100	355	31	15
31	175	-------	100	190	-------	185	-------	880	-------	160	28	-------

NOTE.—Stage-discharge relation affected by ice Nov. 25–28 and Dec. 3 to Apr. 16; discharge for this period computed from gage heights corrected for effect of ice by means of three discharge measurements, observer's notes, and weather records.

Monthly discharge of Piscataquis River near Foxcroft, Maine, for the year ending Sept. 30, 1923

[Drainage area, 286 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	605	31	202	0.706	0.81
November	355	64	208	.727	.81
December	222	64	115	.402	.46
January	900	64	243	.850	.98
February	220	90	155	.542	.56
March	300	64	166	.580	.67
April	18,600	160	2,800	9.79	10.92
May	11,000	570	1,970	6.89	7.94
June	1,330	24	335	1.17	1.30
July	355	15	59.1	.207	.24
August	205	24	68.0	.238	.27
September	64	14	23.9	.084	.09
The year	18,600	14	529	1.85	25.05

PLEASANT RIVER AT MILO, MAINE

LOCATION.—At highway bridge known locally as Snows Bridge, in Milo, Piscataquis County.

DRAINAGE AREA.—325 square miles (measured on map compiled by Maine Water Power Commission).

RECORDS AVAILABLE.—June 4, 1920, to September 30, 1923.

GAGES.—Chain on downstream side of bridge near left abutment. Vertical staff on downstream side of right bridge abutment used prior to April 25, 1921. Gage read by H. S. Snow.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Bed covered with coarse gravel. Control for low stages is a well-defined riffle 100 feet below gage; control at high stages formed by series of riffles extending about a mile below gage.

EXTREMES OF DISCHARGE.—Maximum stage for the year, 14.33 feet as determined from reference mark made by observer at 9 p. m. April 30 (approximate discharge, by extension of rating curve, 24,400 second-feet); minimum stage recorded, 2.20 feet at 4.45 p. m. October 4 (discharge, 38 second-feet).

1920–1923: Maximum stage, that of April 30, 1923; minimum stage recorded, 2.10 feet July 29, August 2, and September 11, 1921 (discharge, 22 second-feet).

ICE.—Stage-discharge relation affected by ice during winter.

REGULATION.—The flow is partially regulated by a power development at Brownville and by storage dams at the headwaters which are used during the log-driving season.

ACCURACY.—Stage-discharge relation changed during flood of April 30; the two curves used during the year were fairly well defined between 80 and 6,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying rating table to mean daily gage heights. Records fair.

Discharge measurements of Pleasant River at Milo, Maine, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 9	M. R. Stackpole	2.89	390	May 28	M. R. Stackpole	3.33	510
Jan. 10	do	[a] 5.05	281	June 9	do	3.60	813
Feb. 7	do	[a] 5.55	269	July 13	do	2.72	179
Mar. 22	do	[a] 5.72	190	Aug. 23	do	2.50	88
May 3	do	6.12	5,420	23	C. H. Pierce	2.48	87
3	do	5.91	5,150				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Pleasant River at Milo, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	49	238	282	240	170	105	180	19,900	500	308	290	108
2	74	200	245	540	170	105	115	10,900	680	268	250	85
3	48	174	240	700	170	105	115	5,480	613	232	165	100
4	40	169	230	490	170	105	170	4,630	218	205	133	97
5	43	152	230	380	160	105	260	3,580	282	193	122	88
6	43	152	230	340	240	105	280	3,580	405	318	185	90
7	94	158	220	320	270	110	400	3,170	552	461	290	90
8	454	158	210	300	260	110	450	2,600	523	366	181	83
9	560	409	200	280	260	110	580	2,600	798	295	157	72
10	392	436	195	280	260	115	580	3,790	940	236	145	90
11	436	360	195	270	250	120	490	3,580	798	210	141	94
12	463	336	185	260	240	120	450	2,790	1,010	185	141	94
13	392	376	180	240	180	125	430	1,960	901	169	218	85
14	252	400	170	230	150	130	400	2,140	762	145	177	83
15	186	550	165	230	140	135	340	1,620	461	197	104	94
16	169	560	160	230	130	140	350	1,150	379	254	88	74
17	238	463	160	220	125	145	280	1,960	336	218	85	85
18	219	238	150	210	125	150	260	1,870	322	165	69	76
19	186	226	140	210	125	165	240	1,620	277	145	69	83
20	169	268	135	200	120	170	320	1,220	250	111	76	108
21	164	305	130	200	115	185	640	1,220	228	232	78	177
22	107	445	125	195	115	190	1,300	1,220	201	201	88	193
23	89	436	125	185	110	200	3,090	1,150	189	149	83	125
24	186	360	120	180	110	210	3,300	888	169	97	108	94
25	454	368	115	180	110	210	3,090	862	153	111	125	205
26	312	368	110	180	110	220	2,890	657	145	104	118	189
27	352	360	105	175	110	220	3,510	514	982	94	122	185
28	312	350	105	175	105	220	5,670	714	750	104	114	88
29	252	340	105	170	-------	210	12,900	640	386	286	111	83
30	245	320	94	170	-------	210	22,200	600	340	494	125	81
31	219	-------	94	170	-------	180	-------	560	-------	379	118	-------

NOTE.—Stage-discharge relation affected by ice Nov. 27–29 and Dec. 3 to Apr. 22; discharge for these periods computed from gage heights corrected for effect of ice by means of three discharge measurements, observer's notes, and weather records. Stage-discharge relation affected by logs May 29 to June 2; discharge for this period computed from gage heights corrected for effect of logs by means of observer's notes and rainfall data.

Monthly discharge of Pleasant River at Milo, Maine, for the year ending Sept. 30, 1923

[Drainage area, 325 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	560	40	232	0.714	0.82
November	560	152	322	.991	1.11
December	282	94	166	.511	.59
January	700	170	263	.809	.93
February	270	105	164	.505	.53
March	220	105	153	.471	.54
April	22,200	115	2,180	6.71	7.49
May	19,900	514	2,880	8.86	10.22
June	1,010	145	485	1.49	1.66
July	494	94	224	.689	.79
August	290	69	138	.425	.49
September	205	72	107	.329	.37
The year	22,200	40	611	1.88	25.54

PASSADUMKEAG RIVER AT LOWELL, MAINE

LOCATION.—Half a mile below dam and highway bridge at Lowell, Penobscot County, and 10 miles above mouth of river.

DRAINAGE AREA.—301 square miles.

RECORDS AVAILABLE.—October 1, 1915, to September 30, 1923.

GAGES.—Water-stage recorder on right bank half a mile below highway bridge; inspected by M. J. Leard. Chain gage on left bank near highway bridge used for auxiliary readings.

DISCHARGE MEASUREMENTS.—Made from cable near gage or by wading.

CHANNEL AND CONTROL.—Channel rough and somewhat irregular, control about 150 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 9.40 feet at 4 p. m. May 2 (discharge, by extension of rating curve, 5,680 second-feet); minimum stage during year from water-stage recorder, 0.42 foot at noon July 25 and September 15 (discharge, 13 second-feet).

1916–1923: Maximum discharge recorded that of May 2, 1923; minimum discharge estimated at 5 second-feet several times in July and August, 1921, when gates at dam were closed.

ICE.—Stage-discharge relation usually affected by ice from December to April.

REGULATION.—Distribution of flow somewhat affected by use of storage reservoirs above station. A small dam and mill half a mile above gage cause diurnal fluctuations in stage when mill is in operation, usually from May to November.

ACCURACY.—Stage-discharge relation shifts slightly at times of high water. Rating curve well defined below 3,500 second-feet. Operation of water-stage recorder satisfactory throughout year. Daily discharge ascertained by applying rating tables to mean daily gage height as determined from inspection of recorder sheets with corrections for effect of ice, except October 1–28, when the mean of bihourly discharges was used, and from July 1 to September 30, when discharge integrator was used. Records good.

Discharge measurements of Passadumkeag River at Lowell, Maine, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 2	M. R. Stackpole	[a]3.22	158	Aug. 13	M. R. Stackpole	2.92	679
Mar. 19	do	[a]3.77	159	24	Stackpole and Grover	.47	16.3
May 10	do	6.51	3,100	24	do	1.50	176

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Passadumkeag River at Lowell, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	146	522	183	125	130	100	260	5,500	952	700	180	242
2	244	158	175	158	125	100	290	5,680	1,010	700	212	290
3	220	42	183	185	125	100	320	5,590	1,010	670	274	300
4	261	154	185	220	125	105	360	5,410	565	625	205	290
5	132	168	183	260	120	105	396	5,050	952	620	325	330
6	190	166	175	270	120	105	500	4,510	952	575	310	200
7	340	274	170	260	120	110	635	4,150	1,010	530	276	134
8	126	223	165	250	115	110	800	3,790	980	365	234	137
9	289	207	160	230	115	110	1,130	3.440	925	610	230	141
10	321	446	155	230	115	115	1,370	3,030	1,190	580	212	145
11	470	337	150	220	110	115	1,460	2,620	1,190	630	140	145
12	376	367	150	220	110	120	1,490	2,300	1,070	660	91	137
13	406	356	145	210	110	125	1,490	2,140	1,010	610	560	87
14	426	339	140	200	110	130	1,460	1,860	1,010	420	490	81
15	346	322	140	195	110	130	1,460	1,650	1,160	335	560	115
16	426	305	135	190	110	140	1,520	1,520	1,070	390	485	16
17	388	302	130	180	110	150	1,400	1,370	952	365	475	148
18	384	292	130	175	105	155	1,340	952	595	375	475	132
19	379	274	130	170	105	159	1,310	1,040	800	222	305	120
20	270	267	125	165	105	165	1.370	1,160	800	226	345	66
21	348	286	125	160	105	165	1,400	952	662	215	255	84
22	301	194	125	160	105	165	1.520	900	715	210	282	68
23	296	255	125	150	105	175	1,650	825	612	175	280	20
24	285	309	120	150	105	190	1,790	750	725	14	175	180
25	290	319	120	145	100	200	1,860	685	652	13	186	158
26	372	309	120	145	100	210	1,930	662	639	17	285	159
27	458	283	120	140	100	230	2,000	666	800	220	172	79
28	548	261	120	135	100	250	2,140	700	800	176	300	93
29	506	238	120	135	-------	250	3,360	750	775	286	112	138
30	485	221	115	130	-------	250	4,780	850	750	298	315	15
31	252	-------	115	130	-------	260	-------	900	-------	300	200	-------

NOTE.—Stage-discharge relation affected by ice Dec. 6 to Apr. 4; discharge for this period computed from gage heights corrected for effect of ice by means of two discharge measurements, observer's notes, weather records, and gage heights from an auxiliary gage half a mile above which was probably not affected by ice.

Monthly discharge of Passadumkeag River at Lowell, Maine, for the year ending Sept. 30, 1923

[Drainage area, 301 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	548	126	332	1.10	1.27
November	522	42	273	.907	1.01
December	185	115	143	.475	.55
January	270	125	184	.611	.70
February	130	100	111	.369	.38
March	260	100	155	.515	.59
April	4,780	260	1,430	4.75	5.30
May	5,680	662	2,300	7.64	8.81
June	1,190	565	878	2.92	3.26
July	700	13	391	1.30	1.50
August	560	91	289	.960	1.11
September	330	15	142	.472	.53
The year	5,680	13	554	1.84	25.01

KENNEBEC RIVER BASIN

MOOSE RIVER NEAR ROCKWOOD, MAINE

LOCATION.—3 miles above Moosehead Lake and 4 miles west of Kineo station and Rockwood post office, Rockwood Township, Somerset County.

DRAINAGE AREA.—708 square miles (revised from map compiled by Maine Water Power Commission).

RECORDS AVAILABLE.—September 7, 1902, to December 31, 1908; May 16, 1910, to September 18, 1912; November 1, 1919, to September 30, 1923.

GAGES.—Stevens continuous water-stage recorder on left bank installed September 27, 1921; referred to gage datum by means of hook gage inside the well; an inclined staff is used for auxiliary readings. Recorder inspected by W. H. Maynard. Records previous to October 1, 1921, obtained from staff gage at Walter Scott's camp.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Channel consists of ledge rock and gravel. Control at new location well defined and apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 9.58 feet at noon May 1 (discharge, by extension of rating curve, 12,200 second-feet); minimum stage recorded, 1.57 feet at 7 a. m. October 6 (discharge, 86 second-feet).

1902-1908; 1910-1912; and 1919-1923: Maximum discharge recorded that of May 1, 1923; minimum stage recorded, 1.30 feet December 16, 1903 (discharge by extension of rating curve, 70 second-feet).

ICE.—Stage-discharge relation apparently not affected by ice at present location.

REGULATION.—During April, May, and June the operation of Long Pond for log driving causes a small diurnal fluctuation.

ACCURACY.—Stage-discharge relation at present location apparently changed slightly at time of high water May 1. A new rating based on later measurements used since that date. Rating curves well defined between 100 and 5,000 second-feet. Operation of water-stage recorder was generally satisfactory throughout year. Daily discharge ascertained by applying rating table to mean daily gage heights. Records good.

Discharge measurements of Moose River near Rockwood, Maine, during the year ending Sept. 30, 1923

[Made by M. R. Stackpole]

Date	Gage height	Discharge
	Feet	*Sec.-ft.*
Mar. 28	1.81	163
May 18	5.00	3,170

Daily discharge, in second-feet, of Moose River near Rockwood, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	106	267	407	289	263	158	160	12,000	1,630	2,780	882	340
2	103	263	417	312	254	158	165	11,400	1,650	2,430	1,040	325
3	103	263	412	312	237	158	170	10,400	1,650	1,580	1,080	325
4	97	263	412	316	204	155	180	9,800	1,700	1,060	1,100	320
5	94	267	412	320	196	162	200	9,400	1,750	975	939	305
6	103	267	412	330	196	158	225	9,200	1,900	1,340	775	300
7	121	263	407	334	200	162	246	9,000	2,000	1,460	672	285
8	144	267	402	339	200	166	276	8,400	2,200	1,200	623	281
9	188	280	397	348	200	166	312	7,800	2,400	940	581	305
10	241	284	397	348	204	166	348	7,400	2,300	800	536	305
11	284	280	387	344	200	166	387	7,000	2,100	760	478	300
12	320	298	387	344	196	166	454	6,600	2,000	960	434	290
13	334	298	382	339	196	166	580	6,000	1,900	1,300	428	290
14	325	271	363	339	196	166	756	5,400	1,800	1,460	390	281
15	325	298	363	334	200	169	850	4,410	1,740	1,060	406	276
16	325	316	358	334	192	177	950	3,800	1,630	828	428	276
17	334	307	358	330	188	185	1,020	3,460	1,380	693	450	276
18	316	312	353	320	185	181	1,080	3,220	1,410	602	467	267
19	307	330	344	316	181	177	1,130	3,150	1,740	745	440	267
20	302	348	348	312	181	173	1,180	3,150	2,360	790	406	258
21	289	392	344	316	177	169	1,300	3,000	2,570	775	390	300
22	276	417	339	312	173	162	1,910	2,710	2,300	715	401	315
23	258	417	334	307	166	162	2,980	2,300	1,980	686	355	320
24	250	433	330	298	162	166	3,880	2,160	1,410	588	335	325
25	229	422	320	298	162	162	3,880	2,040	1,150	512	330	330
26	237	422	316	298	162	162	2,820	1,980	1,090	472	401	325
27	254	417	312	294	162	162	2,980	1,920	1,210	423	396	315
28	280	412	302	289	162	162	4,600	1,860	2,500	428	380	315
29	294	407	298	280	-------	160	6,800	1,680	3,380	450	380	310
30	284	402	294	271	-------	160	10,200	1,680	3,150	489	370	300
31	280	-------	284	267	-------	160	-------	1,580	-------	658	355	-------

NOTE.—Records for Jan. 17, Feb. 6–9, Mar. 29 to Apr. 5, June 2–14, and July 8–13 destroyed by mice in gage house; discharge for these periods estimated by comparison with records of Dead River and precipitation at Jackman.

Monthly discharge of Moose River near Rockwood, Maine, for the year ending Sept. 30, 1923

[Drainage area, 708 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	334	94	239	0.338	0.39
November	433	263	329	.465	.52
December	417	284	361	.510	.59
January	348	267	316	.446	.51
February	263	162	193	.273	.28
March	185	155	165	.233	.27
April	10,200	160	1,730	2.44	2.72
May	12,000	1,580	5,290	7.47	8.61
June	3,380	1,090	1,930	2.73	3.05
July	2,780	423	966	1.36	1.57
August	1,100	330	537	.758	.87
September	340	258	301	.425	.47
The year	12,000	94	1,040	1.47	19.85

24175—25—WSP 561——3

MOOSEHEAD LAKE AT EAST OUTLET, MAINE

LOCATION.—At wharf at east outlet of lake, 8 miles from Kineo, Piscataquis County.

DRAINAGE AREA.—1,240 square miles.

RECORDS AVAILABLE.—April 1, 1895, to September 30, 1923.

GAGE.—Staff at end of boat landing; two datums have been used at east outlet; the first (or original datum) is 1,011.20 feet above mean sea level and approximately 10 feet below sills of outlet gates; gage is read to this datum; the second, to which all gage readings published to and including 1911 have been referred, is 10 feet higher; that is, the zero is at the sill of the gates; as it is believed that low water may go below the sill of the gates (zero of second datum); gage heights since 1912 are published as read; that is, to original datum.

REGULATION.—The lake is regulated to a capacity of 23,735 million cubic feet. The dam at the east outlet is controlled by 39 gates, the sills of the gates being at elevation varying from 8.0 feet to 11.4 feet. At extreme low stages the flow from the lake is controlled by a bar above the dam at an approximate gage height of 9 feet. The records show only fluctuations in the level of the lake and are used in the studies of regulation of the lake and in computing the natural flow of Kennebec River at The Forks.

COOPERATION.— Record furnished by Hollinsworth & Whitney Co.

Daily gage height, in feet, of Moosehead Lake at east outlet, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		12.2	11.4	11.1							15.6	
2	13.0				11.1		10.3	14.9			15.55	
3		11.9		11.2						16.8	15.5	14.05
4	12.9		11.4				10.3	15.75	17.2			
5				11.3		10.6				16.75		14.0
6	12.85	11.85	11.4		11.1				17.25	16.7	15.4	
7						10.55		16.75				13.9
8				11.3							15.3	
9	12.9						10.45		17.2	16.6		
10		11.7		11.2				17.25			15.3	13.8
11	12.8		11.15					17.6		16.5		
12					11.0	10.5	10.55		17.3			13.7
13		11.6	11.15				10.6		17.2		15.0	
14					11.0			17.5				13.5
15	12.7	11.6		11.2		10.4			17.2		14.9	
16						10.25	10.9			16.4		
17		11.6		11.1	10.9			17.5			14.8	13.5
18	12.6		11.0				10.8	17.5	17.1	16.3		
19				11.1	10.9	10.4						13.4
20	12.45	11.5	10.9				10.8		17.0	16.2	14.6	
21					10.8	10.5		17.5				13.4
22		11.6		11.2					16.95		14.5	
23	12.3					10.5	11.1			16.2		
24		11.6		11.2				17.5		16.0	14.4	13.4
25	12.3		10.85	11.2				17.45	16.9			13.2
26					10.7	10.5						
27	12.25	11.5	10.9				12.0			15.75	14.3	
28					10.7	10.5		17.5	16.9			13.15
29		11.5		11.1						15.65	14.2	
30	12.15					10.45	13.6	17.5	16.9			
31				11.1							14.1	

KENNEBEC RIVER AT MOOSEHEAD, MAINE

LOCATION.—At Canadian Pacific Railway bridge one-fourth mile below east outlet dam on Moosehead Lake, half a mile northwest of Moosehead railroad station in Big Squaw Mountain Township, Piscataquis County, and 4.4 miles from Somerset Junction.

DRAINAGE AREA.—1,240 square miles (measured on map compiled by Maine Water Power Commission).

RECORDS AVAILABLE.—October 1, 1919, to September 30, 1923.

GAGE.—Chain gage near middle of bridge, downstream side. Read by Guy Hodgson, Peter James, M. DeMello, and Stanislas Vachon.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Large boulders and gravel. Control is a series of rapids practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.7 feet at 4 p. m. May 11 and May 12 (discharge, by extension of rating curve, 8,070 second-feet); minimum stage recorded, 0.61 foot April 7–15 (discharge, by extension of rating curve, 62 second-feet).

1919–1923: Maximum stage recorded, 7.13 feet May 12 and 13, 1920 (discharge, by extension of rating curve, 13,400 second-feet); minimum stage, that of April 7–15, 1923.

ICE.—Not affected by ice.

DIVERSIONS.—Leakage through west outlet dam and occasional opening of gates in this dam allow some water to pass down the west channel which is not included in records of flow at this station.

REGULATION.—Discharge is regulated by operation of gates at Moosehead Lake; large diurnal fluctuations occur during the log-driving season.

ACCURACY.—Stage-discharge relation changed during high water May 12. Rating curves well defined between 100 and 8,000 second-feet. Gage read to hundredths twice daily. Daily discharge October 1 to May 15 and July 14 to September 30 determined by applying rating table to mean daily gage heights; during remainder of year from gage heights and records of time when changes were made in gate openings in dam at east outlet of Moosehead Lake. Records good.

Discharge measurements of Kennebec River at Moosehead, Maine, during the year ending Sept. 30, 1923

[Made by M. R. Stackpole]

Date	Gage height	Discharge
	Feet	*Sec.-ft.*
May 16	2.90	1,680
Aug. 2	3.52	2,650

Daily discharge, in second-feet, of Kennebec River at Moosehead, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,860	1,200	980	780	930	690	735	198	2,230	3,230	2,830	1,700
2	1,860	1,200	930	310	930	690	690	242	2,360	2,940	2,830	1,630
3	1,790	1,200	930	90	880	690	690	262	2,680	3,010	2,650	1,700
4	1,720	1,140	930	90	880	690	690	270	2,490	3,110	2,650	1,630
5	1,650	1,140	880	90	880	690	690	290	2,250	2,940	2,490	1,440
6	1,720	1,140	880	258	880	650	440	335	2,570	2,760	2,490	1,440
7	1,720	1,140	880	690	880	650	118	360	2,300	2,990	2,490	1,440
8	1,720	1,140	880	830	880	650	62	360	2,180	2,860	2,490	1,700
9	1,790	1,140	880	830	880	650	62	385	2,220	3,190	2,340	2,190
10	1,320	1,090	880	830	880	650	62	2,480	435	3,260	2,490	2,190
11	1,320	1,090	880	830	830	650	62	7,140	430	3,120	2,340	1,760
12	1,320	1,090	880	830	830	690	62	8,070	2,710	3,040	2,340	1,700
13	1,320	1,090	880	830	830	690	62	7,750	2,320	3,330	2,490	1,630
14	1,260	1,090	880	830	780	690	62	7,440	3,090	3,020	2,340	1,560
15	1,260	1,040	880	780	780	930	62	7,750	2,760	3,020	2,340	1,630
16	1,260	1,040	880	780	780	1,040	66	2,060	2,820	2,830	2,340	1,560
17	1,200	1,040	830	780	780	1,040	72	5,600	2,820	3,220	2,340	1,560
18	1,200	1,040	830	780	780	980	76	3,700	3,140	3,020	2,190	1,560
19	1,140	1,040	830	780	780	930	82	4,180	2,910	3,020	2,190	1,560
20	1,580	1,040	830	780	780	880	90	3,990	3,000	3,220	2,190	1,560
21	1,580	1,040	830	780	780	880	98	3,870	3,260	3,020	2,040	1,560
22	1,450	1,040	830	780	735	830	98	5,750	2,700	3,020	1,830	1,500
23	1,380	1,040	830	780	735	780	102	3,820	3,180	2,830	1,700	1,500
24	1,380	1,040	780	780	735	830	102	1,820	3,080	2,830	1,760	1,500
25	1,320	980	780	780	735	830	110	440	3,170	2,830	1,830	1,500
26	1,320	980	780	735	735	830	115	1,580	3,110	2,830	1,830	1,630
27	1,260	980	780	735	690	780	120	1,550	3,110	3,020	1,830	1,700
28	1,260	980	780	735	690	780	130	1,770	2,990	2,830	2,340	1,700
29	1,260	980	780	735	-------	780	142	1,060	3,210	2,830	1,830	1,700
30	1,260	980	780	930	-------	735	167	1,020	3,000	2,830	2,340	1,700
31	1,200	-------	780	930	-------	735	-------	2,330	-------	2,830	1,760	-------

Monthly discharge of Kennebec River at Moosehead, Maine, for the year ending Sept. 30, 1923

[Drainage area, 1,240 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,860	1,140	1,440	1.16	1.34
November	1,200	980	1,070	.863	.96
December	980	780	851	.686	.79
January	930	90	693	.559	.64
February	930	690	810	.653	.68
March	1,040	650	775	.625	.72
April	735	62	204	.165	.18
May	8,070	198	2,830	2.28	2.63
June	3,260	430	2,620	2.11	2.35
July	3,330	2,760	2,990	2.41	2.78
August	2,830	1,700	2,260	1.82	2.10
September	2,190	1,440	1,640	1.32	1.47
The year	8,070	62	1,520	1.23	16.64

NOTE.—For about 20 days in May gates were open in dam at west outlet, allowing water to pass down west channel; also leakage through gates at west outlet at high stages of Moosehead Lake. For the above reasons the measured discharge at gage does not include the total run-off from the basin. The monthly discharge in second-feet per square mile and run-off in inches are affected by storage in Moosehead Lake and do not represent natural flow.

KENNEBEC RIVER AT THE FORKS, MAINE

LOCATION.—Half a mile above highway bridge and 1 mile above mouth of Dead River at The Forks, Somerset County.

DRAINAGE AREA.—1,570 square miles.

RECORDS AVAILABLE.—September 28, 1901, to September 30, 1923.

GAGES.—Gurley seven-day recorder on right bank half a mile above highway bridge; chain on bridge and water-stage recorder on left abutment used prior to October 18, 1919. Recorder inspected by S. C. Durgin.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Channel at bridge is subject to slight changes; control for new location is well defined by riffles a short distance below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 10.05 feet at 6 p. m. April 30 (discharge, by extension of rating curve, 21,100 second-feet); minimum stage during year from water-stage recorder, 1.75 feet at 4 p. m. on September 19 (discharge, 430 second-feet).

1901–1923: Maximum stage recorded, 10.1 feet by water-stage recorder from 4 to 12 p. m. June 18, 1917 (discharge, by extension of rating curve, 23,700 second-feet); minimum stage recorded, 0.3 foot by chain gage at 7 a. m. October 27, 1911 (discharge, 215 second-feet).

ICE.—Stage-discharge relation seriously affected by ice for several months.

REGULATION.—Flow regulated by storage in Moosehead Lake. During May, June, July, and August, the operation of Indian Pond for log driving causes a large diurnal fluctuation. Records of monthly discharge have been corrected for storage by adding or subtracting a discharge corresponding to the amount of water stored in or released from Moosehead Lake.

ACCURACY.—Stage-discharge relation at present location apparently permanent except when affected by ice. Rating curve well defined for ordinary stages. Operation of water-stage recorder satisfactory, except for short periods shown in footnote to daily-discharge table. Daily discharge October 1 to May 28 ascertained by application of rating table to mean gage heights determined by inspection of recorder sheets, with corrections for effect of ice during the winter; daily discharge May 29 to June 22 computed as mean of discharge for 12 two-hour periods; daily discharge June 23 to September 30 ascertained by use of discharge integrator. Records good.

Discharge measurements of Kennebec River at The Forks, Maine, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 5	M. R. Stackpole	[a] 2.77	838	May 16	M. R. Stackpole	4.79	5,030
Feb. 21	do	[a] 4.55	1,010	July 31	do	2.34	865
Mar. 28	do	[a] 4.61	937	Aug. 21	Stackpole and Grover	2.13	692

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Kennebec River at The Forks, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,870	1,410	1,150	1,000	1,150	980	900	14,200	3,620	3,350	3,050	1,400
2	1,870	1,410	1,120	1,100	1,150	900	840	7,840	3,780	3,250	3,000	1,760
3	1,800	1,410	1,180	1,050	1,150	900	820	5,180		3,250	3,250	1,740
4	1,800	1,410	1,120	960	1,150	1,000	820	3,330		3,100	3,550	1,880
5	1,730	1,350	1,100	900	1,150	1,050	880	3,230		3,000	2,950	1,820
6	1,800	1,350	1,100	840	1,150	1,000	1,000	4,200	3,900	3,200	2,500	2,000
7	1,870	1,350	1,100	1,000	1,100	960	740	4,200		3,150	2,800	1,880
8	1,950	1,350	1,100	1,300	1,100	900	580	3,860		3,150	3,100	1,900
9	1,950	1,350	1,100	1,500	1,100	860	580	4,200	3,930	3,150	2,650	1,900
10	1,950	1,290	1,050	1,500	1,100	860	580	4,320	2,110	3,000	2,550	2,100
11	1,660	1,290	1,050	1,450	1,100	860	580	9,270	2,110	3,000	2,500	1,900
12	1,660	1,290	1,050	1,350	1,100	860	580	10,700	3,760	3,150	2,450	2,050
13	1,540	1,290	1,050	1,300	1,050	900	580	10,400	2,690	3,100	2,900	1,900
14	1,470	1,230	1,050	1,250	1,050	900	600	10,100	3,410	3,450	3,150	1,900
15	1,470	1,230	1,050	1,250	1,050	1,050	640	7,840	3,290	3,550	2,950	2,050
16	1,470	1,230	1,050	1,200	1,050	1,200	680	4,930	3,470	3,650	2,700	1,940
17	1,470	1,230	1,050	1,150	1,050	1,300	720	6,470	3,200	3,700	2,300	2,050
18	1,410	1,230	1,050	1,100	1,050	1,300	780	6,200	3,340	3,350	2,200	2,150
19	1,470	1,230	1,050	1,100	1,000	1,300	880	5,680	3,200	3,350	2,250	1,540
20	1,600	1,230	1,050	1,050	1,000	1,250	990	7,280	2,940	3,450	2,100	2,400
21	1,730	1,290	1,000	1,050	1,000	1,150	1,350	5,430	3,640	3,300	2,050	1,820
22	1,660	1,290	1,000	1,000	1,000	1,100	2,650	7,280	3,430	3,300	2,000	1,840
23	1,600	1,230	1,000	1,000	1,000	1,050	3,530	7,010	3,350	3,150	1,840	1,760
24	1,660	1,230	1,000	1,000	1,000	1,000	3,750	4,200	3,250	3,000	2,150	1,760
25	1,600	1,230	1,000	1,000	980	940	3,430	3,130	3,300	3,050	1,380	1,740
26	1,600	1,230	1,000	1,000	980	940	3,230	2,930	3,700	2,950	2,050	1,680
27	1,600	1,200	1,000	1,000	980	940	3,750	3,330	3,800	3,000	2,550	1,680
28	1,540	1,200	940	1,000	980	940	4,680	2,550	3,700	3,000	2,000	1,660
29	1,470	1,200	940	1,000	-------	940	11,000	2,900	4,050	3,200	2,500	1,680
30	1,470	1,150	940	1,000	-------	900	19,900	2,330	3,150	3,150	2,500	1,660
31	1,470	-------	940	1,200	-------	900	-------	3,340	-------	3,000	1,940	-------

NOTE.—Stage-discharge relation affected by ice Dec. 5 to Apr. 19; discharge for this period computed from gage heights corrected for effect of ice by means of three discharge measurements, records of discharge from Moosehead Lake, observer's notes, and weather records. Discharge Nov. 27 to Dec. 1, and average discharge for the period June 3–8 estimated by comparison with records of discharge from Moosehead Lake.

Monthly discharge of Kennebec River at The Forks, Maine, for the year ending Sept. 30, 1923

[Drainage area, 1,570 square miles]

Month	Discharge in second-feet					Corrected run-off in inches
	Observed			Corrected for storage		
	Maximum	Minimum	Mean	Mean	Per square mile	
October	1,950	1,410	1,650	590	0.376	0.43
November	1,410	1,150	1,280	373	.238	.27
December	1,180	940	1,040	632	.403	.46
January	1,500	840	1,120	1,120	.713	.82
February	1,150	980	1,060	544	.346	.36
March	1,300	860	1,000	650	.414	.48
April	19,900	580	2,400	6,270	3.99	4.45
May	14,200	2,330	5,740	10,400	6.62	7.63
June	4,050	2,110	3,450	2,700	1.72	1.92
July	3,700	2,950	3,210	1,650	1.05	1.21
August	3,550	1,380	2,510	730	.465	.54
September	2,400	1,400	1,850	570	.363	.40
The year	19,900	580	2,200	2,190	1.39	18.97

KENNEBEC RIVER AT WATERVILLE, MAINE

LOCATION.—At dam and mill of Hollingsworth & Whitney Co. at Waterville, Kennebec County, 2 miles above Sebasticook River and 3½ miles above Messalonskee Stream.

DRAINAGE AREA.—4,270 square miles.

RECORDS AVAILABLE.—March 22, 1892, to September 30, 1923.

GAGES.—Rod gages in pond above dam and in tailrace of mill. A water-stage recorder is used to obtain records of head on the wheels.

DETERMINATION OF DISCHARGE.—Discharge computed from flow over dam, through the logway, and through the wheels of the mill. When flow is less than about 3,500 second-feet practically all the water is used through the wheels.

ICE.—Stage-discharge relation not as a rule affected by ice; in most winters the entire flow passes through wheels of mill.

REGULATION.—Numerous power plants and much storage above station; results not corrected for storage.

COOPERATION.—Records furnished by Hollingsworth & Whitney Co.

Daily discharge, in second-feet, of Kennebec River at Waterville, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,980	3,420	2,650	1,280	2,940	1,720	1,630	134,000	7,790	3,080	3,860	3,710
2	2,760	2,700	2,560	3,560	2,170	2,240	2,850	118,000	5,050	5,110	3,990	3,210
3	2,640	3,130	1,710	3,880	2,950	1,730	2,800	70,400	2,990	4,600	3,980	1,600
4	3,400	3,070	2,140	3,960	1,190	973	3,860	46,300	7,960	2,950	3,860	3,160
5	3,340	915	2,160	4,110	1,590	2,020	3,800	41,700	6,830	5,050	4,010	3,130
6	2,840	2,560	2,280	3,480	2,430	2,080	3,860	26,600	6,070	4,610	3,920	3,840
7	2,820	2,530	1,990	2,830	2,050	2,070	5,960	22,900	7,330	4,200	3,900	2,350
8	1,080	2,270	2,230	2,980	1,910	2,450	12,400	19,500	7,140	3,390	3,920	1,980
9	2,380	2,710	1,310	2,690	2,510	1,970	8,970	19,500	7,140	4,850	3,970	1,640
10	3,080	2,840	518	2,190	2,150	1,850	15,600	18,200	13,500	4,680	3,900	2,260
11	3,920	2,820	200	2,700	1,250	1,090	15,900	19,500	9,020	4,530	3,970	2,270
12	2,980	917	1,510	2,950	1,910	2,240	15,000	20,800	8,500	4,350	1,600	3,140
13	3,380	2,820	2,210	3,230	2,450	1,680	12,200	23,300	6,420	3,860	3,900	2,840
14	3,640	2,840	1,820	960	2,720	2,080	9,940	23,600	6,420	3,780	3,900	3,140
15	804	3,130	1,840	2,110	2,720	2,010	8,720	20,800	6,970	2,820	2,890	3,380
16	3,110	2,870	2,340	3,300	2,140	2,160	19,000	18,200	6,330	5,290	3,620	1,280
17	3,380	2,840	1,690	2,980	1,880	1,720	14,900	11,900	7,840	4,770	3,920	1,970
18	2,800	1,980	882	2,430	977	998	12,100	12,600	5,200	5,030	3,900	2,550
19	2,530	2,240	1,210	2,720	1,880	2,170	11,400	17,700	4,600	4,850	1,500	2,550
20	2,560	2,720	1,370	1,850	2,450	2,550	12,000	15,800	4,580	4,770	3,090	2,560
21	2,820	3,730	1,300	1,080	2,380	1,810	13,600	16,600	4,620	4,480	3,920	3,180
22	1,800	3,810	1,350	2,160	2,090	2,440	25,300	11,200	5,290	3,800	3,240	2,550
23	2,530	3,820	2,020	2,690	2,470	2,480	35,400	11,200	5,050	3,920	2,680	1,110
24	3,640	2,720	1,350	1,600	2,160	3,450	39,500	13,200	5,660	4,850	2,550	2,550
25	3,920	2,820	827	2,190	1,130	1,310	31,500	12,200	5,050	4,460	2,550	2,830
26	3,920	1,920	1,320	2,420	1,790	2,700	28,700	6,290	4,420	4,630	1,180	2,550
27	3,970	2,530	1,980	1,910	2,050	3,790	24,400	5,160	4,560	4,530	2,240	2,420
28	2,930	2,440	1,850	2,500	2,460	3,360	10,500	8,250	4,700	4,240	2,260	2,540
29	1,550	2,850	1,860	2,070	-------	3,310	52,300	7,480	5,810	3,690	3,920	2,570
30	2,850	1,220	1,860	2,430	-------	2,890	81,800	6,320	4,850	4,620	3,950	1,210
31	3,990	-------	1,450	2,140	-------	2,770	-------	9,910	-------	4,670	3,920	-------

Monthly discharge of Kennebec River at Waterville, Maine, for the year ending Sept. 30, 1923

[Drainage area, 4,270 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	3,990	804	2,910	0.681	0.79
November	3,820	915	2,640	.618	.69
December	2,650	200	1,670	.391	.45
January	4,110	960	2,560	.600	.69
February	2,950	977	2,100	.492	.51
March	3,790	973	2,210	.518	.60
April	81,800	1,630	17,900	4.19	4.68
May	134,000	5,160	26,100	6.11	7.04
June	13,500	2,990	6,260	1.47	1.64
July	5,290	2,820	4,340	1.02	1.18
August	4,010	1,180	3,360	.787	.91
September	3,840	1,110	2,540	.595	.66
The year	134,000	200	6,230	1.46	19.84

NOTE.—The monthly discharge in second-feet per square mile and the run-off in inches do not represent the natural flow from the basin because of artificial storage. The yearly discharge and run-off doubtless represent more nearly the natural flow, for comparatively little stored water is held over from year to year.

DEAD RIVER AT THE FORKS, MAINE

LOCATION.—One-eighth mile above farmhouse of Jeremiah Durgin, 1½ miles west of The Forks, Somerset County.

DRAINAGE AREA.—878 square miles.

RECORDS AVAILABLE.—September 29, 1901, to August 15, 1907; March 16, 1910, to September 30, 1923.

GAGE.—Staff bolted to large boulder on left bank; read by H. J. Farley.

DISCHARGE MEASUREMENTS.—Made from cable 700 feet above gage or by wading.

CHANNEL AND CONTROL.—Stream bed rough; control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.15 feet from levels to flood marks made April 30 (discharge, 23,800 second-feet); minimum open-water stage recorded, 0.82 foot September 20 (discharge, 171 second-feet).

1901–1907; 1910–1923: Maximum stage recorded that of April 30, 1923; minimum stage recorded, 0.2 foot September 12–13, 17, 1918 (water held back by logging dams, discharge not determined).

ICE.—Stage-discharge relation seriously affected by ice.

REGULATION.—A number of dams on lakes above; used for log driving during May and June.

ACCURACY.—Stage-discharge relation for low stages subject to change at infrequent intervals. Rating curve well defined between 200 and 12,000 second-feet, but only approximate below 200 second-feet. Gage read to hundredths twice daily except during the winter, when it was read once a day. Daily discharge ascertained by applying rating table to mean daily gage heights, with corrections for effect of ice during the winter. Records good for figures above 200 second-feet, but only approximate below 200 second-feet.

Discharge measurements of Dead River at The Forks, Maine, during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 18	M. R. Stackpole	[a] 1.58	226	May 15	M. R. Stackpole	3.15	3,830
Jan. 5	do	[a] 2.17	333	July 31	do	1.31	635
Feb. 21	do	[a] .96	197	Aug. 20	Stackpole and Grover	.93	257
Mar. 27	do	[a] 3.52	308	Sept. 29	M. R. Stackpole	.91	237

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Dead River at The Forks, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	235	303	320	180	260	185	390	22,000	1,020	776	556	203
2	235	303	300	200	260	170	410	18,000	880	675	480	203
3	235	294	290	240	250	165	430	14,000	2,140	614	420	203
4	227	235	290	270	250	180	490	10,500	867	568	392	235
5	195	235	280	333	240	185	580	7,130	2,700	510	374	235
6	252	235	270	410	240	195	880	6,140	2,420	522	356	235
7	383	235	270	500	240	200	1,800	6,460	4,220	650	320	235
8	410	235	260	540	230	210	2,500	7,480	3,990	750	278	219
9	420	269	250	560	230	210	2,900	6,790	3,990	675	269	235
10	460	260	240	560	220	210	1,800	6,790	1,970	602	235	235
11	510	235	240	540	195	200	1,800	7,480	2,700	510	235	235
12	470	252	240	500	170	200	1,970	6,790	2,900	500	235	219
13	450	278	240	480	170	195	1,800	4,970	2,510	460	392	219
14	401	320	240	430	180	185	1,970	4,710	2,510	470	460	219
15	347	312	240	360	195	180	1,970	3,550	2,420	625	450	219
16	320	269	230	360	200	170	1,970	4,710	2,140	1,020	401	219
17	312	278	230	360	210	180	1,630	4,970	1,550	950	365	203
18	269	320	226	350	195	185	1,470	4,460	1,310	880	338	187
19	235	320	230	350	195	185	1,550	4,460	1,160	725	294	187
20	235	320	220	330	195	195	1,970	3,550	1,090	579	235	171
21	235	392	220	320	197	200	2,900	2,510	950	450	235	203
22	219	374	210	320	195	210	6,790	2,900	867	410	252	347
23	203	365	200	320	195	220	9,700	3,110	776	410	252	383
24	252	320	200	310	195	240	9,700	2,510	688	392	252	374
25	410	320	195	310	185	260	9,320	2,320	614	392	252	338
26	410	320	185	300	185	290	7,480	1,550	776	347	252	286
27	410	320	185	290	170	308	6,140	1,470	950	329	252	269
28	401	347	185	290	155	330	6,460	1,550	880	460	235	252
29	365	294	180	290	-------	360	16,000	1,310	1,020	688	252	252
30	320	320	180	280	-------	370	23,600	1,630	880	675	252	625
31	303	-------	180	270	-------	380	-------	2,230	-------	638	244	-------

NOTE.—Stage-discharge relation affected by ice Dec. 2 to Apr. 9; discharge for this period computed from gage heights corrected for effect of ice by means of four discharge measurements, observer's notes, and weather records. Discharges estimated Apr. 29 and May 1–4.

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Monthly discharge of Dead River at The Forks, Maine, for the year ending Sept. 30, 1923

[Drainage area, 878 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	510	195	327	0.372	0.43
November	392	235	296	.337	.38
December	320	180	233	.265	.31
January	560	180	360	.410	.47
February	260	155	207	.236	.25
March	380	165	224	.255	.29
April	23,600	390	4,280	4.87	5.43
May	22,000	1,310	5,740	6.54	7.54
June	4,220	614	1,760	2.00	2.23
July	1,020	329	589	.671	.77
August	556	235	317	.361	.42
September	625	171	255	.290	.32
The year	23,600	155	1,220	1.39	18.84

COBBOSSEECONTEE STREAM AT GARDINER, MAINE

LOCATION.—At dam of Gardiner Water Power Co. in Gardiner, Kennebec County.

DRAINAGE AREA.—220 square miles.

RECORDS AVAILABLE.—June 16, 1890, to September 30, 1923.

GAGES.—Staff in pond above dam and in tailrace of power house. There are also gages to indicate the water-wheel gate and the waste-gate openings.

DETERMINATION OF DISCHARGE.—Discharge determined by considering (1) flow over dam, usually nothing except for a short time in the spring; (2) flow through two gates; (3) flow through 39-inch Victor wheel installed in 1907; (4) flow through the 39-inch Hercules wheel installed in 1895; and (5) leakage. Daily discharge computed from tables based on coefficients and experiments. The accuracy of these tables was tested by a series of weir measurements in August, 1921, which indicated that there was no justification for revising the tables except to allow for leakage that was being neglected. Corrections have been made for leakage.

ICE.—Not affected by ice.

REGULATION.—Numerous lakes in the basin are regulated by dams at the outlets. Records not corrected for storage.

COOPERATION.—Computation of daily discharge made by engineers of S. D. Warren Co., Cumberland Mills, Maine.

Daily discharge, in second-feet, of Cobbosseecontee Stream at Gardiner, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	13	273	183	233	293	293	13	3,050	293	13	263	213
2	273	273	273	233	293	293	293	3,050	293	273	263	13
3	273	273	13	233	293	293	293	3,000	13	273	263	193
4	273	273	273	233	13	13	293	2,530	293	13	263	193
5	273	13	273	233	293	293	293	2,030	293	273	13	193
6	273	273	273	233	293	293	483	1,990	293	273	263	193
7	273	273	273	13	293	293	813	1,970	293	273	263	193
8	13	273	273	263	293	293	1,030	1,680	293	13	263	193
9	273	273	273	263	293	293	1,420	893	293	273	263	13
10	273	273	13	263	293	293	1,650	613	13	273	263	193
11	273	273	273	263	13	13	1,570	903	273	273	263	193
12	273	13	273	263	293	293	1,570	603	273	273	13	193
13	273	273	273	263	293	293	1,570	313	273	273	213	193
14	273	273	273	13	293	293	1,610	293	273	273	213	193
15	13	273	273	263	293	293	1,620	293	273	13	213	193
16	273	273	273	263	293	293	1,590	293	273	273	213	13
17	273	273	13	263	293	293	1,570	293	13	273	213	193
18	273	273	233	263	13	13	1,480	293	273	273	213	193
19	273	13	233	263	293	293	1,230	293	273	273	13	193
20	273	273	233	263	293	293	753	13	273	273	213	193
21	273	273	233	13	293	293	403	293	273	273	213	193
22	13	273	233	263	293	293	243	293	273	13	213	193
23	273	273	233	263	293	293	598	293	273	213	213	13
24	273	273	13	263	293	293	1,130	293	13	213	213	193
25	273	273	63	263	13	293	1,710	293	273	213	213	193
26	273	13	173	263	293	293	1,400	293	273	213	13	193
27	273	273	233	263	293	293	513	13	273	213	213	193
28	273	273	233	13	293	293	293	293	273	213	213	193
29	13	273	233	293	-------	293	1,320	293	273	13	213	193
30	273	143	233	293	-------	293	2,460	13	273	263	213	13
31	273	-------	233	293	-------	293	-------	293	-------	263	213	-------

Monthly discharge of Cobbosseecontee Stream at Gardiner, Maine, for the year ending Sept. 30, 1923

[Drainage area, 220 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	273	13	231	1.05	1.21
November	273	13	234	1.06	1.18
December	273	13	212	.964	1.11
January	293	13	228	1.04	1.20
February	293	13	253	1.15	1.20
March	293	13	266	1.21	1.40
April	2,460	13	1,040	4.73	5.28
May	3,050	13	873	3.97	4.58
June	293	13	244	1.11	1.24
July	273	13	210	.955	1.10
August	263	13	203	.923	1.06
September	213	13	164	.745	.83
The year	3,050	13	347	1.58	21.39

ANDROSCOGGIN RIVER BASIN

ANDROSCOGGIN RIVER AT RUMFORD, MAINE

LOCATION.—At two dams of Rumford Falls Power Co. at Rumford, Oxford County.

DRAINAGE AREA.—2,090 square miles.

RECORDS AVAILABLE.—May 18, 1892, to September 30, 1923.

GAGES.—One in pond above each dam and in tailrace of power station and mills.

DISCHARGE.—Computed from discharge over the dam by use of Francis weir formula with modified coefficient, and the quantities passing through the various wheels of the power station and mills, which have been carefully rated.

ICE.—Stage-discharge relation little affected by ice.

REGULATION.—Storage in Rangeley system of lakes at headwaters of Androscoggin River aggregates about 29.6 billion cubic feet. The stored water is regulated in the interests of the water-power users above and below. Records not corrected for storage.

COOPERATION.—Records obtained and computations made by Charles A. Mixer, engineer, Rumford Falls Power Co.

Daily discharge, in second-feet, of Androscoggin River at Rumford, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,390	2,340	2,440	2,890	2,370	2,160	2,200	23,000	2,750	1,760	2,040	1,760
2	2,110	2,360	2,430	3,940	2,340	2,260	2,000	19,200	2,630	2,350	2,210	1,500
3	2,260	2,250	2,220	3,690	2,640	2,210	1,830	15,800	2,660	2,100	2,060	1,600
4	2,150	2,300	2,800	3,170	2,770	2,050	2,000	13,600	2,540	1,860	1,590	1,850
5	2,150	2,960	2,220	3,100	2,640	2,210	3,850	11,000	2,790	2,320	1,190	1,800
6	2,310	2,410	1,780	2,930	2,310	2,370	6,520	10,000	3,300	2,300	1,830	1,740
7	2,190	2,400	1,590	2,800	2,150	2,370	7,220	8,680	3,700	2,220	1,910	1,800
8	2,090	2,420	1,840	2,680	2,290	2,340	7,570	7,690	3,770	1,660	1,910	1,720
9	2,640	2,420	1,980	2,670	2,500	2,320	8,580	7,410	5,270	2,300	1,870	1,500
10	2,530	2,470	2,480	2,440	2,220	2,410	7,120	8,850	4,780	2,100	1,900	1,880
11	2,630	2,390	2,110	2,380	3,000	2,550	5,940	7,180	4,580	2,600	1,940	1,820
12	2,600	2,330	2,340	2,280	2,760	2,480	5,600	5,890	4,410	2,030	1,810	1,700
13	2,490	2,470	2,230	2,260	2,290	2,260	5,660	5,020	3,820	2,070	2,150	1,760
14	2,480	2,430	2,240	2,310	2,220	2,220	5,060	5,450	3,120	2,180	2,040	1,780
15	2,030	2,400	2,250	2,570	2,170	2,170	4,300	4,320	2,860	1,840	1,980	1,710
16	2,360	2,460	2,370	2,440	2,150	2,060	4,730	4,730	2,890	2,430	1,890	1,400
17	2,480	2,430	2,960	2,210	2,340	2,140	4,120	5,010	2,210	2,140	1,840	2,050
18	2,300	2,280	2,630	2,400	2,370	1,880	3,890	4,420	2,810	1,980	1,780	1,660
19	2,230	2,280	2,290	2,750	1,840	2,110	3,930	4,360	2,470	2,060	1,610	1,750
20	2,270	2,610	2,230	2,660	2,580	2,060	5,210	4,500	2,520	2,030	1,890	1,740
21	2,260	2,500	2,400	1,930	2,340	1,880	11,500	5,480	2,360	2,120	1,880	1,890
22	2,070	2,450	2,500	2,530	2,460	1,840	18,500	7,280	2,460	2,030	1,890	2,010
23	2,490	2,420	2,170	2,490	2,150	1,820	18,500	7,150	2,420	2,010	1,910	1,670
24	3,190	2,410	2,640	2,540	2,620	2,370	11,800	6,060	1,590	1,980	1,860	1,930
25	3,020	2,260	2,380	2,650	2,540	2,540	9,260	4,430	2,400	1,980	1,870	1,800
26	2,790	1,740	2,940	2,460	2,460	2,740	7,490	3,280	2,430	1,880	1,640	1,670
27	2,600	1,930	2,530	2,430	2,300	2,370	7,740	3,030	2,360	1,930	2,030	1,540
28	2,680	2,370	2,480	2,620	2,310	2,290	9,470	3,620	2,240	1,820	1,960	1,640
29	2,390	2,560	2,200	2,750	-------	2,200	26,900	2,980	2,430	1,800	2,010	1,760
30	2,430	2,240	2,090	2,630	-------	2,010	33,800	2,900	2,390	2,190	2,030	1,510
31	2,380	-------	2,630	2,210	-------	2,000	-------	3,070	-------	2,190	1,790	-------

Monthly discharge of Androscoggin River at Rumford, Maine, for the year ending Sept. 30, 1923

[Drainage area, 2,090 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	3,190	2,030	2,420	1.16	1.34
November	2,960	1,740	2,380	1.14	1.27
December	2,960	1,590	2,340	1.12	1.29
January	3,940	1,930	2,640	1.26	1.45
February	3,000	1,840	2,400	1.15	1.20
March	2,740	1,820	2,220	1.06	1.22
April	33,800	1,830	8,410	4.02	4.48
May	23,000	2,900	7,270	3.48	4.01
June	5,270	1,590	2,970	1.42	1.58
July	2,430	1,660	2,060	.986	1.14
August	2,210	1,190	1,880	.900	1.04
September	2,050	1,400	1,730	.828	.92
The year	33,800	1,190	3,220	1.54	20.94

NOTE.—The monthly discharge in second-feet per square mile and the run-off in inches do not represent the natural flow from the basin because of artificial storage. (See "Regulation.") The indicated minimum discharge usually occurs on Sunday, when water is held back by dams.

MAGALLOWAY RIVER AT AZISCOHOS DAM, MAINE

LOCATION.—At Aziscohos dam, Oxford County, 15 miles above mouth.

DRAINAGE AREA.—233 square miles (revised from map compiled by Maine Water Power Commission).

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1923.

GAGE.—Vertical staff in two sections, the lower attached to one of the concrete buttresses of the dam and the upper to the concrete gate tower.

DETERMINATION OF DISCHARGE.—Discharge determined from readings of gate openings. Gates have been rated by current-meter measurements at a station about 1 mile below dam.

REGULATION.—The storage of about 9,593 million cubic feet is completely regulated, and the discharge corresponds to requirements of water users below. The operation of the gates is planned to maintain as nearly as possible a constant flow at Berlin, N. H. Results not corrected for storage.

COOPERATION.—Discharge computed and furnished for publication by Walter H. Sawyer, agent Union Water Power Co., Lewiston, Maine.

Monthly discharge of Magalloway River at Aziscohos dam, Maine, for the year ending Sept. 30, 1923

[Drainage area, 233 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,060	101	559	2.40	2.77
November	1,520	155	661	2.84	3.17
December	1,960	156	1,210	5.19	5.98
January	2,030	68	1,150	4.94	5.70
February	598	68	178	.764	.80
March	914	579	772	3.31	3.82
April	887	57	240	1.03	1.15
May	976	81	425	1.82	2.10
June	161	155	159	.682	.76
July	902	161	611	2.62	3.02
August	718	153	512	2.20	2.54
September	1,300	152	459	1.97	2.20
The year	2,030	57	584	2.51	34.01

LITTLE ANDROSCOGGIN RIVER NEAR SOUTH PARIS, MAINE

LOCATION.—At left end of an old dam at Bisco Falls, 200 feet below highway bridge and 5½ miles above South Paris, Oxford County.

DRAINAGE AREA.—75 square miles.

RECORDS AVAILABLE.—September 14, 1913, to September 30, 1923.

GAGE.—Chain on left bank; read by G. A. Jackson.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—At low and medium stages water flows through opening at left of old stone dam; opening was enlarged by high water of April 9, 1914, and again by high water of March, 1921; water flows over dam at gage height 5.30 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year; 9.0 feet at 1 p. m. April 29 (discharge, by extension of rating curve, 2,900 second-feet); minimum stage recorded during year, 0.80 foot at 7 p. m. July 21 (discharge, 2 second-feet).

1914–1923: Maximum stage recorded, 9.87 feet April 14, 1920 (discharge by extension of rating curve, 3,540 second-feet); minimum stage recorded 0.7 foot at 6 p. m. August 16, 1914 (discharge, 1 second-foot).

ICE.—Control remains open throughout winter; stage-discharge relation seldom affected by ice.

REGULATION.—Storage at Snow Falls, 1½ miles above station, and at West Paris, 4 miles above, has some effect on regimen of stream.

ACCURACY.—Stage-discharge relation subject to change at infrequent intervals. Rating curve used during year defined below 1,400 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying rating table to daily gage heights. Records good except for days when the number of gage readings was insufficient to determine accurately the mean for the day.

Discharge measurements of Little Androscoggin River near South Paris, Maine, during the year ending Sept. 30, 1923

[Made by M. R. Stackpole]

Date	Gage height	Discharge
	Feet	*Sec.-ft.*
Oct. 31	1.43	17.8
May 8	3.82	200

Daily discharge, in second-feet, of Little Androscoggin River near South Paris, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	16	24	19	219	32	19	124	1,030	68	4.0	34	6.0
2	14	24	16	189	29	18	149	558	68	6.0	19	4.4
3	12	24	15	124	32	20	189	356	61	6.0	16	6.0
4	9	22	14	116	24	18	219	340	64	4.0	29	4.0
5	10	22	9.6	108	29	19	340	229	61	12	19	4.8
6	7.5	24	10	104	26	20	532	239	76	15	16	4.4
7	9	26	11	61	29	18	650	219	100	16	16	4.4
8	7.5	29	9.6	61	26	18	616	199	108	12	17	4.8
9	34	26	10	54	29	18	532	219	100	9.6	12	3.0
10	44	26	8.4	47	26	18	690	404	112	6.0	11	4.0
11	47	24	9.0	61	24	20	650	404	108	10	9.0	4.4
12	47	22	9.6	76	24	24	532	312	100	9.0	4.0	3.8
13	37	24	9.0	47	22	24	482	249	76	3.2	6.0	3.8
14	34	24	8.4	40	22	24	422	219	72	3.0	6.0	4.0
15	24	22	10	47	22	24	404	199	72	3.0	4.0	4.4
16	16	20	9.6	34	20	24	404	179	54	3.8	3.0	2.8
17	12	20	8.4	34	20	24	388	179	47	4.0	4.0	3.0
18	16	19	8.4	34	19	47	404	179	50	4.4	6.0	3.8
19	14	9.6	9.6	34	20	61	404	159	47	3.0	4.0	2.6
20	9	34	10	34	20	54	482	140	19	3.2	3.0	2.6
21	12	34	9.0	34	18	61	1,200	149	18	2.0	3.2	4.0
22	7.5	34	8.4	37	19	68	1,110	199	18	3.0	3.0	4.4
23	9	24	9.0	34	19	76	650	189	18	9.6	2.8	4.4
24	47	24	7.8	37	18	76	616	179	4.2	11	3.0	4.0
25	44	22	7.2	37	19	80	586	140	10	9.0	2.6	3.8
26	34	18	7.8	34	18	84	482	124	9.0	12	4.0	4.0
27	32	20	8.4	32	18	92	482	100	9.6	11	6.0	4.4
28	29	19	7.2	29	18	104	558	96	12	12	4.0	3.8
29	24	20	7.2	29	-------	76	2,300	92	13	47	6.0	19
30	26	18	7.8	32	-------	76	2,000	68	9.6	40	8.4	16
31	16	-------	6.6	32	-------	47	-------	68	-------	40	6.0	-------

Monthly discharge of Little Androscoggin River near South Paris, Maine, for the year ending Sept. 30, 1923

[Drainage area, 75 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	47	7.5	22.6	0.301	0.35
November	34	9.6	23.3	.311	.35
December	19	6.6	9.71	.129	.15
January	219	29	61.0	.813	.94
February	32	18	22.9	.305	.32
March	104	18	43.6	.581	.67
April	2,300	124	620	8.27	9.23
May	1,030	68	239	3.19	3.68
June	112	4.2	52.8	.704	.79
July	47	2.0	10.8	.144	.17
August	34	2.6	9.26	.123	.14
September	19	2.6	4.96	.066	.07
The year	2,300	2.0	93.0	1.24	16.86

PRESUMPSCOT RIVER BASIN

PRESUMPSCOT RIVER AT OUTLET OF SEBAGO LAKE, MAINE

LOCATION.—At outlet dam at Sebago Lake and hydroelectric plant at Eel Weir Falls, 1 mile below lake outlet.

DRAINAGE AREA.—436 square miles.

RECORDS AVAILABLE.—January 1, 1887, to September 30, 1923.

GAGES.—On bulkhead of gatehouse at outlet dam, and in forebay and tailrace of power plant.

DISCHARGE.—Prior to March, 1904, discharge was determined from records of opening of gates in dam; since March, 1904, flow from lake has been recorded by three Allen meters, one on each of three pairs of 30-inch Hercules, wheels; wheels and recording meters checked by current-meter measurements brake tests of wheels, and electrical readings of the generator output. Water wasted at regulating gates is measured from records of gate openings and coefficients determined from current-meter measurements. Water taken from Sebago Lake for supply of Portland water district and water leaking through reservoir dam, a total of about 18 second-feet, not included in tables of discharge.

REGULATION.—Sebago Lake (area, 46 square miles) is under complete regulation. Results not corrected for storage.

COOPERATION.—Record in cubic feet per minute furnished by S. D. Warren Co.; computations on basis of cubic feet per second made by engineers of the Geological Survey.

Daily discharge, in second-feet, of Presumpscot River at outlet of Sebago Lake, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	306	794	738	738	672	752	158	527	576	313	595	419
2	803	794	732	734	673	755	664	539	571	542	578	190
3	804	773	357	740	733	749	647	543	140	641	599	174
4	801	799	738	736	263	276	604	531	612	304	465	536
5	805	382	735	744	670	752	548	523	496	551	187	593
6	803	742	740	731	670	752	577	140	558	576	656	614
7	805	776	735	285	666	751	485	487	560	579	618	640
8	400	814	744	716	679	752	101	548	571	360	600	554
9	843	798	740	705	694	756	598	559	602	604	672	362
10	885	812	370	676	726	744	667	529	37	596	203	617
11	866	753	732	676	227	242	656	530	622	594	344	579
12	859	380	730	728	752	768	650	579	575	632	102	575
13	831	795	742	721	753	756	616	212	587	590	664	592
14	823	805	733	187	761	764	607	606	567	590	610	596
15	393	806	734	676	764	772	114	552	584	228	610	484
16	803	788	744	674	749	914	634	547	596	590	574	282
17	802	767	335	676	742	748	563	570	179	602	555	640
18	801	731	731	686	290	217	547	559	589	645	408	569
19	839	440	738	673	762	706	574	502	558	726	218	593
20	967	734	736	664	761	717	542	127	618	690	601	592
21	866	736	737	245	757	675	427	578	583	503	587	594
22	207	737	742	674	757	676	166	513	587	286	592	588
23	991	743	735	673	760	644	598	548	597	676	594	247
24	855	728	9	675	752	520	530	554	179	617	576	610
25	845	728	14	674	271	160	521	630	600	542	486	590
26	833	492	761	668	752	621	527	553	578	596	74	590
27	802	736	731	665	752	620	544	177	577	593	676	592
28	795	728	734	268	753	668	508	621	583	544	652	589
29	355	736	734	671	-------	668	127	590	568	218	595	602
30	799	703	728	683	-------	632	500	348	562	620	611	232
31	803	-------	188	672	-------	728	-------	565	-------	594	550	-------

Monthly discharge of Presumpscot River at outlet of Sebago Lake, Maine, for the year ending Sept. 30, 1923

[Drainage area, 436 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	991	207	755	1.73	1.99
November	814	380	718	1.65	1.84
December	761	9	635	1.46	1.68
January	744	187	637	1.46	1.68
February	764	227	663	1.52	1.58
March	914	160	653	1.50	1.73
April	667	101	500	1.15	1.28
May	630	127	496	1.14	1.31
June	622	37	520	1.19	1.33
July	690	218	540	1.24	1.43
August	676	74	511	1.17	1.35
September	640	174	514	1.18	1.32
The year	991	9	595	1.36	18.52

NOTE.—The monthly discharge in second-feet per square mile and the run-off in inches do not represent the natural flow from the basin because of artificial storage. The yearly discharge and run-off doubtless represent more nearly the natural flow, for comparatively little stored water is held over from year to year.

SACO RIVER BASIN

SACO RIVER AT CORNISH, MAINE

LOCATION.—At highway bridge at Cornish, York County, half a mile below mouth of Ossipee River.

DRAINAGE AREA.—1,300 square miles.

RECORDS AVAILABLE.—June 4, 1916, to September 30, 1923.

GAGES.—Friez water-stage recorder on left bank about 300 feet above highway bridge, installed October 30, 1919; recorder referenced to gage datum by hook gage inside of well; chain on highway bridge used from June 4, 1916, to October 29, 1919. Datum of well gage is at a different elevation than that of chain gage, so that at low water the well gage reads 1.17 feet higher than chain gage. Recorder inspected by A. H. Guimont.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Channel covered with sand and boulders; broken by one pier at bridge.

EXTREMES OF DISCHARGE.—Maximum stage during year from levels to flood marks in gage house, 14.72 feet at about 6 a. m. May 2 (discharge, by extension of rating curve, 23,000 second-feet); minimum stage during year from water-stage recorder 1.10 feet at 6.30 a. m. September 15 (approximate discharge, by extension of rating curve, 125 second-feet; water held back by dams).

1916–1923: Maximum stage recorded that of May 2, 1923; minimum open-water stage recorded, 0.03 foot by chain gage October 1, 1921 (discharge, by extension of rating curve, 90 second-feet; water held back by dams).

ICE.—Ice forms to a considerable thickness; stage-discharge relation seriously affected during most winters.

REGULATION.—Distribution of flow somewhat affected by power development at Great Falls, 3½ miles above gage.

ACCURACY.—Stage-discharge relation shifts slightly at infrequent intervals; present rating curve well defined between 450 and 13,000 second-feet. Operation of water-stage recorder satisfactory, except for short periods as indicated in footnote to daily discharge table. Daily-discharge October 1 to June 30 ascertained by applying rating table to mean daily gage heights, as determined by inspection of recorder sheets, with corrections for effect of ice during winter. Daily discharge July 1 to September 30 ascertained by use of discharge integrator. Records good.

Discharge measurements of Saco River at Cornish, Maine, during the year ending Sept. 30, 1923

[Made by M. R. Stackpole]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 30	2.61	1,060	May 7	8.62	11,100
Jan. 8	a3.62	1,120	July 19	2.07	605
Feb. 12	a3.67	838	Sept. 9	1.92	498
Mar. 10	a3.77	771			

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Saco River at Cornish, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	815	860	722	560	760	700	1,550	21,600	2,410	1,110	790	565
2	878	860	603	640	760	800	1,550	22,800	2,410	1,300	710	455
3	851	860	589	740	660	640	1,500	20,200	2,530	1,250	720	500
4	824	860	560	940	680	620	1,800	16,800	2,590	1,440	660	655
5	869	840	600	1,050	780	700	2,700	14,200	2,590	1,450	715	570
6	896	840	660	1,050	800	660	4,000	12,200	2,590	1,290	730	635
7	878	840	600	1,050	780	680	5,400	10,800	2,590	1,350	715	565
8	896	923	500	1,050	780	700	6,800	9,600	2,710	1,200	680	490
9	923	754	440	1,150	760	680	8,000	8,800	2,970	1,400	750	425
10	914	754	330	1,150	660	640	8,400	8,000	3,040	1,300	680	580
11	968	650	470	1,150	600	560	9,600	7,400	3,040	1,010	635	525
12	977	674	540	1,100	760	800	10,800	7,020	2,970	925	710	520
13	986	738	600	1,100	760	860	10,200	6,830	2,840	985	840	505
14	941	746	600	980	700	960	9,600	6,450	2,650	740	790	500
15	887	722	600	1,100	840	940	8,800	5,890	2,470	640	665	420
16	968	754	600	1,050	700	980	8,200	5,710	2,350	670	650	250
17	905	738	600	1,050	580	920	7,600	5,530	2,170	680	600	410
18	905	650	600	1,000	460	820	7,210	5,180	1,990	680	625	425
19	880	706	580	1,000	600	1,050	6,830	5,010	1,820	690	410	410
20	860	770	580	980	700	980	6,450	4,840	1,770	770	595	410
21	820	815	580	900	700	980	6,640	4,840	1,440	740	585	450
22	840	806	580	1,050	800	1,000	7,400	4,840	1,300	730	585	465
23	797	788	560	1,050	820	1,000	9,600	4,500	1,400	820	570	475
24	762	800	560	960	540	1,250	11,800	4,240	1,500	745	535	670
25	824	690	560	1,050	760	1,350	13,200	4,080	1,600	905	530	600
26	923	666	560	1,000	860	1,450	12,600	3,830	1,210	870	405	615
27	980	770	540	900	860	1,600	11,600	3,530	1,220	785	470	605
28	980	674	540	740	880	1,650	10,600	3,310	1,270	830	505	600
29	880	674	540	940	-------	1,700	13,000	3,170	1,230	820	505	530
30	950	582	540	840	-------	1,650	16,600	2,900	1,340	850	525	585
31	959	-------	540	760	-------	1,600	---------	2,710	-------	850	560	-------

NOTE.—Stage-discharge relation affected by ice Dec. 4 to Apr. 8; discharge for this period computed from gage heights corrected for effect of ice by means of three discharge measurements, observer's notes, weather records, and records from West Buxton. Discharge estimated Oct. 19–22, 27–29, Nov. 4–7, 24, by comparison with records of discharge of Saco River at Hiram and Ossipee River at Cornish.

Monthly discharge of Saco River at Cornish, Maine, for the year ending Sept. 30, 1923

[Drainage area, 1,300 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	986	762	895	0.688	0.79
November	923	582	760	.585	.65
December	722	330	564	.434	.50
January	1,150	560	970	.746	.86
February	880	460	726	.558	.58
March	1,700	560	997	.767	.88
April	16,600	1,500	8,000	6.15	6.86
May	22,800	2,710	7,960	6.12	7.06
June	3,040	1,210	2,130	1.64	1.83
July	1,450	640	962	.740	.85
August	840	405	627	.482	.56
September	670	250	514	.395	.44
The year	22,800	250	2,100	1.62	21.86

SACO RIVER AT WEST BUXTON, MAINE

LOCATION.—At hydroelectric plant of Cumberland County Power & Light Co. at West Buxton, York County.

DRAINAGE AREA.—1,500 square miles.

RECORDS AVAILABLE.—October 19, 1907, to September 30, 1916, and January 1, 1919, to September 30, 1923.

GAGES.—One in pond above dam; another in tailrace of power house.

CHANNEL AND CONTROL.—Crest of concrete dam about 300 feet long.

DISCHARGE.—Flow over dam and through wheels of power plant determined by means of hourly gage readings.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Distribution of flow somewhat affected by power developments above gage.

COOPERATION.—Records furnished by Cumberland County Power & Light Co., Portland, Maine.

Daily discharge, in second-feet, of Saco River at West Buxton, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	715	1,810	899	802	900	842	2,390	25,600	3,460	283	1,170	585
2	1,190	1,270	688	1,570	1,120	907	3,340	27,800	2,950	896	960	376
3	1,160	1,210	385	1,230	996	752	2,520	25,600	2,150	1,200	962	471
4	1,180	1,280	1,040	1,020	923	358	2,240	21,500	3,280	1,020	710	641
5	1,330	690	1,110	1,220	1,300	966	4,590	18,100	2,500	948	808	930
6	1,410	1,180	834	1,630	1,170	1,020	7,370	14,600	2,300	1,150	994	724
7	896	1,010	926	984	1,190	1,240	9,850	13,700	2,460	1,060	912	727
8	563	1,030	449	1,340	1,170	1,230	10,400	12,300	2,790	946	1,000	754
9	1,330	945	138	1,550	1,100	1,100	12,100	10,900	2,640	872	722	373
10	1,420	858	131	1,500	844	875	11,900	10,100	2,450	991	585	740
11	1,310	465	273	1,470	671	922	11,400	9,420	3,240	962	884	697
12	1,250	459	308	1,350	1,040	950	12,800	8,530	3,060	891	982	711
13	1,380	802	460	1,110	1,250	1,130	12,900	7,970	3,080	899	974	607
14	1,070	1,070	644	1,110	1,050	1,130	11,800	8,190	2,520	765	1,070	660
15	673	1,130	960	1,560	856	940	10,600	7,400	2,960	917	923	459
16	1,540	878	766	1,440	842	1,140	10,200	7,080	2,480	825	886	288
17	1,240	909	706	1,600	741	676	9,530	6,900	1,500	868	810	674
18	1,260	905	912	1,620	447	610	8,870	6,650	2,550	1,020	848	501
19	1,350	285	982	1,210	1,030	1,340	8,180	6,180	2,150	1,060	270	524
20	1,230	1,190	672	1,190	1,040	1,330	8,090	5,610	1,510	928	555	490
21	710	995	647	549	770	1,250	8,070	5,890	1,360	666	665	398
22	703	1,180	758	1,420	789	1,320	8,680	5,970	1,540	971	713	499
23	1,140	818	771	1,170	1,040	1,860	11,500	6,030	1,590	815	693	379
24	1,140	810	435	1,320	472	1,550	13,300	5,670	1,100	1,000	662	637
25	987	854	1,040	1,240	402	1,260	15,300	5,290	1,340	1,130	617	973
26	947	526	993	1,300	960	3,760	15,100	4,970	1,280	1,110	321	799
27	1,020	991	903	926	1,030	3,060	13,800	4,460	1,290	967	526	810
28	960	1,170	789	931	884	2,920	12,500	4,490	1,400	1,140	569	688
29	814	1,270	621	1,140	-------	2,720	15,900	3,980	1,300	822	499	721
30	1,330	464	665	1,210	-------	2,460	19,800	3,270	6,490	1,550	812	598
31	1,170	-------	348	1,220	-------	1,880	-------	3,460	-------	1,200	525	-------

Monthly discharge of Saco River at West Buxton, Maine, for the year ending Sept. 30, 1923

[Drainage area, 1,550 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,540	563	1,110	0.716	0.83
November	1,810	285	948	.612	.68
December	1,110	131	686	.443	.51
January	1,630	549	1,260	.813	.94
February	1,300	402	930	.600	.62
March	3,760	358	1,400	.903	1.04
April	19,800	2,240	10,200	6.58	7.34
May	27,800	3,270	9,920	6.40	7.38
June	6,490	1,100	2,360	1.52	1.70
July	1,550	283	964	.622	.72
August	1,170	270	762	.492	.57
September	973	288	614	.396	.44
The year	27,800	131	2,600	1.68	22.77

OSSIPEE RIVER AT CORNISH, MAINE

LOCATION.—At highway bridge in Cornish, York County, 1¼ miles above confluence with Saco River.

DRAINAGE AREA.—455 square miles (measured on map compiled by Maine Water Power Commission).

RECORDS AVAILABLE.—July 5, 1916, to September 30, 1923.

GAGE.—Chain attached to bridge; read by O. W. Adams.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel covered with sand and gravel; possibly somewhat shifting; broken by one pier at bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.76 feet at 5 p. m. April 30 (discharge, 6,740 second-feet); minimum stage recorded, 0.22 foot at 9 a. m. August 26 (discharge, by extension of rating curve, 80 second-feet).

1916–1923: Maximum stage recorded, that of April 30, 1923; minimum open-water stage, 0.20 foot on July 3, 1921 (discharge, by extension of rating curve, 76 second-feet).

ICE.—Ice forms to considerable thickness and stage-discharge relation is seriously affected during most winters.

REGULATION.—Flow regulated by dam at outlet of Great Ossipee Lake. Power developments at Kezar Falls, 5 miles above gage, may have some effect on distribution of flow.

ACCURACY.—Stage-discharge relation apparently did not shift during year. Rating curve well defined between 200 and 6,000 second-feet; gage read to hundredths twice a day. Daily discharge ascertained by applying rating table to mean daily gage heights, with corrections for effect of ice. Records good.

Discharge measurements of Ossipee River at Cornish, Maine, during the year ending Sept. 30, 1923

[Made by M. R. Stackpole]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 30	[a] 0.83	236	Mar. 10	2.44	216
Jan. 8	[a] 1.68	246	May 7	4.67	2,860
Feb. 12	[a] 2.23	238	July 19	1.25	401

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Ossipee River at Cornish, Maine, for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	300	255	236	200	280	230	350	6,400	770	340	279	211
2	296	246	230	280	260	220	370	5,740	710	340	230	127
3	320	233	233	260	260	230	400	5,070	650	300	199	120
4	290	236	220	260	260	210	450	4,220	620	272	214	196
5	470	221	220	260	250	210	660	3,670	595	252	205	230
6	448	208	210	260	250	210	2,100	3,130	620	268	208	252
7	425	199	210	250	250	195	3,600	2,950	800	340	300	199
8	402	279	210	246	250	200	3,490	2,680	860	300	320	157
9	402	239	200	260	240	220	3,760	2,770	860	279	360	132
10	380	193	200	280	220	230	3,850	2,770	800	272	340	168
11	402	173	195	340	230	210	3,760	2,770	740	265	320	221
12	425	152	240	340	238	210	3,670	1,980	710	300	320	163
13	380	150	200	340	240	270	3,670	1,900	650	300	320	160
14	360	163	200	320	240	230	3,490	1,820	620	320	320	152
15	340	176	195	310	240	260	3,130	1,660	595	224	243	150
16	360	214	195	300	230	300	2,770	1,660	545	227	221	132
17	360	249	195	300	230	400	2,590	1,580	545	402	221	127
18	340	255	180	300	230	360	2,500	1,500	520	402	211	89
19	340	243	175	300	230	340	2,230	1,420	470	402	185	108
20	320	246	175	290	230	330	2,320	1,340	425	402	185	110
21	286	246	175	280	220	330	2,680	1,340	402	402	152	134
22	272	249	170	380	230	320	2,950	1,420	380	402	157	214
23	265	246	170	380	230	340	4,310	1,340	340	425	173	173
24	255	249	170	360	230	360	4,120	1,340	320	402	214	268
25	259	227	170	350	230	390	3,760	1,190	300	402	182	279
26	252	190	170	330	230	450	3,580	1,050	286	402	80	227
27	262	170	165	320	230	480	3,490	1,050	300	425	122	214
28	279	196	165	300	230	490	3,580	980	320	425	168	218
29	279	230	165	290	------	490	4,980	980	320	425	208	221
30	268	236	165	280	------	500	6,400	860	360	425	214	211
31	262	------	155	280	------	490	------	800	------	380	190	------

NOTE.—Stage-discharge relation affected by ice Dec. 4 to Apr. 7; discharge for this period computed from gage heights corrected for effect of ice by means of three discharge measurements, observer's notes, and weather records.

Monthly discharge of Ossipee River at Cornish, Maine, for the year ending Sept. 30, 1923

[Drainage area, 455 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	470	252	332	0.730	0.84
November	279	150	219	.481	.54
December	240	155	192	.422	.49
January	380	200	298	.655	.76
February	280	220	239	.525	.55
March	500	195	313	.688	.79
April	6,400	350	2,970	6.53	7.29
May	6,400	800	2,240	4.92	5.67
June	860	286	548	1.20	1.34
July	425	224	346	.760	.88
August	360	80	228	.501	.58
September	279	89	179	.393	.44
The year	6,400	80	675	1.48	20.17

MERRIMACK RIVER BASIN

PEMIGEWASSET RIVER AT PLYMOUTH, N. H.

LOCATION.—At two-span highway bridge in Plymouth, Grafton County, three-fourths mile below mouth of Bakers River.

DRAINAGE AREA.—615 square miles.

RECORDS AVAILABLE.—January 1, 1886, to September 30, 1923.

GAGES.—Vertical staff gage in three sections; two lower sections 40 feet above bridge; upper section on bridge abutment; read by A. F. Morse.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge at ordinary and high stages. At extremely low stages measurements made by wading.

CHANNEL AND CONTROL.—Right channel is rocky and practically permanent; left channel covered with fine gravel, which shifts occasionally. Control section for low stages is gravel bed of river and has changed somewhat at various times. At high stages the banks are overflowed below the bridge and the control is somewhat indefinite.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.17 feet at 2 p. m. April 29 (discharge, from extension of rating curve, 22,400 second-feet); minimum discharge during year, 45 second-feet at 7 a. m. August 11 and several times during September.

1903–1923: Maximum open-water stage recorded that of April 29, 1923; minimum discharge that of August 11, 1923, and several times during September, 1923.

ICE.—River freezes over, and stage-discharge relation is affected by ice usually from December to March.

REGULATION.—Several small ponds on Bakers River and other tributaries, but practically no storage regulation. At very low stages the paper mill at Livermore Falls is obliged to shut down several times daily and at these times the ponding of water affects the distribution of flow at Plymouth.

ACCURACY.—Stage-discharge relation changed at time ice went out. Rating curves well defined between 70 and 15,000 second-feet. Gage read twice daily to half inches. Daily discharge ascertained by applying rating table to mean daily gage heights, with corrections for effect of ice during winter. Records good.

Discharge measurements of Pemigewasset River at Plymouth, N. H., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 28	W. E. Armstrong	[a] 1.26	296	Apr. 17	H. F. Hill, jr	2.69	1,920
Jan. 27	H. F. Hill, jr	[a] 2.67	450	17	do	2.68	1,930
Feb. 10	W. E. Armstrong	[a] 2.24	318	June 26	do	1.17	278
Mar. 14	H. F. Hill, jr	[a] 2.19	316	26	do	1.17	278
14	do	[a] 1.83	248	July 19	C. H. Pierce	1.02	173

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Pemigewasset River at Plymouth, N. H., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	207	311	288	200	390	250	770	11,000	960	186	102	82
2	194	311	311	3,500	380	220	700	6,160	820	160	98	98
3	194	302	340	2,200	370	270	660	4,660	740	137	82	106
4	255	288	320	1,950	370	280	860	4,080	650	186	144	78
5	224	271	467	1,250	360	360	4,700	3,940	820	152	98	98
6	182	271	392	900	310	400	8,000	3,760	1,090	152	144	74
7	176	263	311	770	370	340	10,000	3,130	1,370	131	90	82
8	170	288	271	700	340	310	11,600	2,970	1,180	106	64	78
9	340	330	414	640	300	300	13,400	2,970	1,910	119	82	82
10	414	392	207	800	300	290	5,260	3,920	1,620	119	131	110
11	650	381	414	800	310	270	3,650	2,710	1,220	240	57	60
12	710	350	263	760	300	250	4,210	2,300	1,000	94	74	102
13	606	271	255	580	300	270	3,700	2,400	820	131	119	90
14	437	288	217	580	280	290	3,020	2,300	710	119	102	74
15	360	302	224	580	270	300	2,660	2,080	530	119	186	60
16	350	330	210	600	250	320	2,350	2,610	570	160	98	82
17	350	350	220	600	270	350	2,030	2,820	590	173	74	82
18	403	381	240	540	330	500	1,820	2,820	434	186	106	98
19	370	350	270	440	310	780	1,820	2,140	490	186	106	51
20	330	340	260	460	300	740	2,140	1,980	452	160	64	45
21	340	517	220	500	300	520	7,330	1,880	372	152	82	106
22	330	425	230	500	330	480	12,200	3,760	340	119	82	470
23	239	370	220	640	300	550	13,500	2,710	308	144	74	144
24	455	330	240	560	280	940	7,160	2,080	255	90	90	131
25	740	360	210	520	310	2,950	5,130	1,790	173	119	78	86
26	571	330	185	500	280	2,300	3,650	1,670	277	113	82	125
27	491	392	200	480	260	1,550	3,840	1,620	292	98	60	90
28	425	311	210	450	260	1,350	4,280	1,370	186	102	60	125
29	350	370	210	390	-------	850	19,600	1,220	186	277	131	144
30	311	288	200	380	-------	890	19,500	1,090	240	452	434	160
31	350	-------	200	340	-------	790	--------	1,090	-------	292	255	-------

NOTE.—Stage-discharge relation affected by ice Dec. 16 to Apr. 7; daily discharge for this period based on gage heights corrected for effect of ice.

Monthly discharge of Pemigewasset River at Plymouth, N. H., for the year ending Sept. 30, 1923

[Drainage area, 615 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	740	170	372	0.605	0.70
November	517	263	335	.545	.61
December	467	185	265	.431	.50
January	3,500	200	778	1.27	1.46
February	390	250	312	.507	.53
March	2,950	220	654	1.06	1.22
April	19,600	660	5,980	9.72	10.84
May	11,000	1,090	2,940	4.78	5.51
June	1,910	173	687	1.12	1.25
July	452	90	160	.260	.30
August	434	57	111	.180	.21
September	470	45	107	.174	.19
The year	19,600	45	1,060	1.72	23.32

MERRIMACK RIVER AT FRANKLIN JUNCTION, N. H.

LOCATION.—At covered wooden bridge of Boston & Maine Railroad 1 mile below confluence of Pemigewasset and Winnepesaukee rivers, at Franklin Junction, Merrimack County.

DRAINAGE AREA.—1,460 square miles.

RECORDS AVAILABLE.—July 8, 1903, to September 30, 1923.

GAGE.—Standard chain gage fastened to floor of bridge on upstream side over west channel; read by F. R. Roers. Water-stage recorder on right bank 350 feet above railroad bridge installed September 12, 1923; recorder inspected by M. E. Merrill.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Composed of coarse gravel and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 23.5 feet at 6 a. m. April 30 (discharge, by extension of rating curve, 41,000 second-feet); minimum stage recorded, 3.36 feet at 5 a. m. September 17 (discharge, 564 second-feet).

1903–1923: Maximum stage recorded, that of April 30, 1923; minimum discharge, by extension of rating curve, 250 second-feet on October 4, 1903.

ICE.—Stage-discharge relation affected by ice for short periods during severe winters.

REGULATION.—Flow affected by storage in Winnepesaukee, Squam, and New Found lakes and by operation of mills above station.

ACCURACY.—Stage-discharge relation for low stages subject to slight shifts. Rating curve well defined below 10,000 second-feet and fairly well defined below 25,000 second-feet. Gage read to half-tenths twice daily, except Sundays; two readings a day obtained prior to installation of water-stage recorder were probably insufficient to determine accurately the mean stage for the day. Daily discharge ascertained by applying rating table to gage heights. Records fair.

Discharge measurements of Merrimack River at Franklin Junction, N. H., during the year ending Sept. 30, 1923

[Made by H. F. Hill, jr.]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Jan. 26	[a]5.37	1,380	Sept. 9	3.69	738
Mar. 19	4.90	1,810	14	4.26	1,170
Sept. 2	3.74	754			

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Merrimack River at Franklin Junction, N. H., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,060	1,380	1,300	-------	1,900	24,500	1,830	1,120	1,210	950
2	1,380	1,380	1,140	-------	1,830	15,000	1,400	1,120	1,120	800
3	1,300	1,470	1,060	-------	1,950	9,770	1,300	1,120	950	740
4	1,220	1,380	1,380	-------	2,210	9,560	1,400	1,030	1,030	950
5	1,470	1,220	1,300	-------	5,600	8,100	1,610	1,030	1,030	950
6	1,380	1,300	1,380	-------	10,200	6,500	1,500	950	1,120	950
7	1,300	1,380	1,220	-------	14,200	4,840	1,500	1,030	1,120	950
8	1,220	1,470	1,380	-------	14,200	4,660	1,610	870	950	870
9	1,470	1,300	1,220	-------	14,400	4,520	2,210	740	1,120	680
10	1,770	1,380	1,060	-------	11,500	4,340	2,350	800	835	950
11	1,770	1,470	1,380	-------	8,930	4,130	2,490	800	870	950
12	2,000	1,060	1,470	-------	8,090	4,130	1,830	800	950	950
13	1,770	1,220	1,380	-------	8,090	3,450	1,610	740	1,030	1,030
14	1,660	1,300	1,300	-------	6,200	3,280	1,610	770	1,030	910
15	1,470	1,470	1,300	-------	6,000	3,110	1,400	950	950	835
16	1,380	1,560	1,220	-------	5,800	3,450	1,400	1,120	950	680
17	1,470	1,470	1,220	-------	4,840	4,130	1,300	1,300	950	870
18	1,470	1,300	1,380	-------	4,300	3,620	1,300	1,210	950	910
19	1,380	1,220	1,470	-------	4,300	3,280	1,300	1,120	1,030	910
20	1,470	1,560	1,380	-------	4,480	3,180	1,300	1,030	1,120	630
21	1,380	1,660	1,380	-------	8,090	3,110	1,300	1,120	1,120	950
22	1,220	1,560	1,380	-------	13,000	5,200	1,300	950	1,030	870
23	1,470	1,470	1,380	-------	19,200	3,450	1,300	910	950	870
24	1,470	1,470	940	-------	15,300	3,280	1,210	1,120	1,030	1,210
25	1,470	1,140	900	-------	9,560	2,790	1,120	1,210	870	910
26	1,380	1,060	980	-------	7,500	2,490	1,120	1,210	680	950
27	1,560	1,380	1,060	-------	6,000	2,750	1,120	1,210	950	1,300
28	1,560	1,300	1,060	-------	6,200	2,790	1,210	1,210	870	950
29	1,060	1,300	1,060	2,080	30,000	2,640	1,300	910	950	1,030
30	1,300	1,220	900	2,210	38,600	2,460	1,210	1,120	950	870
31	1,380	-------	830	2,080	-------	2,080	-------	1,300	950	-------

NOTE.—Stage-discharge relation affected by ice Dec. 25–31 and during a considerable part of January and February. Daily gage heights not obtained and discharge estimated Jan. 6–28; Feb. 1 to Mar. 28, Apr. 1, 8, 15, 22, 26; May 2, 5, 6, 9, 10, 20, 27, 30; June 10, 17, 24; July 1, 4, 8, 15, 22; and Aug. 4, 5, 11, 12, 14–16, 19, and 26.

Monthly discharge of Merrimack River at Franklin Junction, N. H., for the year ending Sept. 30, 1923

[Drainage area, 1,460 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	nimum		[Per mile	
October	2,000	1,060	1,440	0.986	1.14
November	1,660	1,060	1,360	.932	1.04
December	1,470	830	1,220	.836	.96
January	----------	---------	1,680	1.15	1.33
February	----------	----------	930	.637	.66
March	----------	----------	1,490	1.02	1.18
April	38,600	1,830	9,750	6.68	7.45
May	24,500	2,080	5,180	3.55	4.09
June	2,490	1,120	1,480	1.01	1.13
July	1,300	740	1,030	.705	.81
August	1,210	680	989	.677	.78
September	1,300	630	912	.625	.70
The year	38,600	630	2,290	1.57	21.27

NOTE.—Mean monthly discharge for January, February, and March estimated on basis of 1.7 times discharge of Pemigewasset River at Plymouth plus discharge from Lake Winnepesaukee at Lakeport. The monthly discharge in second-feet per square mile and the run-off in inches shown by the table do not represent the natural flow from the basin because of artificial storage.

MERRIMACK RIVER AT LAWRENCE, MASS.

LOCATION.—At dam of Essex Co., in Lawrence, Essex County.

DRAINAGE AREA.—Total of Merrimack River basin above Lawrence, 4,663 square miles; net drainage area, exclusive of diverted parts of Nashua and Sudbury River and Lake Cochituate basins, 4,452 square miles.

RECORDS AVAILABLE.—January 1, 1880, to September 30, 1923.

COMPUTATIONS OF DISCHARGE.—Accurate record is kept of the flow over the dam and through the various wheels and gates. This flow includes water wasted into the Merrimack from the Nashua, Sudbury, and Cochituate drainage basins. Estimates of the quantity wasted from these basins is furnished by the Metropolitan Water and Sewerage Board of Boston and subtracted from the quantity measured at Lawrence to obtain the net flow from the net drainage area of 4,452 square miles.

DIVERSIONS.—Practically the entire flow of the South Branch of Nashua River, Sudbury River, and Lake Cochituate is diverted for use by the Metropolitan water district of Boston.

REGULATION.—Flow regulated to some extent by storage in Lake Winnepesaukee and other storage reservoirs. The low-water flow of the stream is affected by operation of various power plants above Lawrence.

STORAGE.—There are several reservoirs in the basins. It is estimated that the water surface is about 3.5 per cent of entire drainage area.

COOPERATION.—The entire record has been furnished by R. A. Hale, chief engineer of the Essex Co.; rearranged in form for climatic year by engineers of the Geological Survey.

Daily discharge, in second-feet, of Merrimack River at Lawrence, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	602	3,350	3,302	1,301	5,013	3,610	11,272	55,107	5,124	697	2,746	1,381
2	2,446	2,729	2,419	4,453	5,060	3,635	10,473	43,673	2,794	2,802	2,878	901
3	2,730	3,184	945	5,787	4,154	2,838	10,532	30,015	2,594	2,724	2,929	489
4	2,752	2,157	3,313	7,876	4,373	3,194	13,115	23,085	4,978	838	1,773	1,464
5	2,759	716	3,053	7,197	5,588	4,792	22,893	18,803	3,955	2,816	683	1,779
6	2,740	3,343	2,784	5,680	4,824	4,623	36,706	16,146	3,866	2,919	2,639	2,038
7	1,809	3,150	2,724	5,173	4,696	5,227	41,766	15,306	3,358	1,872	2,463	1,887
8	380	3,161	2,604	5,459	4,616	4,885	42,440	13,127	3,919	256	2,496	1,068
9	3,744	3,349	1,656	5,074	4,431	5,356	41,916	11,792	3,457	2,350	2,683	63
10	4,359	3,341	552	4,968	3,383	4,088	38,366	10,848	4,444	2,260	757	1,632
11	3,892	2,525	3,097	4,324	3,932	4,076	31,896	11,351	5,637	2,158	634	1,808
12	1,996	1,442	3,065	4,405	5,503	5,256	25,993	10,383	5,228	2,018	312	1,829
13	5,274	3,853	2,882	3,965	4,148	4,751	23,574	9,794	4,317	1,855	2,397	1,784
14	3,289	3,357	2,676	3,951	4,186	4,797	21,088	10,319	3,594	1,137	2,201	1,864
15	3,152	3,469	2,552	5,557	4,314	4,601	18,295	10,155	3,525	59	2,179	911
16	5,052	3,289	1,739	4,444	4,211	4,491	17,852	9,436	2,215	2,004	2,031	151
17	3,736	3,456	494	4,180	3,247	5,234	16,062	9,183	1,340	2,095	2,172	1,652
18	3,466	2,338	2,959	4,149	3,149	6,410	14,989	9,842	3,803	2,349	1,328	1,768
19	3,206	733	2,672	4,054	4,792	8,094	13,694	8,864	3,223	2,430	184	1,562
20	3,170	3,605	2,384	3,226	3,869	8,967	13,257	7,389	2,889	2,731	1,792	1,618
21	2,004	3,366	2,191	3,509	4,064	9,767	12,426	6,838	2,925	1,718	1,900	1,582
22	758	3,988	2,516	5,792	2,094	9,782	16,172	7,562	2,863	219	1,902	827
23	3,363	4,038	2,056	6,376	4,854	10,705	23,948	9,731	1,978	2,250	1,823	115
24	3,378	3,682	1,085	6,462	3,246	21,651	26,203	9,863	1,450	2,096	1,880	1,673
25	3,491	2,608	1,196	6,554	2,240	21,581	22,323	8,644	3,440	2,386	1,074	1,991
26	3,772	1,976	3,148	6,499	4,107	24,343	17,328	6,817	2,623	2,468	256	1,948
27	3,844	3,793	2,774	5,986	3,670	21,814	14,768	5,769	2,257	2,692	1,428	1,918
28	2,441	3,083	2,783	5,365	3,861	19,195	12,704	6,898	2,183	1,939	1,827	1,877
29	1,965	3,147	2,344	6,385	-------	16,857	18,112	5,050	2,646	714	1,860	1,031
30	4,260	1,109	1,841	5,837	-------	13,832	43,631	2,640	2,032	3,099	1,942	254
31	3,460	-------	1,545	5,125	-------	12,633	--------	5,738	-------	2,548	1,881	-------

Weekly discharge, in second-feet, of Merrimack River at Lawrence, Mass., for the year ending Sept. 30, 1923

[Weeks arranged in order of dryness]

Week ending Sunday—	Measured at Lawrence (total drainage area, 4,663 square miles)	Wasting into Merrimack River from diverted drainage basins (211 square miles)	From net drainage area of 4,452 square miles	Per square mile of net drainage area
Sept. 9	1,255	13	1,242	0.279
23	1,303	12	1,291	.290
16	1,426	10	1,416	.318
Aug. 26	1,518	23	1,495	.336
Sept. 30	1,527	12	1,515	.340
2	1,603	27	1,576	.354
July 15	1,691	19	1,672	.376
Aug. 12	1,712	18	1,694	.381
19	1,785	14	1,771	.398
July 22	1,935	14	1,921	.431
8	2,032	21	2,011	.452
29	2,078	19	2,059	.462
Oct. 8	2,231	33	2,198	.494
Dec. 31	2,233	43	2,190	.492
24	2,266	38	2,228	.500
July 1	2,268	6	2,262	.508
Dec. 17	2,358	53	2,305	.518
Aug. 5	2,379	23	2,356	.529
Dec. 10	2,384	162	2,222	.499
3	2,543	182	2,361	.530
June 24	2,733	24	2,709	.608
Oct. 1	2,802	35	2,767	.621
Nov. 5	2,837	193	2,644	.594
12	2,902	164	2,738	.615
19	2,928	184	2,744	.616
Oct. 22	3,056	64	2,992	.672
29	3,179	82	3,097	.696
Nov. 26	3,323	207	3,116	.700
Mar. 4	3,559	119	3,440	.773
Feb. 25	3,594	139	3,455	.776
Oct. 15	3,672	64	3,608	.810
June 17	3,694	73	3,621	.813
10	3,997	24	3,973	.892
Feb. 18	4,108	434	3,674	.825
Jan. 21	4,160	403	3,757	.844
June 3	4,405	48	4,357	.979
Feb. 11	4,496	476	4,020	.903
Jan. 14	4,592	287	4,305	.967
Mar. 11	4,721	215	4,506	1.012
18	5,077	256	4,821	1.082
Feb. 4	5,135	409	4,726	1.062
Jan. 7	5,352	127	5,225	1.174
28	6,148	522	5,626	1.264
May 27	7,889	142	7,747	1.740
20	9,313	166	9,147	2.055
13	11,800	353	11,447	2.571
Mar. 25	12,935	643	12,292	2.761
Apr. 22	14,922	295	14,627	3.285
1	17,135	470	16,665	3.743
29	19,341	280	19,061	4.281
8	25,418	441	24,977	5.610
15	28,733	407	28,326	6.363
May 6	32,923	835	32,088	7.208

Monthly discharge of Merrimack River at Lawrence, Mass., for the year ending Sept. 30, 1923

Month	Mean discharge in second-feet				Run-off		Rainfall in inches
	Measured at Lawrence (total drainage area, 4,663 square miles)	Wasting into Merrimack from diverted drainage basins (211 square miles)	From net drainage area of 4,452 square miles	Per square mile of net drainage area	Inches	Per cent of rainfall	
October	3,009	69	2,940	0.660	0.761	31.4	2.42
November	2,911	186	2,725	.612	.683	49.5	1.38
December	2,302	84	2,218	.498	.574	17.7	3.24
January	5,133	351	4,782	1.074	1.238	19.2	6.44
February	4,129	324	3,805	.855	.890	48.1	1.85
March	9,067	361	8,706	1.956	2.255	80.8	2.79
April	22,460	385	22,075	4.958	5.532	104.0	5.32
May	13,231	303	12,928	2.904	3.348	221.7	1.51
June	3,289	38	3,251	.730	.814	29.5	2.76
July	1,952	18	1,934	.434	.500	16.0	3.13
August	1,776	21	1,755	.394	.454	21.2	2.14
September	1,362	13	1,349	.303	.338	19.3	1.75
The year	5,885	179	5,706	1.282	17.387	50.1	34.73

NOTE.—The monthly discharge in second-feet per square mile and the run-off in inches shown by the table do not represent the natural flow from the basin because of artificial storage.

SMITH RIVER NEAR BRISTOL, N. H.

LOCATION.—At highway bridge in South Alexandria, 3 miles from Bristol, Grafton County.

DRAINAGE AREA.—78.5 square miles (measured on Walker map).

RECORDS AVAILABLE.—May 11, 1918, to September 30, 1923.

GAGE.—Vertical staff attached to downstream side of left abutment of highway bridge; read by Lillian R. Bucklin.

DISCHARGE MEASUREMENTS.—Made from downstream side of highway bridge or by wading.

CHANNEL AND CONTROL.—Channel rough and covered with boulders; control ledge rock and boulders 130 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.55 feet at 7.30 a. m. April 6 (discharge, from extension of rating curve, 1,280 second-feet); minimum discharge during year, 4.9 second-feet on September 20.

1918–1923: Maximum open-water stage recorded, 4.7 feet March 29, 1919 (discharge, by extension of rating curve, 1,510 second-feet); minimum discharge, that of September 20, 1923.

ICE.—Ice forms to a considerable thickness during winter; stage-discharge relation affected.

REGULATION.—A few small mills above gage, but no serious effect from their operation. Several small lakes in the basin have little if any storage regulation.

ACCURACY.—Stage-discharge relation shifts slightly at infrequent intervals. Rating curves used are well defined between 7 and 600 second-feet. Gage read to hundredths twice daily except once a day during winter. Daily discharge ascertained by applying rating table to mean daily gage heights, with corrections for effect of ice during winter. Records goods.

Discharge measurements of Smith River near Bristol, N. H., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 27	W. E. Armstrong	*0.96	19.0	June 25	H. F. Hill, jr.	0.72	20.1
Jan. 25	H. F. Hill, jr.	*2.41	56	Sept. 15	do	.58	6.4
Mar. 12	do	*1.64	42.5	15	do	.58	6.1

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Smith River near Bristol, N. H., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	19	22	24	54	48	32	70	910	61	19	17	10
2	18	22	22	155	44	33	72	637	61	16	16	10
3	20	21	31	300	50	35	62	422	50	19	14	7.5
4	20	22	21	230	44	54	105	312	50	16	12	6.7
5	20	22	20	190	45	50	674	253	48	15	11	6.0
6	18	22	19	155	45	37	1,200	208	48	14	11	6.0
7	18	22	20	135	47	70	1,100	187	51	14	11	5.3
8	22	24	20	125	40	70	1,100	168	87	13	11	6.0
9	24	28	21	135	37	56	1,000	177	114	12	10	6.0
10	41	30	20	135	40	58	750	239	83	11	9.1	6.7
11	51	26	23	115	37	43	637	201	61	11	8.3	7.5
12	51	25	22	105	37	37	600	182	50	11	7.5	6.7
13	33	39	24	100	35	43	564	242	45	12	8.3	6.7
14	28	37	27	94	35	44	457	216	40	12	8.3	6.0
15	24	30	27	86	33	37	390	180	35	11	7.5	6.0
16	24	30	25	76	35	43	312	226	32	18	6.7	6.0
17	24	29	23	76	33	135	284	221	32	17	6.0	5.3
18	22	25	23	66	32	120	264	170	32	17	6.7	5.3
19	23	25	22	66	31	120	264	141	28	15	7.5	5.3
20	24	35	20	60	31	135	312	128	24	12	7.5	4.6
21	22	48	20	64	32	135	600	141	26	11	6.7	28
22	21	43	19	66	35	120	674	224	24	11	6.0	20
23	21	57	18	64	33	120	790	177	20	11	6.0	18
24	30	36	18	62	32	180	712	144	20	11	5.3	19
25	33	61	19	58	32	330	582	124	18	11	6.0	17
26	33	54	19	58	31	280	406	108	18	12	5.3	14
27	26	27	18	56	31	185	327	96	16	11	6.0	12
28	24	28	19	56	31	145	390	92	18	22	6.0	13
29	23	26	17	54	-------	110	1,100	85	24	27	18	13
30	24	24	39	52	-------	88	1,200	74	21	26	13	22
31	22	-------	31	50	-------	78	-------	67	-------	21	12	-------

NOTE.—Stage-discharge relation affected by ice Dec. 2 to Apr. 6; daily discharge based on gage heights corrected for effect of ice.

Monthly discharge of Smith River near Bristol, N. H., for the year ending Sept. 30, 1923

[Drainage area, 78.5 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	51	18	25.9	0.330	0.38
November	61	21	31.3	.399	.44
December	39	17	22.3	.284	.33
January	300	50	100	1.28	1.48
February	50	31	37	.472	.49
March	330	32	97.5	1.24	1.43
April	1,200	62	567	7.22	8.06
May	910	67	218	2.78	3.20
June	114	16	41.2	.525	.59
July	27	11	14.8	.189	.22
August	18	5.3	9.2	.117	.13
September	28	4.6	10.2	.130	.14
The year	1,200	4.6	97.6	1.24	16.89

CONTOOCOOK RIVER NEAR ELMWOOD, N. H.

LOCATION.—At covered highway bridge on county road between Hancock and Greenfield, Hillsboro County; half a mile below mouth of Kimball Brook and 1½ miles south of Elmwood railroad station.

DRAINAGE AREA.—168 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 20, 1917, to September 30, 1923.

GAGE.—Chain on upstream side of bridge; read by Mrs. G. M. Elliott.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Stream bed is covered with boulders and gravel; control at low stages is rock ledge about 50 feet below gage and is well defined; at high stages control is probably at a storage dam 3 miles downstream.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.4 feet at 8.15 a. m. April 6 (discharge, by extension of rating curve, 3,150 second-feet); minimum stage recorded, 1.32 feet at 7 a. m. August 7 (discharge, 13 second-feet).

1917–1923: Maximum open-water stage recorded, that of April 6, 1923. A stage of 11.9 feet was recorded March 10, 1921, but the channel was obstructed by ice. Minimum stage recorded, that of August 7, 1923.

ICE.—River is usually covered with ice for several months during winter.

REGULATION.—Considerable storage has been developed in Nubanusit Lake and other reservoirs on the main river and tributaries. Water power is used at various places on the river above the station; the first dam above the gage is at North Peterboro, 4 miles upstream. Records obtained from self-registering gage used during August and September, 1921, showed very little diurnal fluctuation.

ACCURACY.—Stage-discharge relation practically permanent, except when affected by ice. Rating curve fairly well defined between 50 and 1,200 second-feet. Gage read twice daily to hundredths except during winter, when it was read once daily. Daily discharge ascertained by applying rating table to mean daily gage heights, with corrections for effect of ice during winter. Records fair.

Discharge measurements of Contoocook River near Elmwood, N. H., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 24	W. E. Armstrong	2.35	102	Feb. 27	H. F. Hill, jr	[a]3.43	189
Dec. 29	do	[a]2.62	121	Apr. 11	do	5.80	1,080
Jan. 29	H. F. Hill, jr	[a]3.63	251	June 23	do	1.97	58

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Contoocook River near Elmwood, N. H., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	47	122	76	122	250	200	450	2,080	130	56	168	76
2	39	144	82	640	210	230	425	1,180	102	52	108	71
3	52	71	52	544	200	240	710	745	61	47	66	28
4	56	82	71	514	175	270	1,680	574	71	35	76	66
5	43	47	88	425	210	340	2,670	454	95	35	52	43
6	39	56	129	344	220	320	2,940	344	102	39	39	31
7	43	122	82	300	210	250	2,310	344	102	35	19	28
8	52	144	101	250	210	250	2,130	260	201	31	71	28
9	280	144	88	220	200	270	1,990	300	201	28	88	28
10	250	129	56	220	200	260	1,450	344	144	61	76	28
11	201	129	56	200	135	240	1,060	290	130	66	95	31
12	176	71	82	170	150	250	980	260	130	71	25	31
13	129	101	82	150	175	260	780	321	115	82	39	71
14	108	101	115	145	190	270	605	344	88	76	61	61
15	66	115	101	170	200	290	560	280	82	52	61	52
16	88	95	66	200	210	520	514	300	95	52	66	25
17	88	71	56	190	190	760	425	280	31	66	56	25
18	101	88	43	185	175	540	396	280	56	101	56	47
19	76	52	66	160	175	660	396	230	71	95	22	39
20	66	82	82	145	185	640	369	184	61	71	52	35
21	61	184	70	240	185	680	396	201	76	61	43	82
22	39	137	96	340	185	700	396	280	76	56	61	115
23	43	122	76	450	170	820	484	220	76	52	76	95
24	95	108	66	520	150	1,200	484	184	56	43	76	101
25	160	144	66	450	120	2,000	425	108	52	66	71	101
26	122	122	60	420	135	1,900	344	115	61	88	66	95
27	88	82	96	370	170	1,360	300	137	66	47	61	88
28	101	82	120	300	210	1,100	321	152	76	88	66	76
29	61	82	130	250	-------	745	2,580	152	76	144	71	66
30	71	82	110	185	-------	745	2,710	102	71	168	82	43
31	82	-------	52	175	-------	515	-------	115	-------	184	76	-------

NOTE.—Stage-discharge relation affected by ice Dec. 19–31 and Jan. 7 to Mar. 25; discharge based on gage heights corrected for effect of ice.

Monthly discharge of Contoocook River near Elmwood, N. H., for the year ending Sept. 30, 1923

[Drainage area, 168 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	280	39	94.4	0.562	0.65
November	184	47	104	.619	.69
December	130	43	81.2	.483	.56
January	640	122	290	1.73	1.99
February	250	120	185	1.10	1.14
March	2,000	200	607	3.61	4.16
April	2,940	300	1,040	6.19	6.91
May	2,080	102	360	2.14	2.47
June	201	31	91.8	.546	.61
July	184	28	69.3	.414	.48
August	168	19	66.0	.393	.45
September	115	25	56.8	.338	.38
The year	2,940	19	254	1.51	20.49

NUBANUSIT BROOK NEAR PETERBORO, N. H.

LOCATION.—At highway bridge 1½ miles above Peterboro, Hillsboro County.

DRAINAGE AREA.—54.3 square miles.

RECORDS AVAILABLE.—November 18, 1920, to September 30, 1623.

GAGES.—Gurley water-stage recorder on left bank, referenced to gage datum by hook gage inside well; an inclined staff is used for auxiliary readings. Recorder inspected by F. E. Moore.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Control formed by boulders 75 feet below gage; bed covered with small boulders, probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.2 feet at 6.30 p. m. April 6 (discharge, by extension of rating curve, 880 second-feet); minimum stage recorded during year, 1.51 feet from 7 p. m. July 26 to 8 p. m. July 27 (discharge, 1.3 second-feet; water held back by dams).

1920–1923: Maximum open-water stage recorded, 5.4 feet at noon March 10, 1921 (discharge, by extension of rating curve, 1,050 second-feet, revised; a stage of 5.6 feet was recorded at 8.30 a. m. January 21, 1921, but the channel was obstructed by ice at the time); minimum stage during period, that of July 26 and 27, 1923.

ICE.—Ice forms along banks and on rocks below gage; stage-discharge relation affected.

REGULATION.—Distribution of flow affected by operation of mills at West Peterboro half a mile upstream. There are several storage reservoirs on main stream and its tributaries above gage.

ACCURACY.—Stage-discharge relation probably permanent. Operation of water-stage recorder satisfactory except for short periods indicated in footnote to daily-discharge table. Rating curve fairly well defined below 200 second-feet. Daily discharge ascertained by use of discharge integrator. Records good.

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Discharge measurements of Nubanusit Brook near Peterboro, N. H., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 24	W. E. Armstrong	3.03	101	Feb. 26	H. F. Hill, jr	*6.74	106
Dec. 29	do	*5.25	53	June 21	do	2.91	87
Jan. 23	H. F. Hill, jr	*6.61	56	July 27	C. H. Pierce	1.51	1.3
Feb. 25	do	*5.28	30.2	Aug. 19	H. F. Hill, jr	1.61	2.9
25	do	*5.58	30.7	19	do	1.63	2.9

*Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Nubanusit Brook near Peterboro, N. H., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3.2	37	40	20	52	40	190	590	36	2.0	36	28
2	24	44	19	48	58	44	190	470	16	3.8	43	2.1
3	17	36	4.1	130	48	48	190	310	3	1.9	41	2.0
4	35	19	42	240	44	68	240	275	34	8.0	21	1.7
5	34	5.0	44	210	44	98	470	257	35	2.0	2.6	1.6
6	38	36	46	175	52	130	800	240	35	4.0	40	1.7
7	16	44	47	130	44	98	710	205	40	2.0	50	1.7
8	7.2	44	40	98	58	90	670	190	50	6.0	32	1.7
9	45	43	15	76	48	98	630	175	20	32	41	1.8
10	52	44	3.0	62	36	90	510	163	18	34	2.1	1.8
11	41	27	48	58	20	62	410	163	52	35	2.0	1.7
12	36	14	40	52	58	68	350	151	42	44	2.0	1.7
13	27	42	40	40	36	76	310	141	34	38	44	3.2
14	19	42	36	52	52	82	240	131	34	16	44	1.9
15	7	42	33	52	44	98	175	113	36	2.0	32	1.8
16	44	38	11	52	36	115	175	97	16	36	38	1.8
17	35	40	3.2	58	23	150	163	98	3.1	39	39	36
18	39	17	20	58	20	240	151	90	32	36	14	40
19	46	3.4	36	62	44	210	151	68	34	32	2.3	36
20	38	40	40	76	52	175	113	51	39	41	42	46
21	19	43	40	98	30	150	105	78	38	21	41	40
22	3.0	55	44	130	33	210	88	85	34	2.0	34	25
23	36	51	15	175	36	350	141	86	16	1.9	36	4.0
24	44	43	4.3	220	18	580	131	82	1.9	2.0	41	41
25	43	22	3.2	175	20	620	122	75	36	4.0	18	42
26	42	9	15	130	40	500	89	56	36	1.3	2.1	34
27	43	55	26	98	23	350	113	46	38	1.3	39	41
28	22	45	26	58	33	310	113	58	44	6.0	42	37
29	3.2	43	33	62	------	260	630	52	38	4.0	39	18
30	36	4.3	15	58	------	220	710	19	26	32	44	2.5
31	40	------	4.3	58	------	210	------	48	------	40	40	------

NOTE.—Stage-discharge relation affected by ice Dec. 16 to Apr. 5; daily discharge for these periods based on gage heights corrected for effect of ice. Operation of water-stage recorder unsatisfactory Dec. 8–16 and May 4–16; discharge for these periods estimated by comparison with records on other rivers and climatic data.

Monthly discharge of Nubanusit Brook near Peterboro, N. H., for the year ending Sept. 30, 1923

[Drainage area, 54.3 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	52	3.0	30.1	0.554	0.64
November	55	3.4	34.3	.632	.70
December	48	3.0	26.9	.495	.57
January	240	20	97.1	1.79	2.06
February	58	18	39.4	.726	.76
March	620	40	188	3.46	3.99
April	800	88	303	5.58	6.23
May	590	19	150	2.76	3.18
June	52	1.9	30.6	.564	.63
July	44	1.3	17.1	.315	.36
August	50	2.0	30.5	.562	.65
September	42	1.6	16.4	.302	.34
The year	800	1.3	80.5	1.48	20.11

SUNCOOK RIVER AT NORTH CHICHESTER, N. H.

LOCATION.—100 feet below highway bridge and 500 feet from Chichester depot, North Chichester, Merrimack County, 2½ miles above mouth of Little Suncook River.

DRAINAGE AREA.—157 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 21, 1918, to September 30, 1920, and June 15, 1921, to September 30, 1923.

GAGE.—Gurley water-stage recorder on left bank, referred to gage datum by a hook gage inside well; a vertical staff gage is used for auxiliary readings. Recorder inspected by M. H. Gamage.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Stream bed covered with gravel and other alluvial deposits. Low-water control at head of rapids 150 feet below gage; at high water the control is probably formed by crest of an old dam near Epsom.

EXTREMES OF DISCHARGE.—Maximum stage during year, 13.0 feet during early morning of April 7 (discharge, from extension of rating curve, 4,300 second-feet); minimum stage during year, from water-stage recorder, 0.80 foot at 10 p. m. November 25 (discharge, from extension of rating curve, 2 second-feet).

1918–1923: Maximum stage during periods of record, that of April 7, 1923; minimum stage, that of November 25, 1923.

ICE.—River is covered with ice for several months during winter.

REGULATION.—Storage has been developed at several points above Pittsfield. The operation of mills at Pittsfield causes a large variation in discharge during the days when the mills are in operation.

ACCURACY.—Stage-discharge relation apparently permanent except when affected by ice. Rating curve well defined between 10 and 800 second-feet and at two measurements between 2,100 and 2,200 second-feet. Daily discharge ascertained by discharge integrator except from December 16 to May 6 and July 29 to September 17, when mean daily gage heights from recorder sheets were used. Records good.

Discharge measurements of Suncook River at North Chichester, N. H., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 26	W. E Armstrong	[a] 0.24	12.1	Apr. 9	H.F. Hill, jr	8.74	2,180
Jan. 23	H. F. Hill, jr	[a] 4.59	193	9	do	8.66	2,140
Feb. 17	do	[a] 2.63	40.2	June 24	do	1.13	12.2
Mar. 20	do	[a] 5.15	350	Sept. 18	do	1.08	9.3

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Suncook River at North Chichester, N. H., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	12	27	20	60	86	86	220	2,070	107	11	20	19
2	85	24	15	390	80	74	240	1,520	52	97	34	11
3	103	23	10	450	60	70	250	1,100	47	95	36	8.2
4	100	37	92	440	42	94	740	810	132	13	32	7.3
5	90	13	104	410	140	145	1,800	647	95	92	21	16
6	92	98	14	300	86	110	2,300	560	105	95	26	16
7	57	97	12	195	80	110	3,350	460	104	51	34	15
8	19	25	16	135	92	110	2,400	400	125	12	26	15
9	19	15	18	105	86	105	2,210	330	85	91	23	8.7
10	35	19	13	105	78	86	1,760	355	137	99	21	14
11	45	56	100	115	46	140	1,380	285	160	93	14	15
12	65	15	120	105	110	240	1,170	260	116	91	10	16
13	95	89	17	94	110	230	980	380	107	92	15	16
14	56	97	16	38	105	230	835	400	105	58	14	15
15	15	18	17	120	98	250	710	340	105	10	15	15
16	92	27	48	105	86	230	660	284	77	94	15	9.1
17	37	28	12	94	64	280	660	280	11	92	19	16
18	35	23	105	105	50	300	597	240	98	82	13	32
19	33	16	110	105	165	300	548	190	98	87	10	31
20	30	104	20	62	110	280	524	170	95	88	16	34
21	47	116	12	44	90	270	560	195	88	92	15	33
22	13	106	13	86	86	260	610	390	82	12	12	34
23	94	19	14	110	86	280	810	370	55	105	5.5	15
24	35	21	25	110	70	400	810	275	10	105	9.6	35
25	39	15	14	115	92	940	685	230	93	122	11	34
26	102	14	86	110	150	620	560	195	96	111	11	37
27	97	98	28	86	86	490	488	161	98	104	16	40
28	59	96	11	88	86	390	560	174	101	81	18	39
29	16	15	14	94	------	340	2,250	137	99	28	42	38
30	99	14	21	86	------	300	2,650	78	47	19	27	20
31	30	------	20	78	------	250	------	152	------	23	20	------

NOTE.—Stage-discharge relation affected by ice Dec. 16–31 and Jan. 7 to Apr. 6; daily discharge based on gage heights corrected for effect of ice.

Monthly discharge of Suncook River at North Chichester, N. H., for the year ending Sept. 30, 1923

[Drainage area, 157 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	103	12	56.3	0.359	0.41
November	116	13	45.5	.290	.32
December	120	10	36.6	.233	.27
January	450	38	146	.930	1.07
February	165	42	90.0	.573	.60
March	940	70	258	1.64	1.89
April	3,350	220	1,110	7.07	7.89
May	2,070	78	434	2.76	3.18
June	160	10	91.0	.580	.65
July	122	10	72.4	.461	.53
August	42	5.5	19.4	.124	.14
September	40	7.3	21.8	.139	.15
The year	3,350	5.5	198	1.26	17.10

SOUHEGAN RIVER AT MERRIMACK, N. H.

LOCATION.—At head of Atherton Falls, 7 miles below mouth of Beaver Brook and 1½ miles above confluence of Souhegan and Merrimack rivers at Merrimack, Hillsboro County.

DRAINAGE AREA.—168 square miles.

RECORDS AVAILABLE.—July 13, 1909, to September 30, 1923.

GAGES.—Gurley printing water-stage recorder on left bank 350 feet above falls installed October 15, 1913; vertical staff and chain gages used prior to installation of water-stage recorder. Recorder inspected by employee of W. H. McElwain Co.

DISCHARGE MEASUREMENTS.—Made by wading below falls at low stages or from cable at high stages.

CHANNEL AND CONTROL.—Channel opposite gage is a pool in which velocity is very low. Control of this pool is a rock ledge at head of Atherton Falls and is permanent.

ICE.—Ice forms on control for short periods during some winters.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.65 feet at 1.30 p. m. April 6 (discharge, by extension of rating curve, 3,170 second-feet); minimum stage from water-stage recorder, 1.90 feet at 7 a. m. to 5 p. m. August 24 (discharge, 19 second-feet).

1909–1923: Maximum stage recorded, 9.6 feet on August 5, 1915 (discharge, by extension of rating curve, 4,930 second-feet); minimum discharge recorded, 15 second-feet on September 8, 1909.

REGULATION.—Flow affected by operation of mills at Milford, 8 miles above.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 2,000 second-feet. Operation of water-stage recorder satisfactory except for period noted in footnote to daily-discharge table. Daily discharge ascertained by applying rating table to mean gage heights. Records good.

Discharge measurements of Souhegan River at Merrimack, N. H., during the year ending Sept. 30, 1923

[Made by H. F. Hill, jr.]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Feb. 16	2.90	167	Sept. 18	2.01	19.4
Apr. 10	5.03	1,230	19	2.10	26.4

Daily discharge, in second-feet, of Souhegan River at Merrimack, N. H., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	40	88	86	135	253	180	496	1,680	135	48	94	38
2	45	90	100	692	267	182	510	1,010	118	41	82	32
3	48	88	86	665	256	192	637	775	90	43	72	28
4	51	92	74	510	250	210	1,640	637	96	34	60	31
5	42	68	82	393	260	355	2,650	530	104	36	44	30
6	44	78	76	335	260	402	2,970	478	98	37	43	28
7	45	100	70	260	225	351	2,490	442	100	35	54	38
8	58	142	78	213	216	292	2,030	384	162	32	43	28
9	148	162	84	204	219	270	1,890	359	311	34	52	28
10	198	160	66	225	207	256	1,260	367	246	32	36	26
11	225	130	68	210	180	232	1,010	343	190	32	37	26
12	250	104	64	192	192	239	890	319	155	32	31	24
13	172	112	84	180	213	246	802	496	128	45	34	26
14	152	114	90	165	201	256	692	478	112	44	43	27
15	112	100	96	178	192	274	590	367	104	30	32	29
16	104	104	90	207	195	270	610	343	92	49	24	27
17	112	98	76	185	201	465	605	343	62	106	26	25
18	108	90	80	175	182	748	535	319	74	94	24	27
19	102	74	84	180	180	720	478	270	88	68	20	26
20	90	88	72	175	198	665	438	240	76	58	20	28
21	84	158	76	198	219	610	429	260	66	54	30	32
22	64	175	80	637	204	535	420	330	70	43	26	80
23	70	140	78	692	178	830	429	280	70	58	20	110
24	120	132	72	535	190	2,030	452	230	51	57	22	80
25	160	118	84	470	195	2,030	406	200	49	42	41	60
26	158	104	82	398	168	1,540	363	201	70	62	30	48
27	140	86	88	359	192	1,140	311	155	54	60	26	33
28	116	100	104	315	190	1,010	315	165	42	68	33	42
29	96	96	86	295	-------	665	1,720	158	62	98	38	37
30	92	86	84	288	-------	720	2,570	128	39	142	41	34
31	90	-------	78	260	-------	610	-------	116	-------	125	44	-------

NOTE.—Recorder not in operation Oct. 23–26, Jan. 4, May 19–25, Aug. 17–22, 28–31, and Sept. 1–5; discharge estimated by comparison with records in adjacent drainage basins.

Monthly discharge of Souhegan River at Merrimack, N. H., for the year ending Sept. 30, 1923

[Drainage area, 168 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	250	40	108	0.643	0.74
November	175	68	109	.649	.72
December	104	64	81.2	.483	.56
January	692	135	320	1.90	2.19
February	267	168	210	1.25	1.30
March	2,030	180	598	3.56	4.10
April	2,970	311	1,020	6.07	6.77
May	1,680	116	400	2.38	2.74
June	311	39	104	.619	.69
July	142	30	56	.333	.38
August	94	20	39.4	.234	.27
September	110	24	37.6	.224	.26
The year	2,970	20	257	1.53	20.72

SOUTH BRANCH OF NASHUA RIVER BASIN (WACHUSETT DRAINAGE BASIN) NEAR CLINTON, MASS.

LOCATION.—At Wachusett dam, near Clinton, Worcester County.

DRAINAGE AREA.—119 square miles 1896–1907; 118.19 square miles 1908–1913; 108.84 square miles 1914–1923.

RECORDS AVAILABLE.—July, 1896, to September, 1923.

REGULATION.—Flow affected by storage in Wachusett reservoir and other ponds. Beginning with 1897, the determinations of discharge have been corrected for gain or loss in the reservoir and ponds, so that the record shows approximately the natural flow of the stream.

The yield per square mile is the yield of the drainage area including the water surfaces. For the year 1896 to 1902, inclusive, the water surface amounted to 2.2 per cent of the total area; 1903, 2.4 per cent; 1904, 3.6 per cent; 1905, 4.1 per cent; 1906, 5.1 per cent; 1907, 6.0 per cent; 1908 and subsequent years, 7.0 per cent.

COOPERATION.—Record furnished by the water division of the Metropolitan District Commission; rearranged in form of climatic year by engineers of the Geological Survey.

Yield and rainfall in South Branch of Nashua River basin (Wachusett drainage area) near Clinton, Mass., for the year ending Sept. 30, 1923

[Drainage area, 108.84 square miles]

Month	Total yield (million gallons)	Yield per square mile		Run-off		Rainfall in inches
		Million gallons per day	Second-feet	In inches	Per cent of rainfall	
October	1,463.5	0.434	0.671	0.774	32.1	2.41
November	1,724.9	.528	.871	.912	57.3	1.59
December	1,867.1	.553	.856	.987	24.5	4.02
January	5,950.9	1.764	2.729	3.146	39.6	7.95
February	3,059.2	1.004	1.553	1.617	70.5	2.30
March	10,360.7	3.071	4.751	5.478	166.3	3.29
April	9,919.8	3.042	4.707	5.244	95.0	5.52
May	4,423.6	1.311	2.029	2.339	162.1	1.44
June	2,008.5	.615	.952	1.062	30.3	3.51
July	1,000.9	.297	.459	.529	14.2	3.72
August	499.2	.148	.229	.264	12.9	2.04
September	300.2	.092	.142	.159	15.3	1.04
The year	42,578.5	1.072	1.658	22.511	57.97	38.83

SUDBURY RIVER AND LAKE COCHITUATE BASINS NEAR FRAMINGHAM AND COCHITUATE, MIDDLESEX COUNTY, MASS.

DRAINAGE AREA.—Area of Sudbury basin from 1875 to 1878, inclusive, was 77.8 square miles; 1879–80, 78.2 square miles; 1881–1923, 75.2 square miles. Area of Cochituate basin from 1863 to 1909, inclusive, was 18.87 square miles; 1910, 17.8 square miles; 1911 to 1923, 17.58 square miles.

RECORDS AVAILABLE.—Of Sudbury River, January, 1875, to September, 1923; of Lake Cochituate, January, 1863, to September, 1923. Records of rainfall have been kept in the Sudbury basin since 1875 and in the Cochituate basin since 1852, but the latter are considered of doubtful accuracy previous to 1872.

REGULATION.—The greater part of the flow from these basins is controlled by storage reservoirs operated by the Metropolitan Water and Sewerage Board. Lake Cochituate, which drains into Sudbury River a short distance below Framingham, is controlled as a storage reservoir for the Metropolitan waterworks system. In the Sudbury River basin the water surfaces exposed to evaporation have been increased from time to time by the construction of additional storage reservoirs. From 1875 to 1878, inclusive, the water surface amounted to 1.9 per cent of the total area; from 1879 to 1884, to 3 per cent; 1885 to 1893, to 3.4 per cent; 1894 to 1897, to 3.9 per cent; 1898 and subsequent years, 6.5 per cent.

DETERMINATION OF DISCHARGE.—In determining the run-off of the Sudbury and Cochituate drainage areas the water diverted for the municipal supply of Framingham, Natick, and Westboro, which discharge their sewerage outside the basins, is taken into consideration; the results, however, are probably less accurate since the sewerage diversion works were constructed.

Water from the Wachusett drainage area also passes into the reservoirs in the Sudbury basin and must be measured to determine the yield of the Sudbury basin; the small errors unavoidable in the measurement of large quantities of water decrease the accuracy of the determination of the Sudbury water supply during the months of low yield for years subsequent to 1897.

COOPERATION.—Record furnished by the water division of the Metropolitan District Commission; rearranged in form of climatic year by engineers of the Geological Survey.

Yield and rainfall in Sudbury River basin near Framingham, Mass., for the year ending Sept. 30, 1923

[Drainage area, 75.2 square miles]

Month	Total yield (million gallons)	Yield per square mile		Run-off		Rainfall in inches
		Million gallons per day	Second-feet	In inches	Per cent of rainfall	
October	635.2	0.272	0.422	0.486	21.3	2.28
November	835.0	.370	.573	.639	47.8	1.34
December	953.6	.409	.633	.730	21.4	3.42
January	3,631.6	1.558	2.410	2.779	36.4	7.64
February	1,969.1	.935	1.447	1.507	65.3	2.31
March	7,395.6	3.172	4.908	5.659	173.9	3.25
April	5,484.9	2.435	3.767	4.197	78.4	5.35
May	2,743.6	1.177	1.821	2.099	207.3	1.01
June	873.1	.387	.599	.668	16.2	4.12
July	155.3	.067	.103	.118	4.0	2.94
August	−169.4	−.073	−.112	−.130	−6.0	2.17
September	−129.8	−.057	−.089	−.099	−6.5	1.54
The year	24,377.8	.888	1.374	18.653	49.91	37.37

Yield and rainfall in Lake Cochituate basin near Cochituate, Mass., for the year ending Sept. 30, 1923

[Drainage area, 17.58 square miles]

Month	Total yield (million gallons)	Yield per square mile		Run-off		Rainfall in inches
		Millions gallons per day	Second-feet	In inches	Per cent of rainfall	
October	302.1	0.554	0.858	0.99	42.2	2.33
November	260.6	.494	.765	.85	68.8	1.24
December	262.6	.482	.746	.86	23.5	3.66
January	995.3	1.826	2.826	3.26	43.2	7.55
February	565.3	1.148	1.777	1.85	76.2	2.43
March	1,716.1	3.149	4.872	5.62	161.4	3.48
April	1,072.2	2.036	3.150	3.51	68.7	5.11
May	514.6	.944	1.461	1.68	171.9	.98
June	208.1	.395	.611	.68	21.4	3.18
July	88.2	.162	.250	.29	9.6	3.01
August	11.3	.021	.032	.04	1.7	2.16
September	6.2	.012	.018	.02	1.6	1.28
The year	6,002.6	.935	1.446	19.65	53.91	36.41

TAUNTON RIVER BASIN

TAUNTON RIVER AT TITICUT, NEAR BRIDGEWATER, MASS.

LOCATION.—At Summer Street Bridge on road between Bridgewater and Middleboro, Plymouth County, half a mile from the Titicut railroad station and 1 mile above confluence of Namasket and Taunton rivers.

DRAINAGE AREA.—185 square miles.

RECORDS AVAILABLE.—March 1, 1920, to September 30, 1923.

GAGE.—Chain on upstream side of highway bridge; read by Emily Pratt.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Channel deep, with hard bottom covered with rocks and gravel. River overflows banks at high stages.

EXTREMES OF DISCHARGE.—Maximum open-water stage recorded during year, 9.62 feet at 7.30 a. m. March 26 (discharge, 1,560 second-feet); minimum stage recorded during year, 0.94 foot at 8.25 a. m. July 3 (discharge, by extension of rating curve, 48 second-feet).

1920–1923: Maximum stage of 15.5 feet occurred March 19, 1920 (determined from high-water marks; approximate discharge from extension of rating curve, 5,150 second-feet); minimum stage recorded, that of July 3, 1923.

ICE.—River freezes over; stage-discharge relation occasionally affected by ice.

REGULATION.—Nearest dam above gage is at Paper Mill Village, near Bridgewater, where water power is used by a paper mill. The operation of this mill does not materially affect the distribution of flow at the gage.

ACCURACY.—Stage-discharge relation occasionally affected by backwater from dam at East Taunton, a supplementary rating curve being used for periods when backwater occurred. Standard rating curve well defined between 200 and 3,400 second-feet and fairly well defined between 100 and 200 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying rating table to mean daily gage heights. Records fair.

24175—25—WSP 561——6

Discharge measurements of Taunton River at Titicut, near Bridgewater Mass., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 18	W. E. Armstrong	4.93	215	Nov. 8	H. I. Granger	4.21	179
18	do	4.80	160	8	do	4.19	184
24	Armstrong and Granger	5.24	220	Jan. 24	W. E. Armstrong	8.86	1,350
24	do	5.43	338	July 17	Hill and Armstrong	2.82	109

Daily discharge, in second-feet, of Taunton River at Titicut, near Bridgewater, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	108	195	106	194	255	195	410	1,320	164	77	115	125
2	194	182	112	375	315	195	485	1,270	188	53	89	140
3	140	170	138	960	460	235	570	1,070	235	50	89	146
4	104	170	150	800	540	275	680	880	235	53	95	130
5	80	188	170	650	620	360	820	930	188	56	103	92
6	85	255	130	470	570	385	1,100	460	158	95	103	80
7	120	195	220	435	510	385	1,180	460	140	107	107	74
8	210	176	220	510	485	315	1,100	410	140	115	111	89
9	275	170	182	485	435	275	990	335	164	140	107	99
10	320	152	220	570	335	255	880	360	195	158	103	107
11	350	164	170	540	255	235	760	360	255	89	111	89
12	365	188	116	485	205	235	650	335	235	99	115	80
13	320	188	118	460	176	275	570	315	182	83	125	65
14	200	188	138	435	188	410	510	410	120	89	95	83
15	194	170	146	435	188	540	570	435	115	103	99	89
16	188	135	146	410	195	760	510	360	125	107	107	95
17	245	130	174	410	255	1,130	600	360	146	103	111	83
18	215	135	152	385	295	1,320	460	275	146	92	115	80
19	194	146	140	315	275	1,300	410	220	130	99	130	77
20	180	135	138	410	275	1,270	435	188	103	103	125	80
21	194	130	138	1,100	295	1,240	385	255	111	111	95	86
22	220	146	126	1,270	255	1,210	385	275	99	115	86	99
23	235	164	138	1,410	275	1,210	335	220	103	107	74	107
24	400	158	156	1,350	295	1,300	335	205	115	99	74	111
25	340	188	180	1,270	315	1,440	335	188	140	103	83	107
26	166	255	156	1,040	315	1,520	295	220	152	92	89	93
27	225	220	128	930	275	1,240	220	275	146	86	92	109
28	200	158	118	760	235	1,070	205	220	135	83	115	107
29	102	125	136	600	-------	850	275	195	140	92	107	107
30	140	135	140	360	-------	620	1,070	188	103	103	103	111
31	162	-------	146	295	-------	485	-------	182	-------	135	111	-------

NOTE.—Stage-discharge relation affected by ice Jan. 7–19, 27–31, Feb. 1, and Mar. 8–22; discharge based on gage heights corrected for effect of ice.

Monthly discharge of Taunton River at Titicut near Bridgewater, Mass., for the year ending Sept. 30, 1923

[Drainage area, 185 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	400	80	208	1.13	1.30
November	255	125	170	.920	1.03
December	220	106	150	.811	.94
January	1,410	194	648	3.50	4.04
February	620	176	324	1.75	1.82
March	1,520	195	726	3.92	4.52
April	1,180	205	584	3.16	3.53
May	1,320	182	425	2.30	2.65
June	255	99	154	.833	.93
July	158	50	96.7	.523	.60
August	130	74	102	.551	.64
September	146	65	98	.530	.59
The year	1,520	50	308	1.66	22.59

PROVIDENCE RIVER BASIN

BLACKSTONE RIVER AT WORCESTER, MASS.

LOCATION.—150 feet below highway bridge on Webster Street, 3 miles southwest of municipal building, city of Worcester, Worcester County.

DRAINAGE AREA.—31.5 square miles (measured on United States Geological Survey topographic maps).

RECORDS AVAILABLE.—August 14 to September 30, 1923.

GAGE.—Gurley seven-day water-stage recorder on right bank; referred to gage datum by hook gage inside well. Recorder inspected by R. Brown.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Stream bed covered with gravel and alluvial deposits; subject to a growth of aquatic vegetation during summer. Control for low stages is well-defined riffle 200 feet below gage; control for high stages in vicinity of railroad bridge, half a mile below gage.

EXTREMES OF DISCHARGE.—Maximum stage during period August 14 to September 30, from water-stage recorder, 1.45 feet at 4 p. m. September 16 (discharge, 33 second-feet); minimum stage during period, from water-stage recorder, 0.30 foot from 4 a. m. until noon September 3 (discharge, 2.7 second-feet).

DIVERSIONS.—Water is diverted from Kettell Brook for part of the municipal supply of Worcester. Amount of diversion not known.

REGULATION.—Power plants above the gage cause large fluctuations of discharge during low water. Storage is obtained at several small ponds in the basin.

ACCURACY.—Stage-discharge relation during summer subject to change on account of aquatic vegetation in river. Rating curve fairly well defined for stages obtained during period of record. Operation of water-stage recorder satisfactory. Daily discharge ascertained by use of discharge integrator. Records fair.

Discharge measurements of Blackstone River at Worcester, Mass., during the period Aug. 14 to Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Aug. 13	W. E. Armstrong	1.32	32.0	Sept. 26	H. F. Hill, jr	0.31	2.44
13	do	1.32	35.0	26	do	.31	2.85
13	do	.76	7.9	26	do	1.29	26.7
13	do	.66	7.8	27	do	.36	3.40
Sept. 25	H. F. Hill, jr	1.35	28.3	27	do	.36	3.67
25	do	1.34	28.5				

Daily discharge, in second-feet, of Blackstone River at Worcester, Mass., for the period Aug. 14 to Sept. 30, 1923

Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.
1		8.6	11		14	21	12	8.2
2		3.0	12		4.9	22	15	7.9
3		2.7	13		5.3	23	14	3.7
4		13	14	15	10	24	14	12
5		13	15	13	5.7	25	12	12
6		11	16	15	13	26	3.9	13
7		12	17	14	11	27	15	12
8		7.6	18	9.6	2.6	28	14	12
9		3.1	19	4.6	7.8	29	16	7.2
10		14	20	13	11	30	14	3.2
						31	14	

PAWTUXET RIVER AT FISKEVILLE, R. I.

LOCATION.—At an unused mill dam in Fiskeville, Providence County.

DRAINAGE AREA.—101.8 square miles.

RECORDS AVAILABLE.—January 1, 1916, to September 30, 1923.

DETERMINATION OF DISCHARGE.—Discharge determined from records of stage obtained by Gurley water-stage recorder. The dam, which is about 140 feet long, has been rated by laboratory tests on a full-sized model and by current-meter measurements made at bridge a short distance upstream. Rating curve well defined below 1,400 second-feet.

REGULATION.—Previous to April, 1919, there were four reservoirs in the basin having a capacity of 385 million cubic feet; since April, 1919, there have been five reservoirs having a total capacity of 441 million cubic feet. Monthly discharge has been corrected for gain or loss in amount of water held in storage. A few small mill ponds near Fiskeville hold back water Saturday afternoons and Sundays, when the stage of the river is low.

DIVERSIONS.—The Pawtuxet Valley Water Co. diverts part of the flow from 1.3 square miles just above Fiskeville, correction for which has been made.

COOPERATION.—Data collected and compiled under the direction of Frank E. Winsor, chief engineer, city of Providence Water Supply Board.

[2] Includes a water area of 2.5 square miles and a swamp area of 2 square miles.

Daily discharge, in second-feet, of Pawtuxet River at Fiskeville, R. I., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	127	146	109	283	238	230	258	910	123	132	93.2	29.6
2	158	142	63.6	560	246	211	287	539	71.5	153	81.9	2.7
3	155	141	59.8	363	259	202	264	392	101	125	76.1	27.3
4	145	114	121	253	273	229	263	326	146	101	44.3	83.9
5	149	112	133	279	362	351	480	281	141	150	42.7	71.8
6	141	151	126	219	234	302	900	258	108	130	102	72.6
7	120	153	123	181	203	266	719	270	105	97.9	58.4	72.5
8	170	149	127	238	205	300	478	242	104	85.7	41.6	38.7
9	209	166	82.3	316	200	262	511	236	108	117	37.9	29.7
10	202	163	102	284	194	217	423	234	114	84.5	2.8	88.2
11	222	127	144	240	183	186	353	234	155	58.4	18.5	50.1
12	219	125	136	222	201	248	311	223	122	64.5	35.0	38.2
13	190	149	148	193	207	325	284	276	103	53.2	94.7	43.2
14	140	148	144	196	196	422	263	316	87.2	33.5	43.5	42.3
15	140	134	146	245	186	408	234	278	92.4	3.5	46.5	5.3
16	146	143	113	215	214	570	319	254	58.2	73.2	58.9	2.7
17	125	145	126	191	242	1,543	331	252	61.9	65.2	68.8	98.8
18	111	115	162	184	204	1,307	297	228	126	55.9	39.7	67.6
19	105	105	160	192	256	974	265	204	116	48.7	40.2	62.0
20	97.3	139	135	176	285	776	245	177	100	45.5	111	68.8
21	55.8	143	146	391	307	645	218	203	103	26.4	83.1	76.1
22	48.5	138	148	759	327	651	187	220	126	2.7	75.3	42.9
23	125	118	121	787	337	865	208	202	79.1	70.7	44.4	30.7
24	206	111	112	590	373	1,184	204	188	103	72.4	54.7	121
25	206	62.7	124	593	369	863	204	177	153	92.9	35.3	71.6
26	187	75.5	159	528	337	622	187	160	125	90.5	51.2	87.7
27	153	126	149	410	328	488	189	142	120	92.8	94.1	87.9
28	154	111	145	339	255	424	178	161	151	56.2	48.2	95.9
29	133	99.3	152	389	-------	355	472	155	166	96.3	37.5	61.7
30	158	8.8	131	395	-------	323	1,035	117	188	165	38.3	57.1
31	158	-------	139	273	-------	304	-------	148	-------	98.6	49.3	-------

Monthly discharge of Pawtuxet River at Fiskeville, R. I., for the year ending Sept. 30, 1923

[Drainage area, 101.8 square miles]

Month	Observed discharge (second-feet)			Gain or loss in storage (millions of cubic feet)	Discharge corrected for storage (second-feet)		Run-off in inches	Rainfall in inches
	Maximum	Minimum	Mean		Mean	Per square mile		
October	222	48.5	150	10.8	146	1.44	1.66	2.92
November	166	8.8	125	27.8	115	1.13	1.26	1.41
December	162	59.8	129	21.4	121	1.18	1.37	3.11
January	787	176	338	77.5	367	3.61	4.16	6.78
February	373	183	258	43.3	240	2.36	2.46	1.82
March	1,543	186	518	54.7	538	5.29	6.10	3.73
April	1,035	178	352	48.0	371	3.64	4.06	5.92
May	910	117	258	58.7	236	2.32	2.68	1.48
June	188	58.2	115	27.8	104	1.03	1.15	4.93
July	165	2.7	82.0	67.4	56.8	.558	.64	2.78
August	111	2.8	56.3	56.3	35.3	.347	.40	2.35
September	121	2.7	57.6	91.2	22.4	.220	.25	2.15
The year	1,543	2.7	203	224	196	1.93	26.19	39.38

NOTE.—The rainfall was computed as a weighted mean of records obtained at Hopkins Mills, Rocky Hill, South Scituate, and Fiskeville, using weights of 2, 2, 2, and 1, respectively.

THAMES RIVER BASIN

QUINEBAUG RIVER AT JEWETT CITY, CONN.

LOCATION.—1,000 feet below railroad bridge and 570 feet below outlet of canal from Slater Mills (mouth of Pachaug River); Jewett City, town of Griswold, New London County.

DRAINAGE AREA.—712 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 17, 1918, to September 30, 1923.

GAGES.—Water-stage recorder on left bank referenced to gage datum by hook gage inside well; an inclined staff is used for auxiliary readings. Recorder inspected by Edward Thornton.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNEL AND CONTROL.—Channel of gravel and alluvial deposits; control for low stages is fairly well defined riffle a few hundred feet below gage, at high stages the control is at head of rapids 2½ miles below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 13.16 feet at 5 p. m. March 17 (discharge, by extension of rating curve, 7,180 second-feet); minimum stage, from water-stage recorder, 3.83 feet at 11.30 a. m. September 9 (discharge, by extension of rating curve, 64 second-feet; water held back by dams).

1918–1923: Maximum stage, approximately 16.3 feet during high water of March 14–19, 1920 (approximate discharge, by extension of rating curve, 10,800 second-feet); minimum discharge, 30 second-feet August 23, 1919 (water held back by dams).

ICE.—Not affected by ice.

REGULATION.—Flow of Pachaug River, which drains 59.7 square miles and enters Quinebaug River through the canal 570 feet above the gage, is under almost complete regulation. Numerous small reservoirs and power developments on the main river and tributaries above the station also affect the distribution of flow. The operation of mills at Jewett City causes a large variation in discharge.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 200 and 6,000 second-feet. Operation of water-stage recorder was satisfactory except for June 23–26, Aug. 16–28, and Sept. 27–29, for which discharge was estimated by comparison with Pawtuxet River. Daily discharge ascertained by use of discharge integrator. Records good.

Discharge measurements of Quinebaug River at Jewett City, Conn., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
July 27	W. E. Armstrong	5.52	602
Sept. 26	H. F. Hill, jr.	5.51	547
26	do	5.53	639

Daily discharge, in second-feet, of Quinebaug River at Jewett City, Conn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	400	775	595	960	1,570	930	1,940	6,350	690	590	700	310
2	750	715	585	4,050	1,700	990	2,080	4,950	545	670	585	175
3	820	655	380	3,410	1,500	995	1,990	3,590	375	725	485	155
4	655	570	690	1,880	1,260	1,300	2,090	3,050	590	390	430	350
5	745	425	720	1,990	1,520	2,000	3,050	2,510	775	620	325	355
6	740	725	635	1,580	1,470	2,050	4,950	1,870	760	590	440	85
7	510	775	655	1,300	1,350	1,810	5,150	2,010	675	415	555	350
8	505	815	630	1,360	1,310	1,540	4,150	1,920	850	260	505	255
9	1,180	835	510	1,400	1,320	1,440	4,050	1,700	1,050	495	515	78
10	1,100	820	430	1,520	1,150	1,160	3,410	1,670	1,000	555	250	315
11	1,080	610	630	1,330	915	940	3,050	1,560	1,130	530	195	305
12	1,140	570	695	1,290	1,220	1,380	2,600	1,350	1,060	505	150	325
13	1,030	740	770	1,070	1,280	1,960	2,330	1,440	830	515	435	380
14	750	775	695	880	1,250	2,600	1,980	1,990	760	400	420	370
15	595	665	785	1,130	1,170	2,600	1,540	1,870	710	175	460	200
16	695	730	640	1,340	1,100	3,050	2,050	1,590	595	395	490	78
17	875	730	405	1,150	980	6,780	2,140	1,550	395	485	560	235
18	840	555	775	1,090	815	6,150	1,940	1,390	605	475	380	315
19	685	490	750	1,420	980	5,350	1,770	1,240	655	425	190	255
20	700	760	630	980	1,000	4,450	1,650	770	570	350	620	385
21	535	895	690	1,400	1,020	3,950	1,420	1,200	555	290	510	440
22	405	850	700	3,950	1,040	3,950	1,010	1,450	505	215	400	120
23	760	740	555	4,150	1,040	4,350	1,340	1,350	470	390	290	85
24	1,370	730	380	3,500	910	5,750	1,350	1,220	410	375	310	390
25	1,300	565	470	3,320	710	6,050	1,330	1,140	760	425	250	580
26	1,130	475	720	3,050	960	5,150	1,180	915	750	430	170	550
27	925	660	720	2,510	1,050	4,150	1,160	630	725	360	580	550
28	725	690	770	1,780	1,030	3,590	935	880	690	355	470	570
29	520	640	620	1,900	-------	3,050	2,600	640	925	535	400	390
30	690	380	540	1,840	-------	2,690	5,550	530	955	955	445	170
31	760	-------	440	1,540	-------	2,420	-------	750	-------	835	430	-------

Monthly discharge of Quinebaug River at Jewett City, Conn., for the year ending Sept. 30, 1923

[Drainage area, 712 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,370	400	804	1.13	1.30
November	895	380	679	.954	1.06
December	785	380	620	.871	1.00
January	4,150	880	1,940	2.72	3.14
February	1,700	710	1,160	1.63	1.70
March	6,780	930	3,050	4.28	4.93
April	5,550	935	2,390	3.36	3.75
May	6,350	530	1,780	2.50	2.88
June	1,130	375	712	1.00	1.12
July	955	175	475	.667	.77
August	700	150	418	.587	.68
September	580	78	304	.427	.48
The year	6,780	78	1,200	1.68	22.81

CONNECTICUT RIVER BASIN

SECOND CONNECTICUT LAKE NEAR PITTSBURG, N. H.

LOCATION.—At dam of Upper Connecticut River & Lake Improvement Co., at outlet of Second Lake, 12 miles northeast of Pittsburg, Coos County.

DRAINAGE AREA.—41.5 square miles. (Reported by engineers of Upper Connecticut River & Lake Improvement Co.)

RECORDS AVAILABLE.—October 1, 1922, to September 30, 1923.

GAGE.—Vertical staff on cribwork of dam.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.2 feet on June 7 (water stored, 914.2 million cubic feet); minimum stage recorded, 0.7 foot February 1 to March 19 (water stored, 30.3 million cubic feet).

1919–1923: Maximum stage recorded, 15.0 feet on May 25, 1919 (water stored, 979 million cubic feet); minimum stage recorded, 0.7 foot February 1 to March 19, 1923 (water stored, 30.3 million cubic feet).

REGULATION.—Capacity of the lake is 979 million cubic feet at gage height 15 feet. Records show fluctuations in level of the lake and are used in making corrections for effect of storage to observed records of flow of Connecticut River. Additional storage has been developed in Third Lake, but that was not used for regulation of flow during 1922–23.

Daily gage height, in feet, of Second Connecticut Lake near Pittsburg, N. H., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5.6	1.65	1.5	0.9	0.7	0.7	1.0	10.9	13.0	13.35	13.7	13.8
2	5.1	1.75	1.5	1.1	.7	.7	.95	10.7	13.0	13.35	13.7	13.8
3	4.75	1.8	1.45	1.25	.7	.7	.95	9.9	12.95	13.35	13.65	13.8
4	4.0	1.8	1.45	1.3	.7	.7	1.05	9.95	12.95	13.35	13.75	13.7
5	3.2	1.85	1.45	1.3	.7	.7	1.3	10.3	13.05	13.4	13.8	13.7
6	2.85	1.85	1.45	1.25	.7	.7	1.6	10.65	14.0	13.6	13.8	13.7
7	2.6	1.85	1.4	1.25	.7	.7	1.6	10.6	14.2	13.75	13.75	13.7
8	2.5	1.85	1.35	1.2	.7	.7	1.65	10.5	13.65	13.7	13.7	13.7
9	2.1	1.9	1.3	1.15	.7	.7	1.7	10.6	13.1	13.65	13.65	13.65
10	1.9	1.85	1.3	1.15	.7	.7	1.75	10.8	12.6	13.6	13.65	13.65
11	1.8	1.85	1.25	1.1	.7	.7	1.75	10.65	12.75	13.6	13.6	13.65
12	1.7	1.75	1.2	1.1	.7	.7	1.9	10.4	12.8	13.6	13.6	13.0
13	1.65	1.65	1.25	1.05	.7	.7	2.0	10.2	12.85	13.6	13.6	12.2
14	1.6	1.6	1.2	1.05	.7	.7	2.1	10.0	12.85	13.55	13.6	11.5
15	1.5	1.7	1.2	1.0	.7	.7	2.15	10.3	12.9	13.6	13.6	10.85
16	1.5	1.75	1.15	.95	.7	.7	2.2	10.9	12.85	13.8	13.6	10.25
17	1.45	1.8	1.15	.95	.7	.7	2.25	11.8	12.85	13.85	13.6	9.7
18	1.5	1.9	1.15	.9	.7	.7	2.2	12.6	12.85	13.75	13.6	9.2
19	1.5	1.95	1.1	.9	.7	.7	2.15	13.1	12.85	13.65	13.55	8.8
20	1.6	2.0	1.1	.9	.7	.75	2.15	13.0	12.8	13.65	13.55	8.45
21	1.7	2.0	1.05	.85	.7	.75	2.25	12.85	12.8	13.65	13.55	8.5
22	1.65	1.95	1.05	.85	.7	.75	3.4	12.7	12.75	13.65	13.6	9.15
23	1.6	1.9	1.05	.85	.7	.85	5.1	12.6	12.65	13.65	13.7	9.35
24	1.5	1.8	1.0	.8	.7	.9	5.8	12.4	12.65	13.6	13.7	8.7
25	1.5	1.75	1.0	.8	.7	.95	5.9	12.5	12.65	13.6	13.75	8.0
26	1.5	1.7	1.0	.8	.7	.95	5.8	12.65	12.8	13.6	13.75	8.1
27	1.5	1.65	.95	.8	.7	1.0	5.7	12.8	13.15	13.6	13.75	8.15
28	1.5	1.6	.95	.75	.7	1.0	6.1	12.9	13.15	13.65	13.75	8.2
29	1.5	1.55	.95	.75	------	1.0	7.0	13.0	13.25	13.7	13.75	8.3
30	1.5	1.5	.9	.75	------	1.0	9.3	13.0	13.3	13.75	13.8	8.3
31	1.6	------	.9	.75	------	1.0	------	13.0	------	13.75	13.8	------

FIRST CONNECTICUT LAKE NEAR PITTSBURG, N. H.

LOCATION.—At dam of Upper Connecticut River & Lake Improvement Co., at outlet of First Lake, 6 miles northeast of Pittsburg, Coos County.

DRAINAGE AREA.—81.4 square miles (from survey by Connecticut Valley Lumber Co.).

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1923.

GAGE.—Four staffs, one near each outlet gate, all to the same datum which is 0.9 foot above the sill of the lowest outlet gate.

EXTREMES OF STAGE.—Maximum stage recorded during year, 22.6 feet June 10 (water stored, 2,446 million cubic feet);[3] minimum stage recorded, 2.25 feet April 1–3 (water stored, 265.3 million cubic feet).[3]

1917–1923: Maximum stage recorded, 24.15 feet December 11–14, 1918 (water stored 2,645 million cubic feet);[3] minimum stage recorded 2.1 feet February 17, 1917, and March 6, 7, 1922 (water stored, 252.5 million cubic feet).[3]

REGULATION.—Capacity of the lake is 2,651 million cubic feet at gage height 24.2 feet. Dam is controlled by three gates, the sills of the gates varying from −0.9 foot to 14.4 feet on the gage. Records show fluctuation in the level of the lake and are used in making corrections for effect of storage to observed records of flow of Connecticut River. Additional storage has been developed in Second Lake and on tributary streams.

Daily gage height, in feet, of First Connecticut Lake near Pittsburg, N. H., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	17.7	9.7	6.35	7.45	8.4	3.1	2.25	13.5	21.1	20.2	16.55	10.0
2	17.3	9.35	6.45	7.65	8.35	3.1	2.25	14.6	20.8	20.05	16.55	9.7
3	17.0	8.95	6.55	7.75	8.4	3.0	2.25	15.45	20.6	19.75	16.55	9.5
4	16.7	8.6	6.65	7.8	8.35	3.0	2.3	16.15	20.3	19.5	16.55	9.35
5	16.35	8.25	6.7	7.9	8.35	2.95	2.3	16.8	20.2	19.15	16.55	9.0
6	16.0	7.8	6.75	8.0	8.35	2.85	2.6	17.5	20.75	18.9	16.5	8.5
7	15.55	7.4	6.85	8.05	8.3	2.75	2.75	18.25	21.5	18.65	16.5	8.2
8	15.1	7.05	6.9	8.1	8.05	2.7	2.95	18.7	22.15	18.5	16.35	7.8
9	14.65	6.6	7.0	8.25	7.65	2.7	3.15	19.1	22.45	18.2	16.05	7.55
10	14.2	6.25	7.1	8.35	7.2	2.6	3.4	19.45	22.6	17.9	15.75	7.35
11	14.25	5.9	7.15	8.4	6.75	2.6	3.6	19.95	22.35	17.6	15.5	6.9
12	14.0	5.5	7.15	8.45	6.3	2.55	3.8	20.15	21.95	17.3	15.2	6.8
13	13.95	5.35	7.25	8.5	6.05	2.5	4.1	20.3	21.6	17.15	14.9	7.2
14	14.0	5.1	7.25	8.55	5.6	2.5	4.3	20.7	21.6	16.85	14.75	7.25
15	14.05	5.0	7.25	8.6	5.3	2.45	4.5	20.9	21.65	16.6	14.45	7.25
16	14.1	4.75	7.3	8.6	5.05	2.45	4.7	21.0	21.7	16.75	14.25	7.1
17	14.15	4.55	7.35	8.6	4.8	2.45	4.9	21.2	21.8	16.8	13.95	7.05
18	14.15	4.95	7.45	8.55	4.6	2.45	5.05	21.35	21.85	16.9	13.7	6.95
19	14.2	5.1	7.5	8.6	4.4	2.4	5.2	21.5	21.95	16.95	13.35	6.85
20	13.9	5.25	7.5	8.6	4.2	2.4	5.2	21.7	22.0	16.95	13.2	6.7
21	13.55	5.4	7.5	8.6	4.0	2.4	5.7	22.05	22.0	16.9	12.9	6.45
22	13.15	5.6	7.45	8.65	3.9	2.35	6.25	22.0	22.05	16.8	12.65	6.4
23	12.8	5.7	7.45	8.65	37.5	2.35	7.4	21.95	22.05	16.75	12.4	6.15
24	12.55	5.8	7.45	8.6	3.6	2.35	8.1	21.95	21.75	16.7	12.15	6.2
25	12.2	5.9	7.45	8.6	3.5	2.35	8.6	21.9	21.45	16.7	11.85	6.25
26	11.85	6.0	7.45	8.6	3.4	2.35	9.1	21.85	21.15	16.65	11.6	5.9
27	11.5	6.1	7.45	8.6	3.3	2.35	9.3	21.85	20.9	16.65	11.35	5.6
28	11.1	6.2	7.45	8.6	3.2	2.35	9.75	21.75	20.7	16.6	11.1	5.3
29	10.8	6.25	7.45	8.55	-------	2.35	10.55	21.6	20.4	16.6	10.8	5.1
30	10.5	6.3	7.45	8.55	-------	2.3	11.9	21.45	20.3	16.6	10.55	4.85
31	10.15	-------	7.45	8.4	-------	2.3	-------	21.25	-------	16.6	10.3	-------

[3] Does not include water stored in Second Lake or tributaries.

CONNECTICUT RIVER AT FIRST CONNECTICUT LAKE, NEAR PITTSBURG, N. H.

LOCATION.—At outlet of First Connecticut Lake, 6 miles northeast of Pittsburg, Coos County.

DRAINAGE AREA.—81.4 square miles. (From surveys by engineers of Connecticut Valley Lumber Co.)

RECORDS AVAILABLE.—April 1, 1917, to September 30, 1923.

GAGES.—Gurley seven-day water-stage recorder on right bank one-fourth mile below outlet dam, referred to gage datum by hook gage inside well; inclined staff gage is used for auxiliary readings. Recorder inspected by H. H. Young.

DISCHARGE MEASUREMENTS.—Made from cable 200 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed rough, with rock bottom; channel at cable section has been improved by removal of rocks and ledges. Control for river gage is rock ledge extending completely across stream; about 3 feet of fall immediately below ledge.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.30 feet October 4 (discharge, 813 second-feet; water being released from storage); minimum discharge during year, 5 second-feet during several days in April (gates closed at dam).

1917–1923: Maximum discharge during period, 1,460 second-feet at 1.45 a. m. April 9, 1921; minimum discharge during period, 3 second-feet during several days in April, 1917 (gates closed at dam).

ICE.—During extremely cold weather, when stage of river is low, ice occasionally forms on rocks at the control for a few hours each day. Gage heights corrected by comparison of recorder graph with records of gate openings at dam.

REGULATION.—About 4.1 billion cubic feet of storage has been developed in lakes and ponds above gage; records of monthly discharge have been corrected for effect of storage in First Lake since April, 1917, and for effect of storage in Second Lake since October, 1919.

ACCURACY.—Stage-discharge relation subject to occasional changes by reason of gravel deposits on bank opposite gage, and temporarily affected at times by presence of logs. Rating curve well defined below 800 second-feet. Operation of water-stage recorder satisfactory throughout year. Discharge ascertained by applying rating table to gage heights, using weighted mean discharge for days when variations occurred from opening and closing gates at dam. Records good.

Discharge measurements of Connecticut River at First Connecticut Lake, near Pittsburg, N. H., during the year ending Sept. 30, 1923

[Made by C. H. Pierce]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
July 21	2.145	122	July 23	1.74	25.3	July 23	1.96	64
21	2.04	91	23	1.82	35.3	23	2.07	94
21	1.79	30.0						

Daily discharge, in second-feet, of Connecticut River at First Connecticut Lake, nea Pittsburg, N. H., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	796	540	6	26	91	105	42	25	428	245	61	420
2	796	532	6	8	71	102	42	27	485	414	61	445
3	796	547	6	8	55	95	40	29	471	495	61	445
4	804	547	6	8	55	88	40	30	451	492	61	438
5	796	540	7	8	55	93	19	35	458	487	61	438
6	787	540	7	8	55	98	5	36	411	471	61	432
7	796	533	7	8	180	95	5	136	212	479	181	432
8	796	533	7	8	450	88	5	401	408	485	400	437
9	787	533	7	8	505	85	5	436	628	492	393	447
10	295	493	7	8	512	81	5	353	655	519	393	445
11	103	498	7	8	498	75	5	325	698	485	393	432
12	370	465	7	8	485	72	5	525	666	367	410	438
13	18	432	7	8	445	69	5	227	393	337	412	438
14	18	406	7	8	393	66	5	50	44	496	406	445
15	18	334	8	31	362	63	6	50	44	309	400	451
16	18	393	8	50	328	63	6	52	44	86	406	444
17	18	178	8	50	296	63	6	52	44	61	406	438
18	18	6	8	50	264	60	6	52	44	32	406	438
19	261	6	32	48	243	55	6	52	44	45	412	438
20	513	6	60	48	223	55	7	52	44	122	406	432
21	542	6	55	48	195	53	9	362	44	102	406	432
22	547	6	51	48	186	50	8	545	46	126	406	425
23	540	6	44	48	168	48	8	465	364	86	400	419
24	547	6	44	48	156	48	9	316	512	115	400	419
25	540	6	44	48	144	48	9	142	498	115	400	432
26	547	6	44	59	136	48	265	138	498	115	406	412
27	532	6	44	78	124	46	258	191	492	115	406	381
28	538	6	44	78	116	44	16	345	485	84	400	339
29	533	6	44	78	-------	44	18	339	333	61	381	322
30	535	6	44	85	-------	42	22	333	245	61	389	292
31	540	-------	44	100	-------	42	-------	341	-------	61	400	-------

Monthly discharge of Connecticut River at First Connecticut Lake, near Pittsburg, N. H., for the year ending Sept. 30, 1923

[Drainage area, 81.4 square miles]

Month	Observed discharge (second-feet)			Gain or loss in storage in First and Second lakes (millions of cubic feet)	Discharge corrected for storage (second-feet)		Run-off in inches
	Maximum	Minimum	Mean		Mean	Per square mile	
October	804	18	476	−1,142.7	48	0.590	0.68
November	547	6	271	−378.8	125	1.54	1.72
December	60	6	23.2	+82.3	54	.664	.76
January	100	8	36.3	+87.4	69	.854	.98
February	512	55	243	−487.9	41	.504	.52
March	105	42	67.2	−64.1	43.2	.531	.61
April	265	5	29.6	+1,418.4	577	7.08	7.90
May	545	25	208	+1,346.6	712	8.75	10.09
June	698	44	340	−87.7	306	3.76	4.19
July	519	32	257	−407.2	105	1.29	1.49
August	412	61	329	−682.5	74	.909	1.05
September	451	292	322	−954.6	(a)	(a)	(a)
The year	804	5	224	−1,270.8	179	2.21	29.99

[a] Apparent depletion of storage during September exceeded total discharge past the gage during the month.

CONNECTICUT RIVER AT SOUTH NEWBURY, VT.

LOCATION.—At covered highway bridge between South Newbury, Orleans County, Vt., and Haverhill, Grafton County, N. H.; half a mile below Oliverian Brook and 4 miles above mouth of Waits River.

DRAINAGE AREA.—2,830 square miles.

RECORDS AVAILABLE.—July 22, 1918, to December 20, 1921, and August 19, 1922, to September 30, 1923.

GAGE.—Chain on downstream side of bridge; datum is 8.8 feet higher than datum of gage at Orford.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge and from cable 300 feet above bridge.

CHANNEL AND CONTROL.—Channel wide and deep, with gravelly bottom; control not clearly defined, except that several distinct riffles appear between South Newbury and Orford.

EXTREMES OF DISCHARGE.—Maximum stage recorded during periods October 1 to December 20, 1921, and August 19 to September 30, 1922, 14.8 feet at 8 a. m. November 21 and 9 a. m. December 19 (discharge, 17,400 second-feet); minimum stage recorded, 0.4 foot at 8 a. m. October 1 (discharge, 500 second-feet).

Maximum stage recorded during year ending September 30, 1923, 30.65 feet at 7 a. m. May 1 (discharge, from extension of rating curve, 43,600 second-feet); minimum stage recorded, 0.32 foot at 6 p. m. August 7 and 7 a. m. August 11 (discharge, 468 second-feet).

1918–1923: Maximum stage recorded, that of May 1, 1923 (discharge, from extension of rating curve, 43,600 second-feet); minimum stage recorded, 0.30 foot September 24, 1921 (discharge, 460 second-feet).

ICE.—Stage-discharge relation affected by ice, usually from December to March; ice cover generally remains in place throughout winter.

REGULATION.—About 4,100 million cubic feet of storage has been developed at First and Second Connecticut lakes and tributary streams above Pittsburg. There are several power developments above the station, but the operation of these mills does not seriously affect the distribution of flow.

ACCURACY.—Stage-discharge relation changed slightly during spring of 1922 Rating curves well defined between 500 and 28,000 second-feet. Chain gage read to half-tenths twice daily. Daily discharge ascertained by applying rating table to mean daily gage heights, with corrections for effect of ice during winter. Records good.

Discharge measurements of Connecticut River at South Newbury, Vt., during the years ending Sept. 30, 1922 and 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1922		*Feet*	*Sec.-ft.*	1923		*Feet*	*Sec.-ft.*
Aug. 22	Lamson and Jones	4.48	3,550	Apr. 18	H. F. Hill, jr	8.87	8,390
Oct. 27	W. E. Armstrong	4.67	3,750	19	do	8.09	7,500
1923				27	do	14.75	16,100
				27	do	14.28	15,600
Feb. 2	Armstrong and Hill	[a]3.94	1,780	28	do	13.65	15,500
Mar. 15	H. F. Hill, jr	[a]3.45	1,240	June 28	do	2.70	2,010

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Connecticut River at South Newbury, Vt., for the years ending Sept. 30, 1922 and 1923

Day	Oct.	Nov.	Dec.	Aug.	Sept.	Day	Oct.	Nov.	Dec.	Aug.	Sept.
1921–22						1921–22					
1	520	1,420	3,520	-------	2,380	16	2,440	1,740	3,300	-------	5,200
2	615	1,500	3,000	-------	2,140	17	1,900	1,660	3,520	-------	4,980
3	690	2,170	4,400	-------	1,900	18	1,340	1,990	4,510	-------	3,700
4	565	2,900	6,940	-------	1,820	19	1,270	6,000	17,000	1,590	2,830
5	590	2,710	6,700	-------	1,900	20	1,270	14,800	12,500	3,400	2,300
6	590	2,350	5,980	-------	1,900	21	1,820	17,400	-------	6,080	2,060
7	640	2,170	4,730	-------	1,660	22	3,300	15,600	-------	3,800	1,660
8	590	1,900	4,840	-------	1,240	23	3,300	11,500	-------	2,650	1,520
9	665	1,660	5,390	-------	1,240	24	2,800	8,030	-------	2,140	1,450
10	990	1,660	5,060	-------	1,590	25	2,350	4,400	-------	1,980	1,380
11	1,200	1,500	4,840	-------	1,380	26	2,170	3,000	-------	2,380	1,590
12	1,340	1,660	4,730	-------	1,590	27	2,440	3,520	-------	5,530	1,740
13	2,350	2,080	4,290	-------	1,980	28	1,740	3,740	-------	5,640	1,590
14	3,300	2,080	4,180	-------	2,560	29	1,500	4,400	-------	4,100	1,520
15	3,300	1,900	3,630	-------	2,650	30	1,580	3,740	-------	3,200	1,450
						31	1,270	-------	-------	2,920	-------

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922–23												
1	1,450	2,220	1,660	2,470	1,310	1,450	3,800	43,500	3,200	2,740	1,380	1,450
2	1,380	2,220	1,820	8,340	1,520	1,380	3,700	42,200	2,920	2,140	1,240	1,170
3	1,450	2,140	2,220	8,830	1,520	1,380	3,600	36,700	2,830	1,820	1,100	1,010
4	1,590	2,140	2,470	9,090	1,450	1,380	3,900	26,300	2,560	1,170	920	860
5	1,520	1,980	2,300	7,980	1,380	1,520	7,700	18,000	2,830	1,900	800	1,010
6	1,590	1,900	2,140	7,020	1,520	1,660	21,600	15,500	4,540	1,820	1,380	1,040
7	1,590	2,060	1,980	5,860	1,520	1,520	27,900	14,400	8,700	2,060	540	1,100
8	1,660	2,060	1,980	5,090	1,520	1,820	27,200	12,700	9,740	2,060	860	1,010
9	2,380	2,220	1,980	4,430	1,450	1,740	25,200	11,100	9,610	1,980	800	920
10	3,200	2,220	1,980	4,100	1,520	1,520	21,100	12,100	9,350	1,900	565	1,170
11	3,800	2,380	1,980	3,900	1,380	1,590	18,700	11,000	8,220	1,820	740	1,520
12	3,500	2,220	1,900	3,700	1,380	1,590	19,200	9,740	6,420	1,590	980	1,380
13	2,650	2,140	1,900	3,600	1,820	1,450	19,000	9,220	5,200	1,520	1,100	1,380
14	2,470	2,220	1,900	3,300	1,820	1,590	16,300	9,220	4,320	1,590	1,450	1,040
15	2,060	2,380	1,980	2,920	1,820	1,380	13,700	8,220	3,900	1,380	1,380	1,170
16	1,820	2,380	1,900	2,920	1,740	1,450	12,400	8,220	3,200	2,220	1,170	1,170
17	1,590	2,740	1,820	2,650	1,660	1,740	10,100	9,480	2,920	2,140	1,170	1,100
18	1,450	2,920	1,820	2,300	1,590	2,740	8,580	10,000	2,830	2,220	1,170	1,100
19	1,450	2,560	1,660	2,300	1,590	3,200	7,620	8,830	2,650	1,820	1,070	950
20	1,520	2,300	1,660	2,380	1,520	3,500	7,140	7,500	2,380	1,450	890	980
21	1,450	2,740	1,660	2,740	1,450	3,300	9,610	6,900	2,140	1,380	860	1,170
22	1,520	3,100	1,660	3,010	1,310	3,200	19,500	7,980	1,980	1,070	1,100	1,590
23	1,740	2,830	1,740	3,300	1,240	3,200	28,100	8,220	1,660	1,100	1,380	3,010
24	2,140	2,470	1,820	3,300	1,170	5,200	31,600	7,380	1,590	1,310	1,170	3,010
25	3,700	2,220	1,820	3,010	1,240	7,020	29,900	6,300	1,520	1,170	1,450	2,140
26	4,320	1,900	1,740	2,920	1,310	7,140	24,300	5,310	1,820	1,170	1,240	1,660
27	3,700	1,660	1,660	2,650	1,450	6,420	17,700	4,760	1,900	1,070	950	1,660
28	3,300	1,660	1,520	2,300	1,450	5,750	15,400	4,000	1,900	1,380	1,100	1,310
29	2,920	1,590	1,380	2,060	-------	5,200	28,600	3,800	2,220	1,380	1,520	1,450
30	2,560	1,590	1,240	1,980	-------	4,650	37,700	3,700	2,740	1,660	1,240	1,520
31	2,380	-------	1,240	1,740	-------	4,100	-------	3,400	-------	1,820	1,310	-------

NOTE.—Stage-discharge relation affected by ice Dec. 6-31. 1922, and Jan. 10 to Apr. 5, 1923; discharge for these periods based on gage heights corrected for effect of ice. No record obtained Dec. 21, 1921, to Aug. 18, 1922.

Monthly discharge of Connecticut River at South Newbury, Vt., for the years ending Sept. 30, 1922 and 1923

[Drainage area, 2,830 square miles]

Month	Observed discharge (second-feet)			Gain or loss in storage at First and Second Connecticut lakes (millions of cubic-feet)	Discharge corrected for storage (second-feet)		Run-off in inches
	Maximum	Minimum	Mean		Mean	Per square mile	
1921-22							
October	3,300	520	1,630	+179.0	1,700	0.601	0.69
November	17,400	1,420	4,370	+420.6	4,530	1.60	1.78
December 1-20	17,000	3,000	5,650	+81.9	5,700	2.01	1.50
August 19-31	6,080	1,590	3,490	+143.7	3,620	1.28	.62
September	5,200	1,240	2,100	−1,062.8	1,690	.597	.67
1922-23							
October	4,320	1,380	2,250	−1,142.7	1,820	.643	.74
November	3,100	1,590	2,240	−378.8	2,090	.739	.82
December	2,470	1,240	1,820	+82.3	1,850	.654	.75
January	9,090	1,740	3,940	+87.4	3,970	1.40	1.61
February	1,820	1,170	1,490	−487.9	1,290	.456	.49
March	7,140	1,380	2,930	−64.1	2,910	1.03	1.19
April	37,700	3,600	17,400	+1,418.4	17,900	6.33	7.06
May	43,500	3,400	12,400	+1,346.6	12,900	4.56	5.26
June	9,740	1,520	3,930	−87.7	3,900	1.38	1.54
July	2,740	1,070	1,670	−407.2	1,520	.538	.62
August	1,520	540	1,100	−682.5	845	.299	.34
September	3,010	860	1,370	−954.6	1,000	.354	.40
The year	43,500	540	4,380	−1,270.8	4,330	1.53	20.82

CONNECTICUT RIVER AT WHITE RIVER JUNCTION, VT.

LOCATION.—At railroad bridge between Westboro, Lebanon Township, Grafton County, N. H., and White River Junction, Hartford Township, Windsor County, Vt. Mascoma River enters from east 1 mile below gage.

DRAINAGE AREA.—4,120 square miles.

RECORDS AVAILABLE.—November 1, 1911, to September 30, 1923.

GAGES.—Graduations painted on downstream end of pier near west end of bridge used from November 1, 1911, to June 15, 1918; chain gage over west channel installed June 16, 1918. Gage read by F. H. Chipman.

DISCHARGE MEASUREMENTS.—Made at highway bridges one-fourth mile above gage, flow in White River and in Connecticut River above confluence of the two streams being measured separately, sum of the two being the discharge at the gage.

CHANNEL AND CONTROL.—Channel deep, bed covered with alluvial deposits, gravel, and rock ledge; control formed by rock outcrop extending across river at various places below gage; control for high water is probably at Quechee Falls, 7 miles downstream.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 22.0 feet at 4 p. m. May 1 (discharge, from extension of rating curve, 64,800 second-feet); minimum stage recorded during year, 3.2 feet at 8 a. m. and 4 p. m. August 5, and 4 p. m. August 12, and 8 a. m. September 30 (discharge, 820 second-feet).

1912-1923: Maximum stage recorded, 26.8 feet April 12, 1922 (approximate discharge, from extension of rating curve, 88,500 second-feet); minimum stage recorded, 2.8 feet September 8, 1913 (discharge, from extension of rating curve, 560 second-feet).

ICE.—River covered with ice each winter, usually from December to March; stage-discharge relation seriously affected.

REGULATION.—Distribution of flow not seriously affected by power plants, except for low water on Sundays caused by Sunday shutdown of paper mill at Wilder, 2 miles above gage. About 4,100 million cubic feet of storage at Connecticut lakes and tributary streams above Pittsburg, N. H., has some effect on the low-water discharge.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve well defined between 900 and 52,000 second-feet. Gage read to tenths twice daily. Daily discharge ascertained by applying rating table to mean daily gage heights with corrections for effect of ice during winter. Records good.

Discharge measurements of Connecticut River at White River Junction, Vt., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Feb. 2	Armstrong and Hill	[a] 6.98	2,520
Mar. 16	H. F. Hill, jr	[a] 5.73	1,760
Apr. 29	do	19.10	51,200

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Connecticut River at White River Junction, Vt., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,720	3,150	2,390	2,700	3,000	2,000	5,800	63,800	5,180	2,250	2,390	1,980
2	1,850	3,320	2,390	14,500	2,800	1,900	4,800	62,900	4,980	3,150	2,250	995
3	1,980	3,150	1,850	15,400	2,700	1,800	3,800	54,300	3,320	3,500	2,250	1,110
4	2,110	3,150	2,820	13,500	2,000	1,300	5,200	40,000	3,860	1,300	1,600	1,600
5	1,720	1,720	2,820	10,400	2,400	2,000	9,800	27,700	4,220	2,820	820	1,400
6	2,250	2,820	2,820	7,800	2,400	2,100	31,200	21,800	5,390	2,530	1,600	1,400
7	2,820	3,150	3,300	5,800	2,200	2,000	34,900	19,700	8,430	2,530	1,850	1,300
8	1,600	2,820	2,500	6,400	2,100	2,000	40,900	17,700	12,000	1,300	1,500	1,110
9	2,250	3,500	2,000	5,960	2,000	2,000	43,600	16,100	13,200	2,820	1,500	1,300
10	3,860	3,500	2,100	5,800	2,000	2,000	34,900	18,300	12,600	3,150	1,300	1,720
11	4,980	3,320	2,300	5,400	1,800	1,300	29,200	17,300	11,700	2,530	1,500	1,720
12	4,980	1,980	2,800	5,100	2,500	2,000	30,800	15,400	9,770	2,530	890	2,250
13	4,410	3,500	2,700	4,700	2,400	2,000	29,200	14,500	7,680	2,530	925	1,980
14	3,500	3,320	2,700	4,600	2,500	1,700	25,400	13,800	6,270	1,980	1,500	1,600
15	2,250	3,150	2,500	4,800	2,500	1,800	22,200	13,200	5,830	1,300	1,980	1,600
16	2,820	3,320	2,500	4,600	2,500	1,800	19,000	13,200	5,390	2,250	1,850	1,110
17	2,820	3,150	2,200	4,000	2,500	2,100	17,000	14,100	3,500	2,820	1,720	1,500
18	2,390	3,860	2,200	4,000	1,800	2,400	14,800	14,100	4,600	2,820	1,500	1,600
19	2,250	3,150	2,700	3,800	2,500	3,200	13,200	13,800	3,860	2,530	1,300	1,600
20	2,250	3,680	2,400	3,200	2,200	3,300	12,300	11,700	3,500	2,670	1,720	1,600
21	3,860	3,860	2,400	2,400	2,200	3,100	16,100	10,600	3,500	2,110	1,500	1,300
22	1,500	4,220	2,800	3,400	2,200	3,000	26,200	12,000	3,150	1,500	1,110	1,720
23	1,850	4,220	2,200	3,400	2,200	3,000	36,600	12,000	2,820	2,110	1,600	2,110
24	3,150	3,860	1,850	3,400	2,200	15,400	41,800	11,400	1,720	2,820	1,600	4,040
25	3,680	3,500	2,000	3,200	1,800	14,100	40,000	10,000	2,670	1,500	1,600	3,680
26	4,980	2,250	2,500	3,200	2,000	12,300	34,900	8,690	2,530	1,500	1,030	3,150
27	4,790	2,980	2,500	3,300	1,900	11,400	25,400	7,440	1,980	1,600	1,980	2,820
28	4,220	2,670	2,300	2,500	2,200	9,800	21,800	6,960	2,530	1,600	1,720	2,250
29	3,320	2,530	2,200	3,500	-------	9,000	46,200	6,270	2,820	1,720	1,200	2,250
30	3,860	2,390	2,200	3,100	-------	7,900	55,200	5,610	2,820	2,530	1,980	960
31	3,320	-------	2,200	3,000	-------	6,700	-------	5,390	-------	2,390	1,980	-------

NOTE.—Stage-discharge relation affected by ice Dec. 7 to Jan. 1 and Jan. 5 to Apr. 6; discharge for these periods based on gage heights corrected for effect of ice.

Monthly discharge of Connecticut River at White River Junction, Vt., for the year ending Sept. 30, 1923

[Drainage area, 4,120 square miles]

Month	Observed discharge (second-feet)			Gain or loss in storage at First and Second Connecticut lakes (millions of cubic feet)	Discharge corrected for storage		Run-off in inches
	Maximum	Minimum	Mean		Mean	Per square mile	
October	4,980	1,500	3,010	−1,142.7	2,580	0.626	0.72
November	4,220	1,720	3,170	−378.8	3,020	.733	.82
December	3,300	1,850	2,420	+82.3	2,450	.595	.69
January	15,400	2,400	5,380	+87.4	5,410	1.31	1.51
February	3,000	1,800	2,270	−487.9	2,070	.502	.52
March	15,400	1,300	4,400	−64.1	4,380	1.06	1.22
April	55,200	3,800	25,700	+1,418.4	26,200	6.36	7.10
May	63,800	5,390	18,700	+1,346.6	19,200	4.66	5.37
June	13,200	1,720	5,390	−87.7	5,360	1.30	1.45
July	3,500	1,300	2,280	−407.2	2,130	.517	.60
August	2,390	820	1,590	−682.5	1,340	.325	.37
September	4,040	960	1,820	−954.6	1,450	.352	.39
The year	63,800	820	6,350	−1,270.8	6,310	1.53	20.76

CONNECTICUT RIVER AT SUNDERLAND, MASS.

LOCATION.—At five-span steel highway bridge at Sunderland, Franklin County, on road leading to South Deerfield, 18 miles in direct line and 24 miles by river above dam at Holyoke. Deerfield River enters Connecticut River from west 8 miles above station.

DRAINAGE AREA.—8,000 square miles.

RECORDS AVAILABLE.—March 31, 1904, to September 30, 1923.

GAGES.—Chain on downstream side of bridge; Gurley water-stage recorder on left bank near downstream side of bridge. Gage read and recorder inspected by F. W. Leete and H. E. Russ.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Channel deep, with bottom of coarse gravel and alluvial deposits. Control at low stages not well defined but practically permanent. At high stages the control is at crest of dam at Holyoke.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 25.2 feet at 10 a. m. April 7 (discharge, 85,000 second-feet); minimum stage recorded, 0.30 foot by chain gage at 6.30 p. m. September 3 (discharge, by extension of rating curve, 600 second-feet).

1904–1923: Maximum stage recorded, 30.7 feet during night of March 28, 1913, determined by leveling from flood marks (approximate discharge, by extension of rating curve, 108,000 second-feet); minimum stage recorded, 0.0 foot August 29, 1921 (discharge, by extension of rating curve, 450 second-feet).

ICE.—River usually freezes over early in winter but ice is likely to break up at times of sudden rises in stage and at those times it occasionally forms ice jams at Northampton, 10 miles below station, causing several feet of backwater at gage.

REGULATION.—Distribution of flow affected by operation of power plants at Turners Falls, and by regulation of Deerfield River (see Deerfield River at Charlemont, Mass.). Effect of regulation is shown by low water at gage on Sundays and Mondays. Storage in Somerset reservoir and First Connecticut Lake has little effect on monthly discharge as measured at Sunderland.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve for chain gage well defined between 750 and 70,000 second-feet. Chain gage read to half-tenths once daily and used for comparison with water-stage recorder; operation of water-stage recorder was generally satisfactory. Daily discharge ascertained by applying rating table to mean daily gage heights corrected for effect of ice during winter. Records good.

Discharge measurements of Connecticut River at Sunderland, Mass., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 12	Hill and Armstrong	a 7.43	9,350	Mar. 16	W. E. Armstrong	a 6.22	5,300
Mar. 1	do	a 6.87	6,890	28	H. F. Hill jr.	a 13.84	23,300

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Connecticut River at Sunderland, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,620	5,410	3,330	3,000	7,000	6,200	15,000	75,500	8,960	1,960	4,030	3,850
2	1,960	4,990	3,670	10,000	7,000	6,000	14,000	75,500	7,910	3,330	4,990	1,730
3	3,330	4,990	1,730	15,000	7,000	5,600	14,000	72,200	3,330	3,850	3,850	780
4	3,850	4,030	2,720	15,500	4,600	3,000	17,400	63,300	5,620	3,020	2,870	1,840
5	3,500	1,960	4,790	14,500	5,000	5,600	40,000	53,300	7,660	3,670	1,730	3,330
6	3,670	3,500	5,200	13,500	7,000	7,000	71,800	40,800	6,490	4,790	2,320	3,020
7	3,020	7,180	5,620	5,200	7,400	7,000	83,700	35,300	6,720	4,210	3,330	2,720
8	1,960	7,660	6,700	10,500	6,400	8,000	80,400	31,500	13,300	2,320	3,170	2,580
9	4,590	5,830	5,400	9,000	6,400	7,000	80,000	24,700	21,000	2,720	3,500	1,460
10	6,720	5,620	2,900	8,200	6,200	6,200	71,800	32,700	21,400	3,850	1,960	1,400
11	6,050	4,210	3,200	8,200	3,700	3,300	61,300	33,100	19,500	3,330	1,400	2,800
12	5,620	2,200	4,600	8,200	4,200	7,000	54,500	29,300	18,500	3,670	1,180	2,800
13	7,910	4,400	5,000	7,200	5,400	7,600	52,900	28,100	14,300	4,590	2,320	2,870
14	8,960	6,950	5,000	3,800	6,400	7,200	43,500	27,400	13,300	3,020	3,170	2,580
15	4,990	5,830	5,200	5,200	6,800	6,400	44,300	25,800	11,300	1,400	2,870	3,020
16	5,410	5,410	4,400	8,400	6,800	6,400	41,600	25,100	7,910	3,020	2,870	2,080
17	4,990	5,410	2,660	8,400	5,400	6,800	36,100	25,100	4,400	5,830	2,720	2,080
18	4,790	4,790	4,400	9,000	3,200	6,400	26,600	25,100	6,720	5,410	1,840	2,870
19	4,590	2,200	5,400	8,400	4,200	12,000	25,800	25,800	6,720	4,590	1,290	2,580
20	4,990	3,850	5,600	7,600	6,000	14,500	22,800	21,400	5,410	4,400	1,730	2,580
21	4,210	7,420	5,400	4,800	6,400	11,500	28,500	19,200	4,990	3,020	2,870	3,850
22	1,960	7,660	5,200	8,600	6,200	11,500	40,400	20,600	6,050	1,510	2,870	3,330
23	2,870	7,660	4,400	10,000	6,200	12,500	46,200	22,500	4,990	1,960	2,580	2,870
24	4,400	6,490	2,700	9,800	5,600	24,000	52,100	20,300	2,080	3,670	2,580	2,720
25	4,030	6,490	2,100	10,500	3,000	32,000	53,300	18,100	3,330	4,210	1,960	5,200
26	4,030	3,020	4,600	11,000	4,800	30,000	50,900	17,400	4,990	3,670	1,400	5,410
27	6,720	4,790	6,000	9,800	6,200	26,500	43,900	10,700	4,030	3,330	1,400	4,590
28	7,420	7,180	5,600	5,600	6,800	23,000	36,900	14,700	3,670	3,170	2,580	5,200
29	4,990	5,200	5,400	7,200	------	18,500	54,500	12,600	3,670	3,850	2,580	4,600
30	4,990	2,450	5,600	9,000	------	16,500	75,100	7,910	3,670	3,670	4,030	1,960
31	4,990	------	3,300	7,200	------	16,000	------	7,910	------	4,400	4,400	------

NOTE.—Stage-discharge relation affected by ice Dec. 8 to Apr. 6. Daily discharge for this period based on gage heights corrected for effect of ice.

Monthly discharge of Connecticut River at Sunderland, Mass., for the year ending Sept. 30, 1923

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	8,960	1,620	4,620	0.578	0.67
November	7,660	1,960	5,160	.645	.72
December	6,700	1,730	4,440	.555	.64
January	15,500	3,000	8,780	1.10	1.27
February	7,400	3,000	5,760	.720	.75
March	32,000	3,000	11,700	1.46	1.68
April	83,700	14,000	46,000	5.75	6.42
May	75,500	7,910	30,400	3.80	4.38
June	21,400	2,080	8,400	1.05	1.17
July	5,830	1,400	3,530	.441	.51
August	4,990	1,180	2,660	.332	.38
September	5,410	780	2,950	.369	.41
The year	83,700	780	11,200	1.40	19.00

WHITE RIVER AT WEST HARTFORD, VT.

LOCATION.—500 feet above highway bridge in West Hartford, Windsor County, 7 miles above mouth of river.

DRAINAGE AREA.—687 square miles.

RECORDS AVAILABLE.—June 9, 1915, to September 30, 1923.

GAGE.—Inclined staff on left bank; read by F. P. Morse.

DISCHARGE MEASUREMENTS.—Made from cable 1,500 feet below gage or by wading.

CHANNEL AND CONTROL.—Channel wide and of fairly uniform cross section at measuring section; covered with gravel and small boulders. Control formed by rock ledge 100 feet below gage; well defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.5 feet at 7 a. m. April 6 (discharge, by extension of rating curve, 14,300 second-feet); minimum stage recorded during year, 2.05 feet at 7 a. m. June 27 (discharge, by extension of rating curve, 19 second-feet).

1915–1923: Maximum stage recorded, 16.9 feet, April 12, 1922 (discharge, by extension of rating curve, 24,500 second-feet); minimum stage recorded, that of June 27, 1923 (discharge, by extension of rating curve, 19 second-feet). The high water of March 27, 1913, reached a stage of 18.9 feet, as determined from reference point on scale platform opposite gage (discharge, about 30,000 second-feet).

ICE.—River freezes over at gage; control usually remains partly open; although ice on rocks and along shore affects stage-discharge relation.

REGULATION.—There are several power plants on main stream and its tributaries above the station, the nearest being that of Vermont Copper Co. at Sharon; when this plant is in operation it causes some diurnal fluctuation in discharge at low stages. The effect of power plants farther upstream is practically eliminated by the large amount of pondage at Sharon.

ACCURACY.—Stage-discharge relation practically permanent, except when affected by ice. Rating curve well defined between 130 and 5,000 second-feet. Staff gage read to quarter-tenths twice daily. Daily discharge ascertained by applying rating table to mean daily gage heights, with corrections for effect of ice during winter. Records good.

Discharge measurements of White River at West Hartford, Vt., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 3	Hill and Armstrong	[a] 4.00	445	Apr. 26	H. F. Hill, jr	5.96	2,400
Mar. 17	H. F. Hill, jr	[a] 6.52	1,410	July 1	do	3.47	331

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of White River at West Hartford, Vt., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	148	215	247	345	440	330	960	5,300	652	265	187	124
2	122	215	395	4,360	450	350	1,040	3,820	652	200	187	112
3	150	215	345	2,700	440	360	925	3,140	530	187	170	108
4	155	230	305	1,460	410	400	3,640	2,700	590	187	150	100
5	158	230	325	860	340	450	8,950	2,440	590	215	172	108
6	247	230	305	740	400	420	13,800	2,080	717	187	160	100
7	175	247	265	660	390	400	9,790	1,860	855	167	172	102
8	187	230	175	560	400	360	9,580	1,650	1,040	162	162	102
9	560	305	247	600	380	330	8,320	1,860	1,860	152	157	118
10	960	445	265	560	370	300	5,500	2,990	1,750	167	132	285
11	652	395	230	820	340	300	4,730	2,440	1,200	175	130	144
12	395	305	230	720	320	330	6,500	2,200	890	157	118	120
13	305	305	265	700	330	310	4,730	2,440	717	148	112	112
14	265	265	285	660	340	310	3,640	2,200	590	130	116	110
15	230	247	247	620	330	290	3,140	1,970	472	124	116	118
16	200	445	230	600	320	340	2,840	2,700	445	187	132	118
17	230	345	200	540	330	1,100	2,440	2,700	420	247	138	116
18	230	345	215	520	320	1,250	2,320	2,320	420	230	120	118
19	230	305	215	520	320	1,100	2,200	1,860	420	187	120	110
20	230	325	200	490	320	900	2,080	1,550	370	162	124	104
21	230	395	215	480	340	780	4,540	1,550	285	175	112	157
22	230	500	200	620	300	920	6,900	2,200	325	140	104	370
23	187	395	200	740	300	2,080	5,700	1,650	140	130	116	247
24	265	345	200	700	300	5,900	3,640	1,460	162	140	112	157
25	500	325	200	580	300	3,300	2,840	1,280	54	142	110	157
26	345	265	200	560	300	2,440	2,440	1,120	39	162	110	136
27	114	247	175	520	340	1,750	2,320	1,040	81	140	102	152
28	148	230	200	520	340	1,650	2,700	925	187	187	102	136
29	230	285	175	520	-------	1,040	11,700	890	187	395	110	136
30	247	230	175	500	-------	1,370	7,700	750	247	530	104	136
31	230	-------	210	500	-------	1,200	-------	750	-------	200	108	-------

NOTE.—Stage-discharge relation affected by ice Dec. 22-31 and Jan. 5 to Mar. 22; discharge for these periods based on gage heights corrected for effect of ice by means of discharge measurements, observer's notes, and weather records.

Monthly discharge of White River at West Hartford, Vt., for the year ending Sept. 30, 1923

[Drainage area, 687 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	960	114	276	0.402	0.46
November	500	215	302	.439	.49
December	395	175	237	.345	.40
January	4,360	345	815	1.18	1.36
February	450	300	350	.510	.53
March	5,900	290	1,040	1.51	1.74
April	13,800	925	4,920	7.16	7.99
May	5,300	750	2,060	3.00	3.46
June	1,860	39	563	.820	.91
July	530	124	193	.281	.32
August	187	102	131	.191	.22
September	370	100	140	.204	.23
The year	13,800	39	918	1.34	18.11

MASCOMA RIVER AT MASCOMA, N. H.

LOCATION.—On left bank, 250 feet below railroad bridge and 500 feet below outlet of Mascoma Lake, in Mascoma, Grafton County.

DRAINAGE AREA.—148 square miles (measured on Walker map).

RECORDS AVAILABLE.—August 16 to September 30, 1923.

GAGE.—Gurley seven-day water-stage recorder on left bank, referenced to gage datum by a hook gage inside well; an inclined staff is used for auxiliary readings. Recorder inspected by John Greeley.

DISCHARGE MEASUREMENTS.—Made from railroad bridge or by wading above railroad bridge.

CHANNEL AND CONTROL.—Channel opposite gage is a pool in which velocity is very low. Control is well defined at head of rapids 200 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during period August 16 to September 30, 2.08 feet from water-stage recorder at 2 p. m. to 5 p. m. August 18 (discharge, 95 second-feet); minimum stage, 1.71 feet from 8 p. m. to 10 p. m. September 27 (discharge, 36 second-feet).

ICE.—Not affected by ice.

REGULATION.—Operation of gates in storage dam 500 feet above gage causes considerable fluctuation in discharge during low-water periods.

ACCURACY.—Stage-discharge relation probably permanent. Rating curve well defined below 100 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying rating table to gage heights using weighted mean discharge for days when variations occurred from opening and closing gates at dam. Records good.

Discharge measurements of Mascoma River at Mascoma, N. H., during the period Aug. 16 to Sept. 30, 1923

[Made by H. F. Hill, jr.]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft*
Aug. 16	1.90	62	Sept. 2	1.82	59	Sept. 16	1.73	39.7
17	2.00	82	3	1.96	78	16	1.56	21.3
17	2.07	90	16	1.73	39.2	17	1.87	58
Sept. 2	1.82	63						

Daily discharge, in second-feet, of Mascoma River at Mascoma, N. H., for the period Aug. 16 to Sept. 30, 1923

Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.
1		71	11		61	21	82	51
2		51	12		61	22	80	51
2		66	13		58	23	78	40
4		66	14		58	24	78	50
5		63	15		54	25	77	49
6		63	16	77	41	26	64	52
7		63	17	85	53	27	79	49
8		62	18	86	52	28	79	55
9		53	19	67	52	29	79	55
10		63	20	85	52	30	77	45
						31	78	

WEST RIVER AT NEWFANE, VT.

LOCATION.—At covered highway bridge 1¼ miles northeast of Newfane, Windham County.

DRAINAGE AREA.—310 square miles.

RECORDS AVAILABLE.—September 13, 1919, to September 30, 1923.

GAGE.—Chain on downstream side of highway bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Gravel and ledge; well-defined riffle just above island 800 feet below gage; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.1 feet at 8 a. m. April 29 (discharge, by extension of rating curve, 5,930 second-feet); minimum stage recorded during year, 3.64 feet several times during July and August (discharge, by extension of rating curve, 46 second-feet).

1919–1923: Maximum stage recorded, 12.0 feet April 12, 1922 (approximate discharge, by extension of rating curve, 8,120 second-feet); minimum stage recorded, 3.55 feet September 10, 1921 (discharge, by extension of rating curve, 35 second-feet).

ICE.—River freezes over and stage-discharge relation seriously affected.

REGULATION.—A few small mills above station do not seriously affect distribution of flow.

ACCURACY.—Stage-discharge relation apparently permanent except when affected by ice. Rating curve fairly well defined between 70 and 2,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying rating table to mean daily gage heights, with corrections for effect of ice during winter. Records good.

Discharge measurements of West River at Newfane, Vt., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Feb. 1	Armstrong and Hill	[a] 5.46	255
May 8	H. F. Hill, jr.	4.58	450
8	do	4.56	413

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of West River at Newfane, Vt., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	55	100	106	560	260	195	678	1,680	158	73	754	63
2	48	88	192	1,990	260	200	570	1,310	158	63	97	63
3	52	80	265	1,100	260	180	933	968	146	63	92	57
4	55	88	180	430	230	210	2,510	848	127	63	85	57
5	55	95	192	290	220	260	5,090	737	121	69	73	53
6	55	106	225	230	220	280	5,190	610	127	63	63	53
7	55	292	130	170	220	240	4,370	530	210	63	63	53
8	80	352	106	190	210	210	3,850	413	1,140	57	63	53
9	115	309	160	210	210	170	3,130	1,220	1,100	53	63	85
10	130	265	160	190	200	145	2,190	1,630	703	53	53	103
11	206	206	160	170	195	185	1,940	1,100	392	46	53	85
12	170	150	170	160	190	200	2,610	959	260	46	53	73
13	124	130	165	160	240	180	2,190	1,350	210	46	53	73
14	106	130	155	170	240	160	1,580	986	174	46	53	73
15	88	130	150	195	210	150	1,310	788	146	46	53	73
16	88	225	160	210	210	165	1,130	1,120	121	434	53	63
17	95	170	185	175	240	720	1,060	1,220	103	392	53	63
18	88	138	200	160	230	860	907	856	103	134	46	53
19	75	138	190	140	210	820	865	644	97	112	50	53
20	75	138	170	145	195	600	882	538	85	103	69	53
21	75	292	160	195	210	520	3,230	434	85	92	63	97
22	75	215	165	500	210	470	3,130	924	73	73	63	210
23	75	162	160	470	190	980	2,720	644	73	57	57	188
24	100	162	160	430	210	3,650	1,680	507	73	69	53	210
25	124	215	160	400	220	2,820	1,400	392	73	63	50	166
26	100	170	160	350	220	1,580	1,080	346	73	57	46	112
27	100	150	155	310	220	1,310	1,060	220	73	69	46	127
28	100	115	160	300	190	950	1,400	260	73	166	46	97
29	100	124	175	300	-------	780	5,300	250	73	326	134	103
30	115	130	190	280	-------	848	2,510	201	73	346	97	112
31	106	-------	210	280	-------	763	-------	174	-------	210	69	-------

NOTE.—Stage-discharge relation affected by ice Dec 9–31 and Jan. 4 to Mar. 23; discharge for these periods based on gage heights corrected for effect of ice by means of one discharge measurement, observer's notes, and weather records.

Monthly discharge of West River at Newfane, Vt., for the year ending Sept. 30, 1923

[Drainage area, 310 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	206	48	93.1	0.300	0.35
November	352	80	169	.545	.61
December	265	106	170	.548	.63
January	1,990	140	350	1.13	1.30
February	260	190	219	.706	.74
March	3,650	145	671	2.16	2.49
April	5,300	570	2,220	7.16	7.99
May	1,680	174	770	2.48	2.86
June	1,140	73	214	.690	.77
July	434	46	115	.371	.43
August	754	46	86.0	.277	.32
September	210	53	90.8	.293	.33
The year	5,300	46	429	1.38	18.82

ASHUELOT RIVER NEAR GILSUM, N. H.

LOCATION.—60 feet above stone-arch highway bridge on Keene-Newport road, 1 mile below Gilsum and 8 miles north of Keene, Cheshire County.

DRAINAGE AREA.—68.5 square miles (measured on Hitchcock map).

RECORDS AVAILABLE.—August 18, 1922, to September 30, 1923.

GAGE.—A continuous water-stage recorder on right bank, referenced to gage datum by hook gage inside the well; an inclined staff is used for auxiliary readings. Recorder inspected by employee of Keene Gas & Electric Co.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge.

CHANNEL AND CONTROL.—Channel rough, with steep slope; control formed by rocks and boulders near highway bridge.

EXTREMES OF DISCHARGE.—Maximum stage during the period August 18, 1922, to September 30, 1923, from water-stage recorder, 8.25 feet at 4 p. m. April 29 (discharge, by extension of rating curve, 1,460 second-feet); minimum discharge approximately 1 second-foot October 6 and July 10, when water was held back by dams.

REGULATION.—Flow affected by operation of mills at Gilsum. Several lakes and ponds above gage provide opportunity for storage, but little if any utilization is made of the storage.

ACCURACY.—Stage-discharge relation changed during high water of April, 1923; two rating curves used during year; both curves well defined below 70 second-feet and fairly well defined below 1,100 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying rating table to mean daily gage heights, with correction for ice during winter. Records good.

Discharge measurements of Ashuelot River near Gilsum, N. H., during the period Aug. 17, 1922, to Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1922		*Feet*	*Sec.-ft.*	1923		*Feet*	*Sec.-ft.*
Aug. 17	J. S. S. Jones	1.70	18.4	Jan. 30	Armstrong and Hill	[a]3.40	103
18	do	1.99	33.0	Feb. 23	H. F. Hill, jr	[a]2.19	41.6
Sept. 12	do	2.04	40.9	Apr. 6	do	7.74	[b]1,080
13	do	2.38	69	6	do	7.86	[b]1,100
13	do	2.32	68	June 22	do	1.82	31.2
Oct. 6	Armstrong and Granger	1.45	8.4	22	do	1.73	23.9
Nov. 22	W. E. Armstrong	2.46	72	Aug. 17	do	1.56	18.0
Dec. 30	do	[a]2.02	11.1	18	do	1.33	9.4
				18	do	1.31	8.9
				Sept. 27	do	2.28	70

[a] Stage-discharge relation affected by ice. [b] Accuracy doubtful.

Daily discharge, in second-feet, of Ashuelot River near Gilsum, N. H., for the period Aug. 18, 1922, to Sept. 30, 1923

Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.
1		43	11		32	21	27	20
2		36	12		39	22	29	24
3		32	13		53	23	30	24
4		32	14		36	24	25	19
5		36	15		57	25	30	18
6		39	16		120	26	72	14
7		36	17		97	27	77	13
8		32	18	28	63	28	89	10
9		31	19	39	64	29	96	11
10		30	20	33	48	30	77	11
						31	56	

Daily discharge, in second-feet, of Ashuelot River near Gilsum, N. H., for the period Aug. 18, 1922, to Sept. 30, 1923—Continued

Day	Oct	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	10	33	39	230	82	43	125	825	37	15	46	28
2	8.1	20	22	555	62	43	120	580	33	14	44	22
3	6.5	21	20	505	45	43	120	405	34	10	25	18
4	6.0	34	17	230	37	39	393	307	32	11	24	19
5	5.8	27	13	198	49	43	910	259	25	17	25	25
6	5.8	31	17	175	64	52	1,300	239	25	14	20	22
7	7.0	48	22	145	49	52	1,240	220	27	13	25	23
8	6.2	53	38	135	48	36	1,210	203	51	10	27	23
9	11	52	42	100	45	29	1,120	187	73	8.0	30	24
10	23	50	40	84	40	26	825	172	60	1.6	22	21
11	74	44	41	78	36	23	635	158	33	4.8	27	24
12	107	31	50	78	43	26	580	145	26	25	20	13
13	74	41	56	84	45	29	505	182	26	27	27	16
14	53	43	52	52	35	29	425	174	23	25	30	9.5
15	41	42	58	62	37	29	359	150	26	25	18	6.9
16	39	45	54	62	43	43	315	147	32	71	25	4.1
17	39	43	56	62	36	190	283	148	22	63	18	17
18	38	33	58	66	31	220	259	130	22	44	19	11
19	30	31	60	62	32	175	235	106	18	40	19	8.0
20	36	45	64	62	45	155	227	96	16	33	23	9.5
21	32	82	70	135	40	96	307	100	17	33	31	44
22	30	72	78	270	34	90	455	135	18	27	33	51
23	28	59	80	270	34	96	530	123	15	22	23	35
24	45	41	50	270	39	270	505	111	16	33	23	42
25	47	37	38	170	47	300	435	94	16	48	26	51
26	35	43	23	155	43	260	341	86	15	40	17	44
27	39	70	25	140	32	160	291	65	15	36	20	34
28	33	72	19	125	39	125	307	55	19	44	25	30
29	28	49	16	115	-------	96	1,210	52	16	67	96	34
30	24	43	14	100	-------	90	1,150	42	19	54	50	30
31	35	-------	12	84	-------	90	-------	43	-------	44	33	-------

NOTE.—Stage-discharge relation affected by ice Dec. 6–31 and Jan. 7 to Apr. 3; discharge for these periods based on gage heights corrected for effect of ice.

Monthly discharge of Ashuelot River near Gilsum, N. H., for the period Aug. 18, 1922, to Sept. 30, 1923

[Drainage area, 68.5 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1922					
August 18–31	96	25	50.6	0.739	0.38
September	120	10	37.3	.545	.61
1922–23					
October	107	5.8	32.1	.469	.54
November	82	20	44.5	.650	.73
December	80	12	40.1	.585	.67
January	555	52	157	2.29	2.64
February	82	31	43.3	.632	.66
March	300	23	96.7	1.41	1.63
April	1,300	120	557	8.13	9.07
May	825	42	185	2.70	3.11
June	73	15	26.9	.393	.44
July	71	1.6	29.7	.434	.50
August	96	17	28.7	.419	.48
September	51	4.1	24.6	.359	.40
The year	1,300	1.6	105	1.53	20.87

ASHUELOT RIVER AT HINSDALE, N. H.

LOCATION.—At lower steel highway bridge a quarter of a mile below dam of Fisk Paper Co. and 1¼ miles above mouth of river at Hinsdale, Cheshire County.

DRAINAGE AREA.—440 square miles.

RECORDS AVAILABLE.—February 22, 1907, to December 31, 1909, and July 11, 1914, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge, read by Teresa Golden.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Channel covered with coarse gravel and boulders. Control is a short distance below gage and is practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.54 feet at 4 p. m. April 7 (discharge, by extension of rating curve, 5,250 second-feet); minimum stage recorded, 1.87 feet at 8 p. m. August 12 (discharge, by extension of rating curve, 5 second-feet).

1914–1923: Maximum stage recorded, 9.98 feet March 29, 1920 (discharge, by extension of rating curve, 8,940 second-feet); minimum stage recorded that of August 12, 1923.

ICE.—Ice forms below bridge on control, affecting stage-discharge relation for short periods.

REGULATION.—The mills immediately above station are operated continuously except Sundays and holidays, but cause little fluctuation in stage. Several reservoirs and ponds on the river and its tributaries have some effect on distribution of flow.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve fairly well defined below 4,000 second-feet. Gage read to hundredths twice daily. Discharge ascertained by applying rating table to mean daily gage heights, with corrections for effect of ice during winter. Records good.

Discharge measurements of Ashuelot River at Hinsdale, N. H., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 6	Granger and Armstrong	2.95	137	June 22	H. F. Hill, jr	3.01	179
Jan. 30	Hill and Armstrong	[a]4.60	475	Aug. 18	do	2.78	86
Feb 28	H. F. Hill, jr	[a]3.61	308	19	do	2.60	67

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Ashuelot River at Hinsdale, N. H., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	124	197	212	375	430	260	780	4,150	330	75	310	167
2	340	215	255	1,050	400	260	740	2,860	340	120	247	94
3	150	273	145	1,550	380	280	740	2,300	247	167	219	139
4	173	255	206	1,210	380	350	1,670	1,610	282	176	176	46
5	142	68	191	1,000	430	380	3,860	1,370	247	145	139	167
6	137	223	167	770	400	460	4,740	1,210	286	155	129	150
7	176	330	255	700	380	560	5,190	900	320	167	170	139
8	158	430	282	660	380	700	4,740	900	520	65	167	86
9	520	375	179	620	350	780	4,440	950	770	106	145	62
10	555	185	82	600	350	780	4,300	1,370	460	139	113	96
11	695	296	400	520	300	490	3,140	1,150	460	96	68	145
12	625	345	200	490	280	400	2,580	1,000	350	167	11	115
13	520	282	200	490	300	300	2,300	1,260	264	104	106	150
14	310	291	260	520	330	300	2,040	1,150	264	111	94	247
15	282	255	220	660	300	300	1,670	1,000	239	86	155	150
16	264	264	260	560	260	400	1,610	950	231	215	118	79
17	282	282	96	520	280	600	1,430	950	182	430	206	106
18	291	264	170	560	300	770	1,260	855	212	260	129	79
19	247	251	280	560	460	1,000	1,150	770	212	215	62	62
20	282	243	320	560	560	855	1,150	660	239	179	79	158
21	231	490	300	700	600	740	1,100	660	167	90	92	115
22	167	590	280	1,000	460	740	1,210	770	161	60	145	82
23	243	400	200	1,400	400	820	1,490	730	185	145	179	124
24	231	350	140	1,550	350	1,100	1,610	730	94	164	147	255
25	268	223	280	1,000	300	1,800	1,490	555	185	179	161	300
26	255	235	220	780	240	2,200	1,370	460	182	182	73	255
27	300	235	170	660	220	1,650	1,050	460	197	209	66	212
28	223	231	220	600	240	1,200	950	430	170	273	90	200
29	173	255	220	520	-------	860	2,720	350	215	490	203	282
30	231	260	240	490	-------	860	4,150	320	188	520	296	375
31	247	-------	220	460	-------	860	-------	340	-------	340	231	-------

NOTE.—Stage-discharge relation affected by ice Dec. 11-31, Jan. 7 to Mar. 17, and Mar. 21 to Apr. 3, daily discharge for these periods based on gage heights corrected for effect of ice.

Monthly discharge of Ashuelot River near Hinsdale, N. H., for the year ending Sept. 30, 1923

[Drainage area, 440 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	695	124	285	0.648	0.75
November	590	68	286	.650	.72
December	400	82	224	.509	.59
January	1,550	375	746	1.69	1.95
February	600	220	360	.818	.85
March	2,200	260	744	1.70	1.96
April	5,190	740	2,220	5.05	5.63
May	4,150	320	1,070	2.43	2.80
June	770	94	273	.620	.69
July	520	60	188	.427	.49
August	310	11	146	.332	.38
September	375	46	154	.350	.39
The year	5,190	11	558	1.27	17.20

SOUTH BRANCH OF ASHUELOT RIVER AT WEBB, NEAR MARLBORO, N. H.

LOCATION.—At highway bridge on State road between Keene and Troy, one-fourth mile from Webb railroad station, Marlboro, Cheshire County.

DRAINAGE AREA.—36.6 square miles (measured on topographic map).

RECORDS AVAILABLE.—November 16, 1920, to September 30, 1923.

GAGES.—Friez water-stage recorder on right bank, downstream side of bridge, referenced to gage datum by hook gage inside well; inclined staff is used for auxiliary readings. Recorder inspected by W. L. Goodell.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Large pool opposite gage, water swift above and below. Control is formed by boulders 50 feet below gage; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 5.2 feet at 9 a. m. April 29 (discharge, from extension of rating curve, 1,020 second-feet); minimum stage during year, from water-stage recorder, 1.00 foot at 9 p. m. September 12 (discharge, by extension of rating curve, 2.5 second-feet).

1920–1923: Maximum open-water stage from water-stage recorder, that of April 29, 1923 (a stage of 5.8 feet was recorded at 10 p. m. March 9, 1921, but the channel was obstructed by ice at the time); minimum discharge by water-stage recorder, that of September 12, 1923.

ICE.—Channel obstructed by ice during winter.

REGULATION.—Distribution of flow affected by operation of mills at Troy, 4 miles upstream; several small storage ponds on main stream and tributaries above gage.

ACCURACY.—Stage-discharge relation not permanent, owing to movement of rocks at control; apparently no change occurred during year. Rating curve fairly well defined between 3 and 500 second-feet. Operation of water-stage recorder satisfactory except for periods indicated in footnote to daily-discharge table. Daily discharge October 1 to December 6 and March 26 to June 30 ascertained by use of discharge integrator; for remainder of year by application of rating table to mean daily gage heights, as determined from inspection of recorder sheets, with correction for effect of ice during winter. Records good.

Discharge measurements of South Branch of Ashuelot River at Webb, near Marlboro, N. H., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft*
Oct. 5	Armstrong and Granger	1.21	7.1	Apr. 7	H. F. Hill, jr	3.64	474
Nov. 23	W. E. Armstrong	1.87	54	7	do	3.55	442
23	do	1.93	57	June 21	do	1.83	49.6
Dec. 30	do	*1.54	19.9	July 27	C. H. Pierce	1.09	4.4
Jan. 29	do	*3.90	71	Aug. 19	H. F. Hill, jr	1.03	3.2
Feb. 24	H. F. Hill, jr	*2.32	26.9	19	do	1.03	3.
24	do	*3.16	34.2				

*Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of South Branch of Ashuelot River at Webb, near Marlboro, N. H., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.4	29	18	80	35	9	114	280	28	5.6	7	9.8
2	14	30	26	270	31	11	108	198	22	10	7	4.4
3	12	30	22	190	24	9	118	146	14	18	9.4	4.2
4	9.8	25	30	118	31	11	430	120	24	5.6	6.5	5.6
5	8.2	14	18	90	35	31	665	96	24	7.0	4.6	9.0
6	9	24	20	68	35	27	630	89	24	5.3	11	3.5
7	7	42	24	80	33	17	525	92	58	5.8	5.1	5.3
8	20	42	31	90	33	14	490	81	104	6.5	5.1	3.8
9	66	46	28	98	31	11	400	97	65	9.0	9.0	3.5
10	67	37	25	88	29	11	285	106	41	3.3	4.8	3.1
11	76	26	31	88	24	9	245	76	36	3.1	6.3	4.2
12	51	23	20	88	31	11	230	74	32	2.7	4.6	2.9
13	38	32	31	88	47	11	190	116	28	2.7	7.8	6.3
14	30	25	27	74	39	14	150	96	26	5.1	4.2	10
15	21	30	31	68	58	20	134	72	17	7.0	3.8	13
16	30	30	24	58	31	24	128	76	16	13	3.3	6.0
17	30	28	11	58	17	135	106	94	8.6	34	3.3	13
18	32	26	39	52	7	43	108	74	23	21	3.3	5.1
19	23	20	39	52	27	39	96	50	15	16	3.3	5.1
20	28	61	33	43	16	43	97	47	19	5.3	9.8	4.8
21	22	90	31	68	9	47	110	62	25	9.8	3.3	5.6
22	12	47	14	145	7	52	112	87	12	3.5	13	28
23	26	41	17	88	14	98	140	64	8	4.0	10	35
24	36	44	19	58	11	240	128	54	7.8	4.2	9.4	46
25	32	51	17	52	5.8	230	92	44	16	5.6	4.8	40
26	31	36	39	47	11	220	74	32	13	5.3	4.4	22
27	30	64	24	39	14	188	65	23	12	4.2	4.2	25
28	26	37	24	39	11	166	116	34	11	27	4.0	16
29	19	24	11	31	-------	192	805	34	12	39	6.3	49
30	29	21	14	35	-------	136	460	20	14	42	6.5	23
31	24	-------	18	31	-------	91	-------	29	-------	13	18	-------

NOTE.—Stage-discharge relation affected by ice Dec. 7 to Mar. 25; discharge for this period based on gage heights corrected for effect of ice. Clock not in operation Oct. 1–4, June 18–21, 26–27, July 31, Aug. 1–2, 14–15; discharge for these periods estimated by comparison with records in adjacent drainage basins.

Monthly discharge of South Branch of Ashuelot River at Webb, near Marlboro, N. H., for the year ending Sept. 30, 1923

[Drainage area, 36.6 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	76	7.4	27.9	0.762	0.88
November	90	14	35.8	.978	1.09
December	39	11	24.4	.667	.77
January	270	31	79.8	2.18	2.51
February	58	5.8	24.9	.680	.71
March	240	9	69.7	1.90	2.19
April	805	65	245	6.69	7.46
May	280	20	82.7	2.26	2.61
June	104	7.8	25.2	.689	.77
July	42	2.7	11.1	.303	.35
August	18	3.3	6.6	.180	.21
September	49	2.9	13.7	.374	.42
The year	805	2.7	53.8	1.47	19.97

MILLERS RIVER NEAR WINCHENDON, MASS.

LOCATION.—At steel highway bridge known as Nolan's bridge, half a mile below mouth of Sip Pond Brook and 2 miles west of Winchendon, Worcester County.

DRAINAGE AREA.—80.0 square miles.

RECORDS AVAILABLE.—June 5, 1916, to September 30, 1923.

GAGES.—Water-stage recorder on right bank below highway bridge referenced to gage datum by hook gage inside well. Staff on bridge abutment used for auxiliary readings. Recorder inspected by H. D. Sawyer.

DISCHARGE MEASUREMENTS.—Made from the highway bridge or by wading.

CHANNEL AND CONTROL.—Channel covered with gravel and alluvial deposits. Control for low and medium stages is gravel bar 80 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 8.2 feet at 5 p. m. April 30 (discharge, by extension of rating curve, 1,160 second-feet); minimum stage from water-stage recorder, 2.72 feet at noon July 5 (discharge, by extension of rating curve, 13 second-feet; water held back by dams).

1916–1923: Maximum stage recorded, 8.65 feet June 25, 1922 (discharge, by extension of rating curve, 1,280 second-feet); minimum stage recorded, 2.02 feet at 5 a. m. September 20, 1918 (discharge, practically zero; water held back by dams).

ICE.—Ice cover usually forms during winter and, owing to large diurnal fluctuation caused by operation of power plants near Winchendon, water frequently overflows ice.

REGULATION.—The distribution of flow is affected by operation of power plants at and below Winchendon and by storage in Lake Monomonac and other reservoirs.

ACCURACY.—Stage-discharge relation somewhat shifting on account of gravel bar 80 feet below gage. Two well-defined rating curves used during the year. Operation of water-stage recorder was satisfactory throughout year with exception of periods indicated in footnote to daily-discharge table. Daily discharge for open-water periods ascertained by discharge integrator and during winter by applying rating table to mean daily gage heights with corrections for effect of ice. Records good for open-water periods when water-stage recorder was in operation, and fair for other times.

Discharge measurements of Millers River near Winchendon, Mass., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 5	Armstrong and Granger	3.19	36.9	Mar. 31	H. F. Hill, jr	4.21	246
Jan. 10	W. E. Armstrong	*5.14	151	May 16	Armstrong and Pierce	4.41	294
Feb. 17	do	*6.10	230	July 6	W. E. Armstrong	3.39	122
Mar. 31	H. F. Hill, jr	4.23	256	13	do	3.66	168

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Millers River near Winchendon, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	38	72	50	74	135	115	160	920	108		108	35
2	59	65	38	270	150	125	280	600	72		94	21
3	60	63	23	300	125	105	400	450	29	52	94	47
4	55	43	41	280	84	48	700	330	90		78	57
5	58	26	53	260	125	105	960	250	110		34	43
6	66	44	58	240	135	125	1,010	210	102	80	66	44
7	46	78	84	195	150	135	920	285	80	59	86	49
8	34	92	56	125	135	135	860	210	110	27	104	41
9	66	77	31	115	150	125	820	210	114	28	80	30
10	76	82	27	115	150	125	720	205	42	48	31	38
11	125	54	48	105	84	48	540	200	106	69	68	41
12	110	34	56	115	150	150	500	164	112	80	28	37
13	125	65	84	105	170	160	455	140	106	70	80	41
14	80	54	74	64	170	170	400	250	95	66	82	43
15	35	68	84	115	160	210	355	225	88	21	63	53
16	75	66	27	105	170	340	395	200	70	57	64	21
17	85	62	20	94	190	410	350	205	26	72	78	35
18	94	64	42	105	84	390	295	174	74	66	55	51
19	80	36	56	84	150	490	265	138	70	66	29	49
20	74	55	64	36	150	470	240	70	81	66	53	51
21	33	76	84	84	170	450	200	176		44	63	39
22	22	69	94	190	170	430	194	182		28	70	23
23	64	58	84	290	150	410		184	57	72	72	26
24	144	66	20	300	94	370		174		78	56	31
25	130	45	20	290	56	365	185	166		74	40	39
26	90	24	74	260	125	385		130		64	33	32
27	76	47	105	230	105	360	285	64		70	60	26
28	62	48	94	170	125	340	184	142	55	72	49	32
29	28	48	105	210	-------	330	650	138		42	59	32
30	39	26	64	190	-------	270	1,060	40		76	59	21
31	72	-------	27	170	-------	220	-------	106	-------	95	70	-------

NOTE.—Stage-discharge relation affected by ice Dec. 7 to Jan. 1 and Jan. 8 to Mar. 24; daily discharge for these periods based on gage heights corrected for effect of ice. Water-stage recorder not in operation Oct. 11–17, Dec. 18, 19, Jan. 13–31, Mar. 4–7, Apr. 23–26, and June 21 to July 5; discharge for these periods stimated by comparisons with other stations in the Millers River basin.

Monthly discharge of Millers River near Winchendon, Mass., for the year ending Sept. 30, 1923

[Drainage area, 80.0 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	144	22	71.0	0.888	1.02
November	92	24	56.9	.711	.79
December	105	20	57.6	.720	.83
January	300	36	171	2.14	2.47
February	190	56	136	1.70	1.77
March	490	48	255	3.19	3.68
April	1,060	160	465	5.81	6.48
May	920	40	224	2.80	3.23
June	114	26	74.8	.935	1.04
July	95	21	59.7	.746	.86
August	108	28	64.7	.809	.93
September	57	21	37.6	.470	.52
The year	1,060	20	139	1.74	23.62

MILLERS RIVER AT ERVING, MASS.

LOCATION.—One-fourth mile below dam at Erving, Franklin County, 8 miles above confluence of Millers River with Connecticut River, and below all important tributaries.

DRAINAGE AREA.—372 square miles.

RECORDS AVAILABLE.—August 1, 1914, to September 30, 1923.

GAGE.—Stevens water-stage recorder on right bank, referred to gage datum by hook gage inside well; vertical staff attached to downstream end of factory wall is used for auxiliary readings. Recorder inspected by Napoleon Lemire.

DISCHARGE MEASUREMENTS.—Made from cable near gage or by wading.

CHANNEL AND CONTROL.—Channel covered with coarse gravel and boulders; control section is a short distance below gage and remained practically permanent until July, 1922, when débris deposited at right bank somewhat affected the control.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 5.44 feet at 3.45 a. m. April 7 (discharge, 5,050 second-feet); minimum stage, from water-stage recorder, 1.00 feet at 9 a. m. August 27 (discharge, 10 second-feet; water held back by dams).

1914–1923: Maximum open-water stage recorded, 5.74 feet at 10 a. m. March 28, 1920 (discharge, 5,800 second-feet; a stage of 5.97 feet was recorded at 8.30 a. m. February 27, 1918, but the stage-discharge relation was affected by ice); minimum discharge, practically zero at various times during 1915 and 1916, when water was held back by dams above gage.

ICE.—River freezes over below gage at various times during winter; ice considerably broken by rising and falling stages due to power operations; stage-discharge relation is seriously affected.

REGULATION.—Distribution of flow affected by operation of various power plants and storage reservoirs above the station.

ACCURACY.—Stage-discharge relation practically permanent during the year, except when affected by ice. Rating curve well defined between 90 and 4,000 second-feet. Operation of water-stage recorder satisfactory throughout year. Daily discharge for open-water periods ascertained by use of discharge integrator, and during winter from mean daily gage heights corrected for effect of ice. Records good.

Discharge measurements of Millers River at Erving, Mass., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 7	Armstrong and Granger	2.13	271	Feb. 24	W. E. Armstrong	*3.58	398
Dec. 12	W. E. Armstrong	2.12	244	Mar. 29	H. F. Hill, jr.	3.74	1,490
Jan. 11	Hill and Armstrong	*3.28	841	May 15	Armstrong and Pierce	2.60	481

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Millers River at Erving, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	82	320	310	540	880	480	970	4,000	300	146	250	82
2	265	315	275	1,100	800	480	880	3,200	370	240	215	66
3	210	260	210	1,150	800	460	1,120	2,200	205	184	184	39
4	260	310	360	1,100	980	410	1,920	1,700	320	136	142	180
5	230	194	285	940	1,100	500	3,700	1,200	295	290	92	136
6	220	345	380	810	920	520	4,550	950	340	195	205	148
7	260	350	510	700	760	450	4,700	980	405	150	170	120
8	148	480	385	750	800	560	4,500	870	580	210	138	75
9	400	490	275	640	580	490	4,000	880	610	148	148	24
10	410	430	152	600	560	520	3,300	1,040	480	146	110	108
11	560	460	315	640	480	600	2,650	920	385	154	92	118
12	470	315	260	600	620	640	2,200	860	405	142	18	118
13	550	330	440	640	580	600	1,840	790	465	148	182	128
14	500	310	455	660	560	580	1,660	950	380	112	158	106
15	166	340	295	570	600	600	1,440	850	330	66	120	78
16	430	355	380	510	640	800	1,300	800	320	136	132	24
17	275	345	162	540	560	1,150	1,280	780	205	140	126	104
18	335	290	420	640	640	1,450	1,160	780	355	146	122	96
19	360	235	375	540	660	1,600	940	680	230	102	22	97
20	340	385	420	570	640	2,000	950	450	250	126	110	90
21	210	395	415	700	600	1,550	900	570	255	90	134	45
22	235	410	410	1,300	540	1,500	750	730	255	66	130	54
23	330	375	325	1,400	540	1,650	810	770	196	160	132	24
24	370	385	176	1,550	540	2,150	850	660	192	138	152	120
25	520	380	240	1,350	370	2,350	940	610	285	140	82	118
26	455	174	285	1,400	580	2,350	830	560	215	158	19	118
27	380	405	345	1,200	540	2,050	780	350	240	142	102	112
28	350	385	355	960	500	1,800	790	470	215	170	136	116
29	260	290	335	1,050	-------	1,440	2,550	400	225	140	140	73
30	380	240	630	1,100	-------	1,400	3,950	355	186	355	158	22
31	280	-------	480	1,050	-------	1,200	-------	325	-------	295	126	-------

NOTE.—Stage-discharge relation affected by ice Jan. 7–22 and Jan. 29 to Mar. 17; daily discharge for these periods based on gage heights corrected for effect of ice.

Monthly discharge of Millers River at Erving, Mass., for the year ending Sept. 30, 1923

[Drainage area, 372 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	560	82	330	0.887	1.02
November	490	174	343	.922	1.03
December	630	152	344	.925	1.07
January	1,550	510	881	2.37	2.73
February	1,100	370	656	1.76	1.83
March	2,350	410	1,110	2.98	3.44
April	4,700	750	1,940	5.22	5.82
May	4,000	325	990	2.66	3.07
June	610	186	316	.849	.95
July	855	66	160	.430	.50
August	250	18	131	.352	.41
September	180	22	91.3	.245	.27
The year	4,700	18	606	1.63	22.14

SIP POND BROOK NEAR WINCHENDON, MASS.

LOCATION.—500 feet above highway bridge, one-fourth mile below Massachusetts-New Hampshire State line, 1½ miles below outlet of Sip Pond, and 3 miles northwest of Winchendon, Worcester County.

DRAINAGE AREA.—18.8 square miles.

RECORDS AVAILABLE.—May 29, 1916, to September 30, 1923.

GAGES.—Gurley graph water-stage recorder on left bank 500 feet above highway bridge, with hook gage inside well; a vertical staff is used for auxiliary readings. Prior to June 26, 1917, an inclined staff on right bank 50 feet above highway bridge was used. Recorder inspected by Mary N. Greenall.

DISCHARGE MEASUREMENTS.—Made from footbridge or by wading.

CHANNEL AND CONTROL.—Channel fairly uniform in section in vicinity of gage; control clearly defined about 100 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 8.97 feet at noon April 6 (discharge, 269 second-feet); minimum stage from water-stage recorder, 4.77 feet at 11 p. m. September 17 (discharge, 1.2 second-feet).

1916–1923: Maximum stage recorded, 9.34 feet at 1 p. m. May 23, 1919 (discharge, by extension of rating curve, 339 second-feet); minimum discharge during period, 1.1 second-feet, August 16, 1919.

ICE.—Channel usually remains open during winter, although stage-discharge relation is occasionally affected, and ice forms in float well, interfering with operation of water-stage recorder.

REGULATION.—Distribution of flow is considerably affected by operation of mills at State Line, N. H., and by storage in Pearly and Sip ponds.

ACCURACY.—Stage-discharge relation subject to slight changes. Rating curve well defined below 250 second-feet. Operation of water-stage recorder was generally satisfactory throughout year except occasionally during winter, when it was affected by ice in float well. Daily discharge determined by applying rating table to mean daily gage heights with corrections for effect of ice during winter. Records good during open-water periods, and fair during winter.

Discharge measurements of Sip Pond Brook near Winchendon, Mass., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 10	W. E. Armstrong	[a]6.15	23.5	May 16	Armstrong and Pierce	6.15	33.4
Feb 16	do	[a]6.71	29.0	July 12	W. E. Armstrong	5.40	8.4
Apr. 1	H. F. Hill, jr.	6.58	49.6	12	do	5.38	10.3
1	do	6.58	49.1				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Sip Pond Brook near Winchendon, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	6.8	24	19	32	37	20	63	200	17	8.2	14	3.5
2	18	20	17	44	32	18	66	123	10	8.4	15	3.3
3	16	18	14	30	32	16	60	92	17	7.6	14	5.8
4	13	19	18	32	30	10	92	76	14	8.2	12	4.0
5	14	9.6	22	34	28	14	200	76	17	7.2	10	5.2
6	11	24	13	28	30	16	261	60	16	7.6	14	4.3
7	9.1	26	12	28	32	13	250	48	16	7.8	15	3.1
8	8.6	28	10	26	37	14	250	38	19	8.4	12	3.2
9	27	28	19	22	22	14	250	38	13	8.6	10	5.1
10	32	30	6.6	26	20	13	200	38	18	9.6	8.4	3.2
11	34	30	15	24	20	14	160	34	21	10	7.8	3.0
12	34	23	17	24	24	18	132	36	19	9.4	11	3.6
13	34	27	12	26	22	22	114	48	23	9.0	9.4	3.3
14	28	28	10	26	20	20	96	34	21	5.9	10	3.1
15	16	30	10	22	22	20	92	34	26	5.6	11	2.9
16	23	27	15	22	20	20	88	32	15	11	7.6	3.6
17	26	26	12	24	20	20	69	32	9.0	10	10	1.2
18	18	23	9.9	20	16	16	69	30	16	9.4	4.2	1.3
19	15	16	11	20	20	26	60	34	13	9.2	6.8	2.2
20	24	32	12	20	18	37	51	24	13	8.4	7.2	2.7
21	23	34	15	24	18	32	48	34	11	9.4	4.4	2.6
22	13	30	9.6	30	18	34	51	36	10	8.2	3.9	2.3
23	24	28	9.3	32	18	42	57	32	7.0	7.4	7.0	2.6
24	32	27	8.0	37	16	57	60	30	11	9.0	4.2	2.2
25	25	23	7.8	37	16	76	54	30	11	11	4.7	2.0
26	26	20	12	34	16	88	48	19	11	11	3.9	2.0
27	24	10	9.3	34	18	84	40	13	8.6	9.4	4.2	1.9
28	19	13	8.8	32	22	88	40	19	9.4	15	5.3	4.3
29	12	11	8.6	32	-------	80	170	19	9.6	14	3.9	4.0
30	25	13	8.3	32	-------	69	240	16	7.8	16	5.1	3.7
31	26	-------	10	28	-------	63	-------	17	-------	16	3.7	-------

NOTE.—Stage-discharge relation affected by ice Jan. 7 to Mar. 23; discharge based on gage heights corrected for effect of ice.

Monthly discharge of Sip Pond Brook near Winchendon, Mass., for the year ending Sept. 30, 1923

[Drainage area, 18.8 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	34	6.8	21.2	1.13	1.30
November	34	9.6	23.3	1.24	1.38
December	22	6.6	12.3	.654	.75
January	44	20	28.5	1.52	1.75
February	37	16	23.0	1.22	1.27
March	88	10	34.6	1.84	2.12
April	261	40	114	6.06	6.76
May	200	13	44.9	2.39	2.76
June	26	7.0	14.3	.761	.85
July	16	5.6	9.55	.508	.59
August	15	3.7	8.38	.446	.51
September	5.8	1.2	3.17	.169	.19
The year	261	1.2	28.0	1.49	20.23

PRIEST BROOK NEAR WINCHENDON, MASS.

LOCATION.—At highway bridge 3 miles above confluence of Priest Brook and Millers River and 3½ miles west of Winchendon, Worcester County.

DRAINAGE AREA.—18.8 square miles.

RECORDS AVAILABLE.—May 25, 1916, to September 30, 1917, and July 18, 1918, to September 30, 1923.

GAGE.—Sloping staff on left bank 200 feet below highway bridge; read by Moses Supry and Louisa Thibault.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Channel above the station is straight with fairly uniform section and gravel bottom. Control is formed by foundation of an old dam 30 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.22 feet at 7.15 a. m. May 1 (discharge, by extension of rating curve, 457 second-feet); minimum stage recorded, 2.24 feet at 7.10 p. m. July 1 (discharge, 0.8 second-foot).

Maximum stage during the periods May 25, 1916, to September 30, 1917, and July 18, 1918, to September 30, 1923, estimated as 6.5 feet (water over top of gage) at 7 a. m. March 28, 1919 (discharge, by extension of rating curve, 700 second-feet); minimum discharge during these periods, 0.4 second-foot at 8 a. m. August 21, 1921.

ICE.—Brook freezes over at gage but usually remains open at control; stage-discharge occasionally affected.

REGULATION.—Flow not appreciably affected by regulation.

ACCURACY.—Stage-discharge relation permanent during year. Rating curves used well defined between 1 and 150 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying rating table to mean daily gage heights with corrections for ice during winter. Records good.

Discharge measurements of Priest Brook near Winchendon, Mass., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 10	Armstrong and Hill	[a] 3.27	28.8	May 16	W. E. Armstrong	3.36	44.0
Feb. 23	W. E. Armstrong	[a] 3.25	13.4	July 13	do	2.36	2.1
Mar. 31	H. F. Hill, jr	[a] 3.65	66				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Priest Brook near Winchendon, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3	13	5.8	15	33	17	50	305	20	2.0	18	1.6
2	3	5.1	19	58	33	18	70	173	12	1.6	11	1.7
3	3	17	11	63	30	19	61	101	12	1.5	5.8	1.4
4	5	5.8	7.1	60	29	21	138	96	10	1.7	4.4	1.4
5	9.8	14	9.0	45	31	25	248	72	14	1.6	3.6	1.3
6	3.0	5.1	17	47	29	27	292	56	6.8	2.0	3.4	1.3
7	2.4	25	5.8	41	32	26	324	50	30	2.0	3.4	1.3
8	5.8	23	5.1	33	28	26	303	45	33	2.3	7.1	1.3
9	30	25	8.0	30	25	26	292	36	48	1.5	6.4	1.5
10	19	19	5.8	25	24	28	256	43	24	1.3	2.9	1.5
11	23	25	5.8	25	24	24	155	37	17	1.2	2.3	2.7
12	24	15	15	24	23	23	149	38	37	1.0	2.0	1.4
13	23	9.8	6.4	24	22	22	103	52	14	1.2	2.2	2.0
14	17	14	5.8	23	21	23	106	42	11	.9	3.4	1.8
15	11	19	9.0	21	21	25	84	46	10	.9	1.7	1.5
16	14	15	8.0	23	21	28	83	44	5.6	5.8	7.4	1.4
17	19	9.8	9.8	24	20	32	74	45	4.6	7.7	2.4	1.4
18	15	9.0	8.0	23	20	39	63	43	5.1	2.4	1.3	1.3
19	12	12	6.4	21	19	47	57	37	6.8	2.0	1.2	1.3
20	14	12	9.0	23	18	52	59	33	3.0	1.8	1.1	1.4
21	15	21	8.0	26	17	47	58	55	4.1	1.6	1.2	1.8
22	9.8	21	8.0	36	17	49	52	52	2.1	1.6	2.1	2.4
23	8.0	14	12	46	17	62	68	34	3.4	1.4	1.5	2.2
24	26	12	15	52	17	78	70	50	3.4	1.5	1.2	6.4
25	15	13	9.0	54	17	140	57	36	4.8	1.9	1.1	2.7
26	12	12	8.0	48	19	140	48	24	8.7	1.8	.9	1.8
27	14	7.1	7.4	46	18	130	46	15	1.6	1.4	.9	2.1
28	12	4.4	12	44	18	100	49	9.4	2.1	8.0	1.1	1.5
29	9.8	6.4	7.1	40	-------	84	239	20	3.3	24	5.3	4.8
30	3.9	9.8	7.1	36	-------	72	308	10	3.6	32	3.0	2.7
31	14	-------	9.0	33	-------	68	-------	8.7	-------	28	2.1	-------

NOTE.—Stage-discharge relation affected by ice Jan. 10 to Mar. 31; discharge for these periods based on gage heights, corrected for effect of ice. Gage not read Oct. 1–4, Feb. 12–22, and 24; discharge estimated by comparison with records at near-by stations.

Monthly discharge of Priest Brook near Winchendon, Mass., for the year ending Sept. 30, 1923

[Drainage area, 18.8 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	30	2.4	12.8	0.681	0.79
November	25	4.4	13.8	.734	.82
December	19	5.1	9.01	.479	.55
January	63	15	35.7	1.90	2.19
February	33	17	23.0	1.22	1.27
March	140	17	49.0	2.61	3.01
April	324	46	132	7.02	7.83
May	305	8.7	55.2	2.94	3.39
June	48	1.6	12.0	.638	.71
July	32	.9	4.70	.250	.29
August	18	.9	3.59	.191	.22
September	6.4	1.3	1.96	.104	.12
The year	324	.9	29.3	1.56	21.19

EAST BRANCH OF TULLY RIVER NEAR ATHOL, MASS.

LOCATION.—At highway bridge half a mile below mouth of Lawrence Brook and 3½ miles north of Athol, Worcester County.

DRAINAGE AREA.—50.2 square miles.

RECORDS AVAILABLE.—June 13, 1916, to September 30, 1923.

GAGE.—Vertical staff on downstream side of right abutment; read by W. A. Thompson.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Two channels under bridge, one channel above; 200 feet below gage the channel is divided by an island. Control well defined by rocks and boulders near head of island.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.9 feet at 7 a. m. April 6 and 7 a. m. April 7 (discharge, by extension of rating curve, 800 second-feet); minimum stage recorded, 0.28 foot several times during July and August (discharge, 2.8 second-feet).

1916–1923: Maximum stage recorded, 4.2 feet at 7 a. m. March 29, 1920 (discharge, by extension of rating curve, 1,000 second-feet); minimum stage recorded, 0.22 foot several times during August and September, 1921 (discharge, 2.2 second-feet).

ICE.—River freezes slightly along banks, but stage-discharge relation is seldom affected.

DIVERSIONS.—About half a mile below station water is at times diverted through a canal into Packard Pond. The following measurements of this diversion were made: October 7, 1922, 0.7 second-foot; July 12, 1923, no water diverted.

REGULATION.—Flow not seriously affected by regulation.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 300 second-feet. Gage read to hundredths twice daily, except from January 1 to March 17, when it was read once daily. Daily discharge ascertained by applying rating table to mean daily gage heights Records good.

Discharge measurements of East Branch of Tully River near Athol, Mass., during the year ending Sept. 3, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 7	Armstrong and Granger	0.66	11.7	May 15	Armstrong and Pierce	1.94	116
Mar. 30	H. F. Hill, jr.	2.25	176	July 12	W. E. Armstrong	.34	4.3

Daily discharge, in second-feet, of East Branch of Tully River near Athol, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	14	23	26	35	87	40	176	532	27	5.8	66	11
2	13	22	26	106	83	39	129	372	26	4.8	42	8.5
3	12	22	24	187	83	40	150	265	24	4.8	26	6.8
4	12	22	25	183	80	53	283	211	24	5.0	19	5.2
5	12	21	25	162	78	63	628	174	22	4.6	15	4.6
6	11	22	24	143	80	76	582	150	24	5.0	12	4.0
7	12	48	21	125	74	72	605	129	25	6.0	10	3.4
8	20	74	21	106	72	68	690	114	58	5.5	10	3.2
9	50	77	22	92	65	66	618	106	78	4.8	9.2	3.6
10	60	64	21	80	63	62	460	125	65	4.4	8.2	3.4
11	74	56	19	78	61	61	348	120	53	4.2	7.0	3.0
12	83	44	19	72	59	61	309	120	45	3.8	6.2	2.9
13	76	38	21	67	59	59	289	136	41	3.4	6.0	3.2
14	48	35	20	67	59	61	277	137	37	3.2	5.5	3.8
15	40	37	21	63	55	65	224	127	33	2.9	4.8	3.8
16	34	35	20	61	53	65	195	115	18	4.0	4.4	4.0
17	32	32	21	57	50	97	182	118	15	25	4.0	3.4
18	28	30	22	55	50	130	170	114	13	30	3.6	3.6
19	29	29	21	55	49	154	152	102	13	23	3.4	3.2
20	29	34	21	53	48	158	141	85	12	15	3.2	3.0
21	26	61	22	78	46	145	146	80	9.5	11	3.0	3.4
22	24	64	21	132	45	139	162	114	9.0	8.8	4.4	4.0
23	24	53	21	166	44	166	164	110	8.5	7.2	3.8	4.6
24	37	44	21	170	42	253	166	91	8.0	6.2	8.2	7.0
25	44	37	22	158	42	408	148	76	8.0	6.0	3.8	8.5
26	44	33	22	150	42	326	125	60	7.2	6.0	3.0	8.0
27	39	28	24	136	40	340	106	50	7.8	5.5	2.8	7.5
28	34	27	24	106	40	312	114	42	6.2	12	2.8	6.5
29	28	26	25	109	-------	289	452	37	6.0	61	9.2	7.5
30	26	25	25	103	-------	176	665	34	5.8	106	12	8.5
31	25	-------	24	95	-------	160	-------	31	-------	94	12	-------

NOTE.—Stage-discharge relation affected by ice Feb. 17 to Mar. 1 and Mar. 7-10; discharge based on gage heights corrected for effect of ice.

Monthly discharge of East Branch of Tully River near Athol, Mass., for the year ending Sept. 30, 1923

[Drainage area, 50.2 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	83	11	33.6	0.669	0.77
November	77	21	38.8	.773	.86
December	26	19	22.3	.444	.51
January	187	35	105	2.09	2.41
February	87	40	58.9	1.17	1.22
March	408	39	136	2.71	3.12
April	690	106	296	5.90	6.58
May	532	31	132	2.63	3.03
June	78	5.8	24.3	.484	.54
July	106	2.9	15.8	.315	.36
August	66	2.8	10.7	.213	.25
September	11	2.9	5.1	.101	.11
The year	690	2.8	73.2	1.46	19.76

MOSS BROOK AT WENDELL DEPOT, MASS.

LOCATION.—One-fourth mile above confluence with Millers River and one-fourth mile from Wendell Depot, Franklin County.

DRAINAGE AREA.—12.2 square miles.

RECORDS AVAILABLE.—June 7, 1916, to September 30, 1923. From June 4 to October 16, 1909, records were obtained at a station near mouth of stream and from April 25 to August 27, 1910, at a weir a short distance below present location.

GAGE.—Sloping staff gage on left bank; read by M. C. Eno.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel composed principally of ledge rock and boulders; control formed by large boulders 25 feet below gage.

EXTREMES OF DISCHARGE.—Maximum open-water stage recorded during year, 3.81 feet at 5 p. m. April 29 (discharge, by extension of rating curve, 181 second-feet); minimum stage recorded, 0.81 foot at 7 a. m. August 19 (discharge, 0.7 second-foot).

1916–1923: Maximum stage recorded, 3.8 feet on March 28, 1919, and June 22, 1922 (discharge, by extension of rating curve, 190 second-feet); minimum stage recorded, that of August 19, 1923.

ICE.—Stage-discharge relation affected by ice during some winters.

REGULATION.—Flow not affected by regulation.

ACCURACY.—Stage-discharge relation changed with going out of ice on March 30. Rating curve used previous to ice formation well defined below 60 second-feet; rating curve used subsequent to March 30 well defined below 35 second-feet. Gage read to hundredths twice daily, except from December 5 to March 17, when it was read once daily. Daily discharge ascertained by applying rating table to mean daily gage heights with corrections for effect of ice during some days in winter. Records good.

Discharge measurements of Moss Brook at Wendell Depot, Mass., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 11	Hill and Armstrong	*2.06	14.9	May 15	Armstrong and Pierce	2.00	33.2
Feb. 26	W. E. Armstrong	*1.49	8.2	July 12	W. E. Armstrong	.99	1.8
Mar. 29	H. F. Hill, jr.	*2.43	50				

*Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Moss Brook at Wendell Depot, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5.7	6.3	8	70	12	10	37	91	9.6	3.4	6.8	2.0
2	5.3	5.5	7	47	13	12	35	61	8.0	3.2	5.4	1.7
3	5.3	6.0	8	37	14	14	42	57	7.6	3.7	4.5	1.7
4	4.9	8.5	8	32	17	12	83	45	7.6	3.5	4.1	1.5
5	4.8	11	10	29	13	16	156	40	8.3	3.2	3.4	1.4
6	4.8	15	10	25	11	21	158	34	8.5	3.7	2.7	1.3
7	4.6	20	12	20	10	22	134	30	9.6	5.0	4.1	1.3
8	16	25	11	19	8	21	138	26	16	3.4	3.2	1.2
9	17	20	9	16	7	21	121	43	38	2.3	2.5	2.5
10	19	16	8	15	7	15	93	49	26	2.1	2.2	2.0
11	26	13	7	14	13	12	78	45	14	2.0	2.1	1.3
12	20	11	6	12	12	12	74	57	11	1.8	1.9	1.2
13	13	9.7	5	12	10	14	66	54	9.6	1.8	2.5	5.6
14	11	9.0	6	10	11	14	59	47	8.8	1.7	1.7	3.4
15	9.7	10	6	10	10	17	53	39	8.3	2.3	1.3	1.8
16	8.8	11	8	11	10	22	50	36	8.0	3.7	.8	1.6
17	9.7	9.7	7	9	9	29	47	38	7.6	3.2	.8	1.5
18	9.0	9.0	6	8	9	43	42	32	7.2	2.5	.7	1.4
19	8.5	9.0	7	8	10	62	36	27	6.8	2.2	.8	1.3
20	7.6	21	7	9	9	74	32	25	6.4	1.8	1.1	1.3
21	7.4	23	7	12	9	68	32	35	5.3	1.6	.7	2.5
22	7.1	16	6	40	9	70	35	41	5.1	1.5	3.3	1.7
23	7.6	16	6	52	9	74	32	35	4.7	1.3	1.6	2.7
24	9.0	16	6	46	9	80	30	29	6.8	1.6	1.1	4.1
25	10	14	7	34	8	90	26	16	7.2	3.2	1.2	2.6
26	9.0	16	6	32	8	76	24	13	6.8	2.9	1.4	2.2
27	8.5	20	6	25	8	70	21	16	4.7	1.8	1.3	2.1
28	7.9	15	7	21	9	62	35	15	3.7	17	1.4	2.0
29	7.4	12	7	17	-------	60	168	12	4.4	40	7.2	4.7
30	7.1	9.7	7	16	-------	54	152	10	4.1	23	4.2	3.4
31	6.8	-------	7	13	-------	39	------	9.6	------	9	2.5	------

NOTE.—Stage-discharge relation affected by ice Dec. 1 to Mar. 30; discharge based on gage heights corrected for effect of ice.

Monthly discharge of Moss Brook at Wendell Depot, Mass., for the year ending Sept. 30, 1923

[Drainage area, 12.2 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	26	4.6	9.6	0.786	0.91
November	25	5.5	13.4	1.10	1.23
December	12	5	7.4	.607	.70
January	70	8	23.3	1.91	2.20
February	17	7	10.1	.828	.86
March	90	10	39.0	3.20	3.69
April	168	21	69.6	5.70	6.40
May	91	9.6	35.7	2.93	3.38
June	38	3.7	9.3	.762	.85
July	40	1.3	5.1	.418	.48
August	7.2	.7	2.5	.205	.24
September	5.6	1.2	2.2	.180	.20
The year	168	.7	18.9	1.55	21.14

DEERFIELD RIVER AT CHARLEMONT, MASS.

LOCATION.—One mile below village of Charlemont, Franklin County.

DRAINAGE AREA.—362 square miles.

RECORDS AVAILABLE.—June 19, 1913, to September 30, 1923.

GAGES.—Friez water-stage recorder on left bank, referenced to gage datum by a hook gage inside well; an inclined staff gage is used for auxiliary readings. Recorder inspected by E. F. Spear.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Channel covered with coarse gravel and boulders; fairly uniform section; control practically permanent.

EXTREMES OF DISCHARGE.—Maximum open-water stage during year, from stage recorder, 9.14 feet at 9 a. m. April 29 (discharge, by extension of rating, 14,900 second-feet; a stage of approximately 20 feet about midnight March 23 was caused by an ice jam); minimum stage during year from water-stage recorder, 1.52 feet several times during July and September (discharge, 52 second-feet; water held back by dams at power stations above gage).

1913–1923: Maximum stage recorded, 15.7 feet on July 8, 1915 (discharge, by extension of rating curve, 45,000 second-feet); minimum stage recorded, 0.70 foot on June 17, 1921 (discharge, practically nil; water held back by dams).

ICE.—River usually frozen over during greater part of winter; ice jams occasionally form below gage, causing several feet of backwater.

REGULATION.—Flow during low and medium stages largely regulated by storage reservoir at Somerset, Vt. Several power plants above station cause diurnal fluctuation.

ACCURACY.—Stage-discharge relation practically permanent, except when affected by ice. Rating curve well defined below 10,000 second-feet. Operation of water-stage recorder satisfactory throughout year except as shown in footnote to daily-discharge table. Daily discharge during open water period ascertained by discharge integrator; during remainder of year by applying rating table to mean daily gage heights from recorder sheets with corrections for effect of ice. Records good.

Discharge measurements of Deerfield River at Charlemont, Mass., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Feb. 27	W. E. Armstrong	[a] 8.84	705
Mar. 17	do	[a] 8.67	1,030
June 14	Armstrong and Hill	2.26	364

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Deerfield River at Charlemont, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	320	320	112	1,440	500	400	620	1,880	390	73	215	158
2	370	350	265	2,550	540	370	600	1,340	186	260	172	60
3	385	310	260	1,340	560	400	1,060	990	93	240	130	55
4	395	190	320	880	350	470	3,450	850	215	83	108	54
5	310	88	285	690	500	560	9,750	800	315	196	66	66
6	375	335	225	500	640	600	9,300	520	240	340	70	67
7	275	750	160	295	640	680	6,400	700	445	81	102	74
8	175	550	170	260	620	600	6,800	540	3,200	61	88	110
9	475	420	280	270	640	540	4,950	1,160	3,550	180	68	405
10	530	390	114	145	520	440	2,850	1,920	1,520	175	66	245
11	600	345	240	180	460	340	2,450	1,160	860	160	62	146
12	510	152	280	280	640	370	3,050	1,060	620	210	70	150
13	385	365	260	380	580	500	2,500	1,920	370	185	106	190
14	420	355	340	200	560	470	2,050	1,240	345	56	156	150
15	130	330	270	370	520	440	1,740	980	330	59	225	130
16	375	395	230	440	540	540	1,440	1,160	300	500	156	70
17	480	410	170	360	490	1,150	1,160	1,600	108	405	83	126
18	415	320	185	300	490	1,050	950	1,100	275	270	67	192
19	455	102	220	330	520	1,150	870	820	250	194	64	265
20	440	450	210	420	580	920	1,080	510	255	146	69	210
21	310	600	240	410	570	870	4,950	910	265	70	100	870
22	94	380	240	1,700	580	1,000	5,200	1,080	400	67	180	540
23	415	360	390	1,250	500	2,700	4,100	840	97	108	134	550
24	520	340	135	800	340	5,700	2,250	700	65	196	87	720
25	460	290	120	780	300	3,600	1,420	480	355	270	56	425
26	400	110	180	640	320	2,000	1,180	450	355	265	67	300
27	345	370	260	560	620	1,350	1,160	230	330	198	58	250
28	250	310	300	520	500	1,000	1,940	395	315	600	62	210
29	86	305	290	520	-----	870	9,900	355	355	770	720	255
30	310	135	300	460	-----	790	3,400	210	205	295	520	265
31	330	-----	220	450	-----	715	-----	330	-----	285	192	-----

NOTE.—Stage-discharge relation affected by ice Dec. 7-31 and Jan. 8 to Mar. 24; daily discharge for this period based on gage heights corrected for effect of ice by discharge measurements, observer's notes, weather records, and comparisons with power-plant records at New England Power Co.'s plant No. 4 at Shelburne Falls. Water-stage recorder not in operation Mar. 24-27 (gage house damaged by ice) and Sept. 11-14; discharge estimated by comparison with power-plant records.

Monthly discharge of Deerfield River at Charlemont, Mass., for the year ending Sept. 30, 1923

[Drainage area, 362 square miles]

Month	Observed discharge in second-feet			Gain or loss in storage at Somerset, Vt. (in millions of cubic feet)	Discharge without storage (second-feet)		Run-off in inches
	Maximum	Minimum	Mean		Mean	Per square mile	
October	600	86	366	−462	193	0.533	0.61
November	750	88	338	− 74	309	.854	.95
December	390	112	234	− 47	216	.597	.69
January	2,550	145	636	+133	686	1.90	2.19
February	640	300	522	−400	357	.986	1.03
March	5,700	340	1,050	+119	1,090	3.01	3.47
April	9,900	600	3,290	+742	3,580	9.89	11.03
May	1,920	210	911	+250	1,000	2.76	3.18
June	3,550	65	554	− 54	533	1.47	1.64
July	770	56	226	−136	175	.483	.56
August	720	52	139	− 38	125	.345	.40
September	870	48	243	− 33	230	.635	.71
The year	9,900	48	706	0	706	1.95	26.46

NOTE.—The increase or decrease of water held in storage at Somerset, Vt., during the month computed by engineers of the Geological Survey from data of storage increase or decrease furnished by the company operating the reservoir.

WARE RIVER AT GIBBS CROSSING, MASS.

LOCATION.—Between highway and electric railway bridges at Gibbs Crossing, Hampshire County, three-quarters of a mile above mouth of Beaver Brook, and 3 miles below Ware.

DRAINAGE AREA.—201 square miles.

RECORDS AVAILABLE.—August 20, 1912, to September 30, 1923.

GAGES.—Water-stage recorder on right bank referred to gage datum by a hook gage inside well; an inclined staff gage is used for auxiliary readings. Recorder inspected by Marion G. Moore.

DISCHARGE MEASUREMENTS.—Made from electric railway bridge or by wading.

CHANNEL AND CONTROL.—Channel rough and subject to a growth of aquatic vegetation during summer. Control free from weeds and at ordinary stages well defined at a section near gage; shifts occasionally; at high stages control is probably at the dam at Thorndike, 4 miles below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 6.00 feet at 11 a. m. April 6 (discharge, 2,820 second-feet); minimum stage, from water-stage recorder, 1.22 feet at 8 a. m. September 17 (discharge, 16 second-feet; water held back by dams).

1912–1923: Maximum open-water stage recorded, 6.00 feet on March 27, 1920, and April 6, 1923 (discharge, 2,820 second-feet); minimum stage recorded, 1.20 feet on October 26, 1914 (discharge, 5 second-feet; water held back by dams).

ICE.—River usually freezes over, and the stage-discharge relation is affected by ice during most winters.

REGULATION.—Flow affected by operation of mills at Ware, which at low stages causes a large variation in discharge on days when the mills are in operation and a low discharge on Sundays and holidays.

ACCURACY.—Stage-discharge relation permanent throughout year except when affected by ice. Rating curve well defined below 1,800 second-feet, and fairly well defined below 2,700 second-feet. Operation of water-stage recorder was satisfactory throughout year. Daily discharge during open-water period ascertained by discharge integrator; during remainder of year by applying rating table to mean daily gage heights with corrections for effect of ice. Records good.

Discharge measurements of Ware River at Gibbs Crossing, Mass., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 18	Armstrong and Hill	*3.12	412	May 3	W. E. Armstrong	3.72	1,210
Mar. 4	H. F. Hill, jr	2.72	442	July 22	do	1.45	34.7

*Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Ware River at Gibbs Crossing, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	26	130	134	510	370	200	580	1,900	205	62	102	66
2	82	114	102	1,180	340	240	580	1,460	90	120	78	24
3	124	136	104	980	330	180	640	1,040	98	92	128	24
4	120	95	170	680	300	290	1,100	760	200	42	98	50
5	67	70	102	520	320	340	2,020	590	184	100	60	66
6	76	190	110	440	310	310	2,700	500	164	98	106	68
7	63	215	91	390	260	320	2,460	475	162	102	136	66
8	69	265	65	380	240	315	2,020	405	295	35	116	46
9	280	260	74	390	240	285	1,680	385	480	142	106	24
10	325	215	33	350	210	265	1,400	380	355	102	30	44
11	300	156	78	340	175	250	1,100	370	305	100	22	64
12	275	114	124	320	220	290	920	360	240	76	24	55
13	270	210	120	310	230	270	750	410	188	66	50	53
14	205	210	96	280	220	315	620	465	168	38	82	50
15	116	164	92	280	220	340	570	395	148	26	90	30
16	205	162	78	270	210	520	610	365	90	65	89	17
17	215	156	56	240	165	1,360	590	365	44	83	66	56
18	136	130	120	210	100	1,340	530	325	162	70	31	43
19	116	102	100	200	175	1,280	470	245	134	73	24	43
20	122	200	110	220	175	1,060	460	225	126	80	38	50
21	82	260	100	400	160	960	420	305	106	64	60	58
22	51	215	100	960	155	1,040	365	500	74	28	59	40
23	172	176	82	940	180	1,580	385	455	64	66	51	21
24	240	162	38	790	140	2,200	375	375	56	80	46	62
25	305	91	110	700	76	2,000	355	285	174	85	36	63
26	260	89	120	620	175	1,780	335	245	138	66	20	71
27	250	164	105	510	190	1,460	300	190	128	67	21	93
28	176	170	96	470	210	1,180	330	235	118	45	23	62
29	124	136	115	440	-------	850	1,360	230	114	31	55	44
30	200	28	120	380	-------	830	2,200	76	104	69	53	22
31	196	------	210	400	-------	740	-------	190	-------	116	65	-------

NOTE.—Stage-discharge relation affected by ice Dec. 11, 14–30, Jan. 13–19, 29–31, Feb. 1–27, and Mar. 5, 6; discharge for these periods based on gage heights corrected for effect of ice.

Monthly discharge of Ware River at Gibbs Crossing, Mass., for the year ending Sept. 30, 1923

[Drainage area, 201 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	325	26	169	0.841	0.97
November	265	28	160	.796	.89
December	210	33	102	.508	.58
January	1,180	200	487	2.42	2.79
February	370	76	218	1.08	1.12
March	2,200	180	787	3.92	4.52
April	2,700	300	941	4.68	5.22
May	1,900	76	468	2.33	2.69
June	480	44	164	.816	.91
July	142	26	73.8	.367	.42
August	136	20	63.4	.315	.36
September	93	17	49.2	.245	.27
The year	2,700	17	307	1.53	20.74

SWIFT RIVER AT WEST WARE, MASS.

LOCATION.—1,000 feet below old wooden dam opposite West Ware station of Boston & Albany Railroad, Hampshire County, 6 miles downstream from Enfield, and 3 miles below confluence of East and West branches of Swift River.

DRAINAGE AREA.—186 square miles.

RECORDS AVAILABLE.—July 15, 1910, to September 30, 1923.

GAGE.—Gurley seven-day water-stage recorder on left bank, referenced to gage datum by hook gage inside of well; an inclined staff is used for auxiliary readings. Recorder inspected by H. C. Davis.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Gravel and alluvial deposits; some aquatic vegetation in channel during summer. Control has shifted slightly at various times, the greatest change occurring during high water of April 3, 1916, when dam above gage was washed out; at high stages the control is probably at dam at Bondsville, 4 miles below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, 9.08 feet at 4 p. m. April 7 (discharge, by extension of rating curve, 2,390 second-feet); minimum stage, from water-stage recorder, 1.92 feet several times during September (discharge, 37 second-feet).

1910–1923: Maximum discharge recorded, that of April 7, 1923; minimum discharge recorded, 22 second-feet on September 22, 1914.

ICE.—River usually freezes over, and stage-discharge relation is affected by ice during most winters.

REGULATION.—Operation of mills at Enfield, 6 miles above station, has at times affected distribution of flow at low and medium stages; not seriously affected during present year.

ACCURACY.—Stage-discharge relation has changed at infrequent intervals, a change taking place at time of high water April 7, 1923; rating curve well defined between 100 and 1,500 second-feet. Operation of water-stage recorder was satisfactory throughout year except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying rating table to mean daily gage heights determined by inspection of gage-height graph; with corrections for effect of ice during winter. Records good.

Discharge measurements of Swift River at West Ware, Mass., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 19	H. F. Hill, jr	[a]2.98	238	May 4	W. E. Armstrong	4.98	840
Mar. 4	do	[a]3.46	233	July 22	do	2.14	68

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Swift River at West Ware, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	124	176	153	266	358	180	528	1,880	242	107	95	83
2	136	174	164	500	370	190	486	1,480	230	115	97	70
3	131	176	156	655	382	210	528	1,050	225	113	107	68
4	136	173	151	685	395	230	745	870	227	110	124	76
5	130	167	158	598	370	260	1,380	735	240	110	107	72
6	121	169	158	514	320	260	2,120	630	225	108	115	70
7	115	216	158	446	300	240	2,380	540	237	105	109	74
8	135	251	158	382	280	230	2,200	497	347	99	120	72
9	246	266	156	358	270	220	1,920	497	469	105	103	70
10	300	255	145	346	260	210	1,660	585	427	105	103	85
11	334	233	145	323	270	210	1,340	570	347	105	95	83
12	323	208	150	311	240	210	1,080	540	295	105	89	76
13	288	192	155	290	230	220	940	585	252	101	105	74
14	251	186	150	275	220	240	840	585	222	95	91	70
15	218	186	151	277	220	230	750	555	200	99	93	55
16	198	190	165	266	210	240	705	525	188	103	95	45
17	192	186	153	255	210	460	660	497	168	103	91	68
18	178	180	150	245	200	670	615	455	159	103	76	57
19	167	174	145	230	190	745	585	427	172	101	76	48
20	162	176	155	245	180	715	540	386	157	101	93	52
21	156	204	151	346	180	700	511	400	152	95	83	54
22	151	216	150	570	175	670	483	540	143	81	81	55
23	155	208	151	700	175	808	469	555	135	97	85	57
24	226	196	143	715	170	1,140	455	511	150	89	83	83
25	277	182	136	655	170	1,300	427	441	157	89	72	89
26	288	165	145	612	165	1,300	400	386	137	97	68	87
27	266	156	156	556	165	1,100	373	347	135	93	76	83
28	226	162	156	486	175	930	400	308	132	97	74	85
29	204	160	173	446	-------	760	1,030	295	137	107	89	85
30	186	151	185	420	-------	700	1,800	270	132	109	93	66
31	176	-------	208	407	-------	612	-------	242	-------	105	91	-------

NOTE.—Stage-discharge relation affected by ice Dec. 11, 13, 14, 19, 20, 30, Jan. 13, 14, 17–20, and Feb. 6 to Mar. 17; discharge for these periods based on gage heights corrected for effect of ice. Water-stage recorder not in operation Mar. 7–10 and July 2–7; discharge estimated by comparison with records in adjacent drainage areas.

Monthly discharge of Swift River at West Ware, Mass., for the year ending Sept. 30, 1923

[Drainage area, 186 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	334	115	200	1.08	1.24
November	266	151	191	1.03	1.15
December	208	136	156	.839	.97
January	715	230	432	2.32	2.68
February	395	165	245	1.32	1.38
March	1,300	180	522	2.81	3.24
April	2,380	373	945	5.08	5.67
May	1,880	242	587	3.16	3.64
June	469	132	215	1.16	1.29
July	115	81	102	.548	.63
August	124	68	92.9	.500	.58
September	89	45	70.4	.378	.42
The year	2,380	45	313	1.68	22.89

QUABOAG RIVER AT WEST BRIMFIELD, MASS.

LOCATION.—At two-span highway bridge near West Brimfield station of Boston & Albany Railroad, Hampden County, one-third mile above mouth of Blodgett Mill Brook.

DRAINAGE AREA.—150 square miles.

RECORDS AVAILABLE.—August 23, 1909, to September 30, 1923.

GAGE.—Gurley seven-day water-stage recorder formerly at downstream end of center pier of bridge was relocated on left bank, upstream side of bridge May 31, 1923; referenced to gage datum by means of a hook gage inside well; a vertical staff on upstream side of right abutment of bridge is used for auxiliary readings. Recorder inspected by Mrs. G. G. Allen.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Stream bed covered with boulders, gravel, and alluvial deposits; slight shifts in control below bridge have occurred at various times, but control for section above bridge has remained practically permanent.

EXTREMES OF DISCHARGE.—Maximum open-water stage during year from water-stage recorder, 4.42 feet at 8 a. m. March 26 (discharge, 1,430 second-feet); minimum stage from water-stage recorder, 1.83 feet at 4 a. m. August 25 and 10 a. m. September 17 (discharge, by extension of rating curve, 13 second-feet; water held back by dams).

1909–1923: Maximum open-water stage recorded, 5.3 feet at noon March 17, 1920 (discharge, 1,980 second-feet); minimum stage recorded, 1.40 feet on September 17 and 18, 1910 (discharge, 2.5 second-feet; water held back by dams).

ICE.—River usually freezes over, and the stage-discharge relation is affected during most winters.

REGULATION.—Flow affected by operation of power plants at several places above gage. At low stages this causes a large variation in discharge on days when the mills are in operation and a low discharge on Sundays and holidays.

ACCURACY.—Stage-discharge relation has changed slightly at various times. Rating curves well defined for periods used. Operation of water-stage recorder was satisfactory throughout year. Daily discharge for open-water periods ascertained by discharge integrator, and during winter by applying rating table to mean daily gage heights corrected for effect of ice. Records good.

Discharge measurements of Quaboag River at West Brimfield, Mass., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 7	W. E. Armstrong	[a] 2.57	82	June 2	W. E. Armstrong	2.50	133
Jan. 19	do	[a] 4.59	188	3	do	2.52	130
Mar. 3	H. F. Hill, jr	[a] 4.13	187	July 19	do	2.12	58
May 2	W. E. Armstrong	3.57	737	21	do	2.02	37.1

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Quaboag River at West Brimfield, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	140	134	115	250	240	145	860	840	120	122	74	62
2	146	136	120	740	220	170	860	840	125	120	70	45
3	136	144	105	700	380	185	820	800	142	116	108	60
4	132	142	100	600	320	200	840	720	144	108	150	74
5	134	162	98	500	185	210	1,000	700	138	114	154	48
6	138	166	92	450	175	195	1,100	620	132	114	178	60
7	116	188	74	420	175	195	1,100	580	160	110	136	53
8	164	184	76	400	160	190	1,050	540	285	108	132	55
9	194	164	80	380	165	175	1,050	500	305	110	110	44
10	178	164	68	360	140	170	1,050	470	285	104	108	50
11	200	166	72	330	135	140	980	440	260	93	98	44
12	182	164	64	300	135	130	880	450	230	90	92	45
13	176	156	78	270	155	115	800	460	220	84	100	48
14	178	150	76	270	145	105	740	440	196	72	77	46
15	178	154	74	290	130	92	700	420	186	82	80	36
16	172	156	74	280	130	220	680	400	168	98	81	40
17	164	154	76	250	125	920	660	380	150	81	84	39
18	156	156	76	220	120	880	650	340	154	86	55	35
19	138	154	72	190	115	820	620	340	140	81	66	34
20	146	160	74	200	110	760	580	320	124	76	72	32
21	140	172	78	460	110	730	550	320	116	65	60	30
22	144	150	68	700	105	690	485	340	116	68	62	32
23	152	150	72	580	105	1,080	440	320	110	72	58	41
24	176	150	72	500	100	1,320	420	310	132	62	60	49
25	162	128	98	500	100	1,220	400	290	120	66	60	49
26	152	130	105	440	100	1,300	385	270	110	64	56	35
27	146	130	100	380	110	1,260	360	250	118	66	88	44
28	148	150	98	360	130	1,180	400	240	110	72	72	42
29	140	130	105	330	-------	980	760	205	148	89	56	36
30	144	105	115	280	-------	1,120	840	170	116	88	68	42
31	134	-------	140	250	-------	1,100	-------	135	-------	79	77	-------

NOTE.—Stage-discharge relation affected by ice Nov. 27 to Mar. 23; discharge for this period based on gage heights corrected for effect of ice.

Monthly discharge of Quaboag River at West Brimfield, Mass., for the year ending Sept. 30, 1923

[Drainage area, 150 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	200	116	155	1.03	1.19
November	188	105	152	1.01	1.13
December	140	64	87.6	.584	.67
January	740	190	393	2.62	3.02
February	380	100	154	1.03	1.07
March	1,320	92	581	3.87	4.46
April	1,100	360	735	4.90	5.47
May	840	135	434	2.89	3.33
June	305	110	162	1.08	1.20
July	122	62	89.0	.593	.68
August	178	55	88.5	.590	.68
September	74	30	45.0	.300	.34
The year	1,320	30	257	1.71	23.24

WESTFIELD RIVER AT KNIGHTVILLE, MASS.

LOCATION.—At single-span steel highway bridge known locally as Pitcher Bridge, in Knightville, in town of Huntington, Hampshire County, 1 mile north of outlet of Norwich Lake and 3 miles above confluence with Middle Branch of Westfield River.

DRAINAGE AREA.—162 square miles.

RECORDS AVAILABLE.—August 26, 1909, to September 30, 1923.

GAGE.—Chain attached to downstrean side of highway bridge; read by J. A. Burr.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Channel rough, covered with boulders and ledge rock; control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.32 feet at 7 a. m. April 5 (discharge, by extension of rating curve, 3,990 second-feet); minimum stage recorded, 0.87 foot several times in July and August (discharge, 17 second-feet).

1909–1923: Maximum open-water stage recorded, 9.5 feet on August 4, 1915 (discharge, by extension of rating curve, 8,520 second-feet; minimum stage recorded, 0.60 foot on August 10, 1913 (discharge, 4 second-feet).

ICE.—Ice usually forms in the river early in the winter and affects stage-discharge relation.

REGULATION.—Flow not seriously affected by regulation.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice; although individual discharge measurements have at times appeared erratic, the rough and irregular channel causes difficulty in obtaining accurate discharge measurements. Rating curve fairly well defined below 3,500 second-feet. Gage read to hundredths twice daily, except from December 17 to January 1 and January 17 to March 22, when it was read once a day. Daily discharge ascertained by applying rating table to mean daily gage heights, with corrections for effect of ice during winter. Records good.

Discharge measurements of Westfield River at Knightville, Mass., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 15	W. E. Armstrong	[a]3.01	170	May 7	W. E. Armstrong	2.15	281
Mar. 2	Hill and Armstrong	[a]2.50	153	7	do	2.13	262
14	W. E. Armstrong	[a]2.92	251	July 24	do	.90	18.7

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Westfield River at Knightville, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	50	76	88	185	240	115	412	625	123	57	70	39
2	49	73	110	980	260	135	350	512	99	50	61	27
3	49	77	125	435	290	135	567	390	108	77	50	25
4	44	76	100	412	240	460	2,470	330	128	123	45	21
5	42	76	88	275	195	370	3,830	275	99	67	37	17
6	40	77	76	275	170	330	3,180	257	81	67	26	18
7	42	194	70	178	185	290	2,360	240	77	67	21	19
8	123	257	72	160	145	240	2,140	225	412	50	43	21
9	390	160	96	145	160	230	1,540	625	2,030	39	43	202
10	205	130	82	160	160	220	1,120	655	595	35	30	87
11	540	117	76	160	135	195	945	435	257	30	20	56
12	196	106	92	170	125	185	877	460	205	26	22	37
13	158	93	86	160	125	195	845	910	168	25	32	50
14	139	79	70	170	130	240	812	512	158	22	46	53
15	117	95	76	170	135	210	655	412	134	23	53	41
16	92	111	72	160	135	240	567	435	117	29	37	36
17	104	109	96	145	135	290	512	595	106	30	26	28
18	100	99	92	145	130	350	460	412	99	31	20	26
19	85	89	88	135	120	480	435	330	89	28	20	21
20	79	108	72	135	115	440	435	275	79	25	24	22
21	81	225	76	195	115	410	685	390	67	22	24	30
22	79	168	74	660	110	440	625	845	67	19	45	121
23	82	132	70	480	110	1,450	512	370	67	18	58	99
24	108	110	74	310	110	2,030	485	310	74	18	35	240
25	113	96	76	410	105	1,280	370	257	87	29	26	130
26	102	88	96	330	105	1,120	330	210	79	67	22	102
27	85	90	105	290	105	877	275	194	68	46	25	79
28	79	96	96	260	115	747	370	175	54	275	61	56
29	79	100	90	280	-------	595	2,360	163	57	257	84	64
30	77	96	92	260	-------	540	945	148	73	158	82	65
31	76	-------	80	240	-------	435	-------	130	-------	109	47	-------

NOTE.—Stage-discharge relation affected by ice Nov. 24 to Jan. 1 and Jan. 9 to Mar. 22; discharge for these periods based on gage heights corrected for effect of ice.

Monthly discharge of Westfield River at Knightville, Mass., for the year ending Sept. 30, 1923

[Drainage area, 162 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	540	40	116	0.717	0.83
November	257	73	113	.698	.78
December	125	70	85.7	.529	.61
January	980	135	273	1.69	1.95
February	290	105	150	.926	.96
March	2,030	115	493	3.04	3.51
April	3,830	275	1,050	6.48	7.23
May	910	130	391	2.41	2.78
June	2,030	54	195	1.20	1.34
July	275	18	61.9	.382	.44
August	84	20	39.8	.246	.28
September	240	17	61.1	.377	.42
The year	3,830	17	252	1.56	21.13

WESTFIELD RIVER NEAR WESTFIELD, MASS.

LOCATION.—At Trap Rock Crossing, 1 mile below mouth of Big Brook, 2 miles below mouth of Westfield Little River, and 3 miles east of Westfield, Hampden County.

DRAINAGE AREA.—496 square miles.

RECORDS AVAILABLE.—June 27, 1914, to September 30, 1923.

GAGES.—Stevens continuous water-stage recorder on right bank, referenced to gage datum by means of a hook gage inside well; an inclined staff gage is used for auxiliary readings. Recorder inspected by Andrew Kelly.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed covered with gravel and alluvial deposits; some aquatic vegetation in channel during summer. Riffle of boulders 200 feet below gage forms control at low and medium stages. At high stages control is probably formed by crest of storage dam at Mittineague, 3 miles below the station.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 13.22 feet at 5 a. m. April 6 (discharge, by extension of rating curve, 11,100 second-feet); minimum stage from water-stage recorder, 3.20 feet several times during August and September (discharge, by extension of rating curve, 90 second-feet).

1914–1923: Maximum stage recorded, 17.4 feet on August 4, 1915, and May 22, 1919 (discharge, by extension of rating curve, 17,400 second-feet); minimum stage recorded, 2.78 feet on October 2, 1921 (discharge, by extension of rating curve, 9 second-feet).

ICE.—Stage-discharge relation seldom, if ever, affected by ice. River freezes over above and below gage, but control remains open throughout winter.

DIVERSIONS.—Water is diverted from Westfield Little River and carried to Springfield for municipal use.

REGULATION.—There are several power plants above station but diurnal fluctuation is small; nearest dam is at Westfield.

ACCURACY.—Stage-discharge relation for low stages subject to slight changes. Rating curves well defined between 100 and 7,500 second-feet. Operation of water-stage recorder was satisfactory throughout year. Daily discharge ascertained by application of rating table to mean daily gage heights as determined from recorder sheets. Records good.

Discharge measurements of Westfield River near Westfield, Mass., during the year ending Sept. 30, 1923

[Made by W. E. Armstrong]

Day	Gage height	Discharge	Day	Gage height	Discharge	Day	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 9	3.73	261	May 6	4.92	814	July 23	3.45	152
Mar. 15	4.74	755	11	5.69	1,460	23	3.51	170

Daily discharge, in second-feet, of Westfield River near Westfield, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	246	210	258	856	653	370	1,170	1,900	380	201	243	155
2	231	240	279	3,660	702	400	1,210	1,550	336	189	183	140
3	249	246	249	1,700	814	445	1,550	1,250	306	210	168	135
4	219	228	258	1,320	751	835	5,170	1,100	490	207	207	155
5	204	255	279	950	667	1,360	8,650	985	460	225	177	152
6	189	249	228	737	597	1,170	8,350	870	375	243	160	132
7	195	332	189	555	576	1,020	5,720	856	385	201	147	132
8	249	632	177	478	520	828	5,170	772	1,470	189	137	140
9	985	496	237	478	508	765	4,020	1,550	2,550	177	132	130
10	681	340	234	520	490	590	2,800	2,160	1,580	198	142	186
11	985	316	258	466	390	555	2,400	1,430	985	174	132	201
12	800	302	219	425	484	660	2,400	1,280	695	157	130	125
13	569	285	219	430	430	702	2,070	2,070	541	168	150	147
14	336	255	237	410	445	807	1,820	1,510	460	165	107	150
15	309	282	228	466	450	765	1,580	1,210	410	195	107	157
16	332	282	255	466	466	878	1,470	1,210	344	168	140	157
17	292	295	216	400	405	2,350	1,360	1,400	285	165	132	140
18	276	270	252	410	415	2,120	1,250	1,170	370	171	132	132
19	267	270	222	390	576	2,030	1,210	950	285	157	125	120
20	267	288	222	370	405	1,780	1,210	765	258	157	160	115
21	267	455	207	611	410	1,580	1,400	1,130	225	147	145	135
22	285	410	228	2,450	410	1,780	1,400	2,120	246	157	132	155
23	270	360	225	1,740	460	4,260	1,280	1,360	231	157	140	243
24	279	270	216	1,250	405	6,560	1,250	1,020	243	147	168	514
25	336	243	201	1,210	332	4,020	1,020	870	273	150	140	352
26	302	207	299	1,100	380	3,000	910	730	273	150	130	249
27	285	243	267	985	340	2,500	814	562	270	171	150	207
28	225	246	252	800	348	2,400	918	639	210	249	130	162
29	240	231	276	814	------	1,700	4,780	450	216	709	155	192
30	243	228	240	786	------	1,700	2,900	395	195	410	155	162
31	252	------	231	716	------	1,550	------	496	------	299	155	----

Monthly discharge of Westfield River near Westfield, Mass., for the year ending Sept. 30, 1923

[Drainage area, 496 square miles]

Month	Observed discharge in second-feet			Diversion from Westfield Little River in millions of gallons	Total discharge in second-feet		Run-off in inches
	Maximum	Minimum	Mean		Mean	Per square mile	
October	985	189	350	404.69	370	0.746	0.86
November	632	207	299	390.17	319	.643	.72
December	299	177	237	402.47	257	.518	.60
January	3,660	370	902	422.41	923	1.86	2.14
February	814	332	494	383.41	515	1.04	1.08
March	6,560	370	1,660	402.04	1,680	3.39	3.91
April	8,650	814	2,580	385.95	2,600	5.24	5.85
May	2,160	395	1,150	420.57	1,170	2.36	2.72
June	2,550	195	512	440.40	535	1.08	1.20
July	709	147	208	439.72	230	.464	.53
August	243	107	149	441.52	171	.345	.40
September	514	115	176	471.18	200	.403	.45
The year	8,650	107	726	5,004.53	747	1.51	20.46

NOTE.—The effect of storage in Borden Brook reservoir not taken into account in computing the total discharge.

MIDDLE BRANCH OF WESTFIELD RIVER AT GOSS HEIGHTS, MASS.

LOCATION.—At highway bridge in Goss Heights, Hampshire County, half a mile above confluence of Middle and North branches of Westfield River and 1½ miles above Huntington.

DRAINAGE AREA.—53 square miles.

RECORDS AVAILABLE.—July 14, 1910, to September 30, 1923.

GAGES.—Water-stage recorder on right bank upstream side of bridge abutment; referenced to gage datum by means of a hook gage inside of well; an inclined staff is used for auxiliary readings.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Channel covered with coarse gravel and boulders. Control somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 4.59 feet at 11 p. m. April 5 (discharge, from extension of rating curve, 2,010 second-feet); minimum stage from water-stage recorder, 0.75 foot several times during August (discharge, 2 second-feet).

1910–1923: Maximum open-water stage recorded, 7.33 feet on July 8, 1915 (discharge, by extension of rating curve, 4,500 second-feet; a gage height of 7.8 feet was recorded on March 13, 1920, but channel was obstructed by ice at that time); minimum discharge, practically zero on October 26 and 27, 1914.

ICE.—River usually frozen over during greater part of winter; ice jams occasionally form below gage, causing several feet of backwater.

REGULATION.—Flow affected at times by operation of small power plant 2 miles above station.

ACCURACY.—Stage-discharge relation changed when ice went out in March, 1923. Rating curves used during year well defined below 1,000 second-feet. Operation of water-stage recorder satisfactory throughout year. Daily discharge ascertained by applying rating table to mean daily gage heights determined by inspection of gage-height graph with corrections for effect of ice during winter. Records good during open-water periods and fair during winter.

Discharge measurements of Middle Branch of Westfield River at Goss Heights, Mass. during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 8	W. E. Armstrong	[a]1.22	20.5	Mar. 14	W. E. Armstrong	[a]2.56	94
Jan. 15	H. F. Hill, jr.	[a]2.19	76	May 7	do	1.26	78
Mar. 2	Hill and Armstrong	[a]2.27	45.4	July 24	do	.79	4.0

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Middle Branch of Westfield River at Goss Heights, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	16	23	30	400	68	43	134	182	37	10	11	7.0
2	17	23	34	270	88	43	142	145	34	11	8.0	6.0
3	17	25	34	170	98	43	260	122	32	11	7.0	6.0
4	17	27	33	115	86	130	945	108	35	9.0	6.0	5.0
5	17	27	32	105	76	155	1,360	99	34	11	5.0	5.0
6	18	29	30	80	68	98	1,120	90	29	12	5.0	5.0
7	18	71	28	78	78	88	780	81	39	12	4.0	5.0
8	81	77	27	78	58	78	682	72	206	8.0	5.0	5.0
9	120	53	26	76	68	68	440	212	390	7.0	4.0	24
10	65	43	23	72	50	50	314	184	171	6.0	4.0	16
11	117	39	20	68	46	50	276	127	94	5.0	3.5	9.0
12	71	34	22	66	39	50	280	158	68	4.0	5.0	6.0
13	44	32	22	62	44	58	233	233	54	4.0	4.0	4.0
14	35	31	28	58	50	78	201	150	46	4.0	4.0	9.0
15	31	30	34	68	40	68	171	122	41	6.0	5.0	5.0
16	30	39	25	58	39	78	155	129	37	7.0	3.5	3.0
17	27	37	24	48	43	170	142	152	32	6.0	3.0	3.0
18	30	31	23	50	39	120	132	118	29	7.0	2.5	3.0
19	28	30	22	56	40	110	122	97	24	7.0	3.0	3.0
20	27	46	27	48	43	78	125	88	20	6.0	4.0	3.0
21	26	79	28	170	43	68	160	190	19	6.0	3.5	3.0
22	25	52	31	310	44	110	158	215	15	6.0	7.0	11
23	26	39	31	155	40	650	142	134	14	6.0	10	22
24	35	38	30	130	35	430	134	108	16	5.0	5.0	58
25	37	35	30	145	38	290	106	94	16	7.0	3.5	28
26	32	32	28	120	35	240	92	76	12	9.0	3.5	15
27	30	31	34	120	38	210	81	66	10	7.0	4.0	8.0
28	27	29	30	110	43	185	120	58	9	85	4.0	8.0
29	27	28	27	88	-------	174	682	54	10	68	11	7.0
30	26	28	28	70	-------	179	270	44	12	32	12	9.0
31	25	-------	27	78	-------	147	-------	41	-------	19	8.0	-------

NOTE.—Stage-discharge relation affected by ice Nov. 25–30, Dec. 3, 4, 5–31, Jan. 1, and Jan. 6 to Mar. 28; discharge for these periods based on gage heights corrected for effect of ice.

Monthly discharge of Middle Branch of Westfield River at Goss Heights, Mass., for the year ending Sept. 30, 1923

[Drainage area, 53 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	120	16	36.8	0.694	0.80
November	79	23	37.9	.715	.80
December	34	20	28.0	.528	.61
January	400	48	114	2.15	2.48
February	98	35	52.7	.994	1.04
March	650	43	140	2.64	3.04
April	1,360	81	332	6.26	6.98
May	233	41	121	2.28	2.63
June	390	9.0	52.8	.996	1.11
July	85	4.0	13.0	.245	.28
August	12	2.5	5.42	.102	.12
September	58	3.0	10.1	.191	.21
The year	1,360	2.5	78.5	1.48	20.10

FARMINGTON RIVER NEAR NEW BOSTON, MASS.

LOCATION.—At highway bridge a quarter of a mile below Clam River and 1 mile south of New Boston, Berkshire County.

DRAINAGE AREA.— 92.7 square miles.

RECORDS AVAILABLE.—May 27, 1913, to September 30, 1923.

GAGES.—Gurley seven-day water-stage recorder on left bank, downstream side of bridge, referenced to gage datum by a hook gage inside well; a vertical staff on bridge abutment is used for auxiliary readings. Recorder inspected by George Snow.

DISCHARGE MEASUREMENTS.—Made from a cable or by wading.

CHANNEL AND CONTROL.—Channel rocky and covered with boulders; control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.4 feet at 11.30 p. m. April 5 (discharge, by extension of rating curve, 1,800 second-feet); minimum stage, from water-stage recorder, 2.35 feet at 7.30 a. m. July 21 (discharge, 8.8 second-feet; water held back by dam).

1913–1923: Maximum open-water stage from water-stage recorder, 7.64 feet on October 26, 1913 (discharge, by extension of rating curve, 3,200 second-feet); minimum stage, from water-stage recorder, 2.22 feet on August 27, 1913 (discharge, 4.4 second-feet; water held back by dam).

ICE.—River usually frozen over during greater part of winter with occasional ice jams below gage.

REGULATION.—Flow affected by storage in Otis reservoir, about 5 miles above New Boston, which has a capacity of 880 million cubic feet, and by operation of a woodworking shop just above station.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve well defined below 1,700 second-feet. Operation of water-stage recorder satisfactory throughout year. Daily discharge ascertained by applying rating table to mean daily gage heights determined by inspection of gage-height graph, with corrections for ice during winter. Records good.

Discharge measurements of Farmington River near New Boston, Mass., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 17	Hill and Armstrong	[a]6.00	91	May 10	W. E. Armstrong	4.52	412
Mar. 5	W. E. Armstrong	[a]5.68	190	July 25	do	3.40	119

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Farmington River near New Boston, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	74	74	80	540	105	60	210	399	90	31	62	40
2	75	71	82	720	140	65	197	289	86	32	54	33
3	93	75	77	340	120	90	269	247	106	68	46	54
4	99	75	76	270	115	185	910	210	149	55	42	110
5	96	73	76	185	105	175	1,550	173	143	80	36	108
6	96	74	77	160	105	150	1,500	149	114	87	90	107
7	108	110	78	140	90	140	1,020	131	137	76	118	98
8	139	110	120	160	84	120	1,060	123	379	39	118	38
9	218	108	130	210	82	105	910	427	491	28	116	51
10	218	94	120	340	78	98	680	383	323	56	84	39
11	257	90	115	185	76	90	500	244	205	68	45	35
12	151	86	120	140	66	78	477	254	158	91	73	40
13	105	81	120	120	64	90	415	341	123	88	123	108
14	81	77	195	140	62	120	364	269	100	91	112	108
15	71	84	175	140	60	90	320	232	96	98	99	104
16	65	99	160	120	62	120	289	276	86	96	49	52
17	87	91	160	90	54	640	276	244	77	93	45	75
18	85	84	160	90	50	500	250	195	70	90	50	108
19	80	81	160	105	50	420	227	173	65	86	73	122
20	77	93	150	90	49	380	205	158	63	35	143	125
21	77	107	140	410	49	340	224	356	55	15	120	125
22	73	96	120	640	48	540	227	500	50	31	158	123
23	77	87	60	380	46	840	218	299	53	36	102	118
24	108	87	44	270	44	910	197	227	52	65	39	143
25	94	85	44	210	44	650	183	195	45	88	35	84
26	88	87	90	185	44	500	173	176	50	90	45	63
27	80	81	90	160	49	445	162	154	80	86	106	60
28	82	76	78	150	54	375	224	133	64	104	106	59
29	78	81	66	140	-------	302	945	118	58	105	141	56
30	78	75	64	130	-------	269	575	106	41	73	120	43
31	76	-------	60	120	-------	210	-------	96	-------	70	106	-------

NOTE.—Stage-discharge relation affected by ice Dec. 7 to Mar. 22; discharge for these periods based on gage heights corrected for effect of ice.

Monthly discharge of Farmington River near New Boston, Mass., for the year ending Sept. 30, 1923

[Drainage area, 92.7 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	257	65	103	1.11	1.28
November	110	71	86.4	.932	1.04
December	195	44	106	1.14	1.31
January	720	90	228	2.46	2.84
February	140	44	71.2	.768	.80
March	910	60	293	3.16	3.64
April	1,550	162	492	5.31	5.92
May	500	96	235	2.54	2.93
June	491	41	120	1.29	1.44
July	105	15	69.4	.749	.86
August	158	35	85.7	.925	1.07
September	143	33	81.0	.874	.98
The year	1,550	15	165	1.78	24.11

HOUSATONIC RIVER BASIN

HOUSATONIC RIVER NEAR GREAT BARRINGTON, MASS.

LOCATION.—At highway bridge one-fourth mile northeast of Van Deusenville station of New York, New Haven & Hartford Railroad (Berkshire division) and 2 miles north of Great Barrington, Berkshire County.

DRAINAGE AREA.—280 square miles.

RECORDS AVAILABLE.—May 17, 1913, to September 30, 1923.

GAGE.—Inclined staff attached to concrete anchorages on downstream side of left abutment of highway bridge; vertical high-water section attached to bridge abutment; read by Mrs. Herbert Armstrong.

DISCHARGE MEASUREMENTS.—Made from upstream side of highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; control for high stages is not well defined; at low stages control is riffle a few hundred feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.35 feet at 8 a. m. April 6 (discharge, by extension of rating curve, 4,650 second-feet); minimum stage recorded, 0.45 foot at 6 a. m. September 9 (discharge, 5 second-feet).

1913–1923: Maximum stage recorded, 8.0 feet on March 31, 1916 (discharge, by extension of rating curve, 5,300 second-feet). Zero flow recorded at various times caused by storage of water at dams above.

ICE.—Stage-discharge relation seldom, if ever, affected by ice, although river freezes over a few hundred feet downstream from gage.

REGULATION.—Storage above dam of a paper mill a mile above station causes low flow on Sundays and holidays.

ACCURACY.—Stage-discharge relation has changed slightly at infrequent intervals. Rating curve fairly well defined between 10 and 2,000 second-feet. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying rating table to mean daily gage heights. Records good.

Discharge measurements of Housatonic River near Great Barrington, Mass., during the year ending Sept. 30, 1923

[Made by W. E. Armstrong]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Mar. 3	2.35	506	May 8	2.34	462
3	2.27	459	July 24	1.26	91

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Daily discharge, in second-feet, of Housatonic River near Great Barrington, Mass., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	280	175	240	320	415	240	850	1,410	300	240	390	162
2	300	175	175	1,410	415	320	650	990	320	280	342	31
3	84	175	135	1,270	520	342	1,200	850	175	150	222	34
4	110	240	175	885	365	190	1,340	710	320	280	120	96
5	175	115	162	745	990	520	3,010	580	260	92	61	127
6	175	240	112	610	520	675	4,500	390	300	175	300	110
7	135	162	145	342	320	520	4,400	580	300	90	205	110
8	42	300	205	440	365	492	3,820	550	710	48	150	58
9	415	222	205	465	162	520	2,740	640	1,130	55	175	5
10	550	205	20	390	162	465	2,560	850	990	92	125	300
11	550	145	320	415	222	390	2,050	850	850	42	24	260
12	580	31	415	365	675	440	1,650	745	780	110	63	260
13	492	240	205	320	440	520	1,490	675	610	100	82	280
14	440	175	205	92	280	492	1,200	990	492	80	110	300
15	205	280	190	342	320	415	920	745	415	150	112	205
16	365	162	175	300	260	415	885	675	260	240	135	145
17	415	222	19	280	240	920	920	990	280	205	125	222
18	320	280	205	205	342	990	885	990	280	222	63	205
19	175	65	190	240	520	1,130	780	780	222	240	27	145
20	205	240	68	222	240	1,130	780	815	300	162	222	135
21	205	260	222	65	320	990	640	885	205	88	175	162
22	127	320	150	1,130	222	1,200	610	885	320	94	300	137
23	140	190	190	1,060	240	1,570	850	780	240	76	365	47
24	175	222	37	1,060	190	2,650	710	780	320	117	240	440
25	162	222	29	850	130	2,560	710	640	365	110	162	280
26	175	84	205	850	320	2,650	580	415	280	162	51	175
27	190	240	150	920	240	2,130	492	280	175	150	240	55
28	162	205	175	415	300	1,650	440	610	205	190	222	190
29	37	240	465	580	-------	1,200	1,060	780	320	465	142	222
30	280	41	205	675	-------	1,200	1,570	260	320	640	162	256
31	205	-------	24	745	-------	990	-------	415	-------	580	342	-------

Monthly discharge of Housatonic River near Great Barrington, Mass., for the year ending Sept 30, 1923

[Drainage area, 280 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	580	37	254	0.906	1.04
November	320	31	196	.700	.78
December	465	19	175	.625	.72
January	1,410	65	581	2.08	2.40
February	990	130	348	1.24	1.29
March	2,650	190	965	3.45	3.98
April	4,500	440	1,480	5.29	5.90
May	1,410	260	727	2.60	3.00
June	1,130	175	401	1.43	1.60
July	640	42	185	.661	.76
August	390	24	176	.629	.73
September	440	5	165	.589	.66
The year	4,500	5	471	1.68	22.86

HOUSATONIC RIVER AT FALLS VILLAGE, CONN.

LOCATION.—Half a mile below power plant of Connecticut Power Co. at Falls Village, Litchfield County.

DRAINAGE AREA.—644 square miles.

RECORDS AVAILABLE.—July 11, 1912, to September 30, 1923.

GAGES.—Stevens continuous water-stage recorder on left bank, referenced to gage datum by hook gage inside well; chain gage 300 feet upstream used for auxiliary readings. Recorder inspected by an employee of the Connecticut Power Co.

DISCHARGE MEASUREMENTS.—Made from cable 150 feet above gage or by wading.

CHANNEL AND CONTROL.—Channel deep and fairly uniform in cross section; one channel at all stages. Control not clearly defined except at low stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 9.9 feet at 2 p. m. April 6 (discharge, 5,570 second-feet); minimum stage, from water-stage recorder, 0.28 foot at 5.45 a. m. August 18 (discharge, practically nil; water held back by dam).

1912–1923: Maximum stage recorded, 13.3 feet on March 29, 1914 (discharge, 8,830 second-feet); minimum stage recorded, zero flow at various times when water was held back by dam.

ICE.—Stage-discharge relation affected by ice during some winters.

REGULATION.—Low-water flow is completely regulated by power plant at Falls Village.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined between 100 and 7,000 second-feet. Operation of water-stage recorder satisfactory. Daily discharge for open-water periods ascertained by use of discharge integrator, and during winter from mean daily gage heights corrected for effect of ice. Records good.

Discharge measurements of Housatonic River at Falls Village, Conn., during the year ending Sept. 30, 1923

[Made by W. E. Armstrong]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Mar. 4	[a]3.72	706	July 25	2.22	478
May 8	3.66	1,210	25	1.54	204

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Housatonic River at Falls Village, Conn., for th year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July	Aug.	Sept
1	136	310	290	620	1,100	700	1,960	2,350	530	192	615	3(
2	325	305	380	1,900	940	700	1,780	2,000	445	381	560	1(
3	300	300	108	2,100	1,050	880	1,680	1,750	455	380	435	2(
4	250	315	300	1,950	820	820	2,400	1,400	545	152	380	24
5	230	162	300	1,650	1,000	920	4,150	1,250	760	475	198	25
6	215	320	320	1,350	1,050	1,050	5,400	1,120	590	550	375	26
7	250	365	300	1,050	940	1,000	5,000	1,000	710	580	365	26
8	240	375	315	1,250	1,000	1,200	5,300	880	1,180	154	330	22
9	670	395	295	920	940	1,050	5,300	1,180	1,850	310	265	35
10	740	400	105	1,000	820	920	4,550	1,540	2,050	280	188	48
11	710	380	335	880	760	880	3,800	1,520	1,740	280	200	44
12	710	165	320	860	740	980	3,100	1,360	1,420	280	140	42
13	640	405	385	780	860	920	2,600	1,240	1,020	270	255	44
14	530	350	295	640	820	980	2,300	1,540	845	220	280	42
15	320	300	255	740	700	980	1,950	1,480	735	395	275	33
16	330	315	300	700	740	1,200	1,800	1,140	700	340	270	28
17	350	325	125	600	700	2,400	1,660	1,380	470	345	196	24
18	430	385	280	740	700	2,800	1,520	1,460	540	300	255	24
19	405	235	300	520	740	3,250	1,420	1,340	460	285	124	21
20	370	295	340	700	640	3,000	1,540	950	400	290	305	19
21	325	430	310	700	600	2,550	1,100	1,160	520	245	405	18
22	156	465	260	1,650	560	2,700	1,000	1,620	435	110	340	33
23	290	390	270	1,750	560	3,600	1,220	1,680	365	265	375	34
24	305	305	120	1,900	580	4,800	1,080	1,460	275	285	360	71
25	330	380	110	1,750	460	5,200	1,100	1,140	315	280	275	64
26	355	180	250	1,650	500	4,900	1,020	910	395	285	265	40
27	350	285	290	1,600	640	4,300	900	780	400	295	245	30
28	460	290	310	1,450	600	3,700	960	760	370	510	255	41
29	200	275	780	1,300	-------	2,900	1,700	750	470	835	265	45
30	290	215	780	1,250	-------	2,600	2,400	455	450	700	260	11
31	290	-------	400	1,150	-------	2,300	-----	510	-------	705	260	-----

NOTE.—Stage-discharge relation affected by ice Dec. 16–24 and Dec. 28 to Mar. 18; discharge for these periods based on gage heights corrected for effect of ice.

Monthly discharge of Housatonic River at Falls Village, Conn., for the year ending Sept. 30, 1923

[Drainage area, 644 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	740	136	371	0.576	0.66
November	465	162	321	.498	.56
December	780	105	307	.477	.55
January	2,100	520	1,200	1.86	2.14
February	1,100	460	770	1.20	1.25
March	5,200	700	2,130	3.31	3.82
April	5,400	900	2,390	3.71	4.14
May	2,350	455	1,260	1.96	2.26
June	2,050	275	715	1.11	1.24
July	835	110	354	.550	.63
August	615	124	301	.467	.54
September	710	118	327	.508	.57
The year	5,400	105	871	1.35	18.36

NAUGATUCK RIVER NEAR NAUGATUCK, CONN.

LOCATION.—One-fifth mile above Beacon Hill Brook and 1.3 miles below Naugatuck, New Haven County.

DRAINAGE AREA.—247 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 15, 1918, to September 30, 1923.

GAGE.—Gurley water-stage recorder on left bank installed August 12, 1919, referenced to gage datum by hook gage inside well; an outside staff gage is used for auxiliary readings. Recorder inspected by T. C. Melbourne.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Channel deep and fairly uniform in section at gage; control is well-defined riffle a few hundred feet downstream.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.13 feet at 7 p. m. January 1 (discharge, by extension of rating curve, 4,750 second-feet); minimum discharge, 59 second-feet at 6 a. m. September 16 (water held back by dams).

1918–1923: Maximum stage recorded, 9.95 feet March 8, 1922 (discharge by extension of rating curve, 7,920 second-feet); minimum discharge recorded, 34 second-feet August 31, 1921, and several times during October, 1921 (water held back by dams).

ICE.—Some ice forms near the gage, but the stage discharge is apparently not affected.

REGULATION.—Distribution of flow somewhat affected by operation of mills at Naugatuck and towns above, also by several small reservoirs.

ACCURACY.—Stage-discharge relation subject to occasional changes. Rating curve well defined between 90 and 2,500 second-feet. Operation of water-stage recorder satisfactory throughout the year. Daily discharge ascertained by applying rating table to mean daily gage heights, as taken from recorder sheets. Records good.

Discharge measurements of Naugatuck River near Naugatuck, Conn., during the year ending Sept. 30, 1923

[Made by W. E. Armstrong]

Date	Gage height	Discharge
	Feet	*Sec.-ft.*
July 26	1.14	152
26	.97	106

Daily discharge, in second-feet, of Naugatuck River near Naugatuck, Conn., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	88	130	114	1,920	410	300	674	919	207	128	120	82
2	90	128	118	2,160	430	327	674	644	197	124	112	122
3	124	128	98	982	445	390	716	560	190	135	110	92
4	136	130	108	674	415	734	1,230	495	252	142	101	96
5	154	118	130	535	398	989	2,400	435	334	285	83	93
6	173	126	130	460	342	782	2,580	398	350	190	96	92
7	234	181	102	374	354	620	1,550	370	480	152	96	90
8	365	206	120	350	334	520	1,190	338	632	118	95	90
9	855	176	120	402	342	435	1,115	1,430	584	135	90	79
10	365	158	100	394	334	410	870	1,190	435	126	76	93
11	570	136	98	342	303	415	758	710	315	124	77	96
12	375	122	124	346	309	626	686	698	255	120	74	95
13	254	118	130	324	324	884	620	1,080	213	126	93	101
14	201	110	116	285	315	1,115	560	740	199	103	95	93
15	181	130	143	346	291	891	510	578	228	93	96	80
16	184	141	132	346	276	1,780	540	545	197	114	93	66
17	190	136	130	306	279	3,300	495	596	179	114	93	87
18	198	122	134	273	264	2,040	445	500	190	110	82	88
19	173	110	122	321	267	1,870	425	415	177	103	69	87
20	168	136	116	294	264	1,510	410	398	167	99	97	87
21	156	192	130	940	267	1,310	386	465	152	95	93	95
22	145	156	130	1,270	258	1,750	354	680	152	80	95	80
23	187	136	122	870	249	3,030	354	485	135	95	92	145
24	307	134	114	680	228	3,220	342	394	133	99	93	252
25	209	116	114	620	243	2,310	327	338	137	110	82	149
26	176	102	124	560	249	1,710	297	303	167	101	67	118
27	163	108	128	525	258	1,430	282	288	204	99	85	106
28	136	108	181	495	288	1,310	300	273	167	187	92	99
29	124	112	158	455	-------	933	2,400	255	179	216	137	87
30	126	104	138	390	-------	905	1,150	225	154	145	114	67
31	130	-------	122	362	-------	821	-------	216	-------	126	95	-------

Monthly discharge of Naugatuck River near Naugatuck, Conn., for the year ending Sept. 30, 1923

[Drainage area, 247 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	855	88	224	0.907	1.05
November	206	102	134	.543	.61
December	181	98	124	.502	.58
January	2,160	273	600	2.43	2.80
February	445	228	312	1.26	1.31
March	3,300	300	1,247	5.05	5.82
April	2,580	282	821	3.32	3.70
May	1,430	216	547	2.21	2.55
June	632	133	245	.99	1.10
July	285	80	129	.522	.60
August	137	67	93	.377	.43
September	252	66	100	.405	.45
The year	3,300	66	382	1.54	21.00

HUDSON RIVER BASIN

HUDSON RIVER AT GOOLEY, NEAR INDIAN LAKE, N. Y.

LOCATION.—1 mile above Gooley, Essex County, 1 mile below mouth of Cedar River, 1½ miles above mouth of Indian River, and 6 miles northeast of Indian Lake Village, Hamilton County.

DRAINAGE AREA.—418 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 30, 1916, to September 30, 1923.

GAGE.—Gurley printing water-stage recorder on right bank; inspected by Earle Husson.

DISCHARGE MEASUREMENTS.—Made from cable 100 yards below gage or by wading.

CHANNEL AND CONTROL.—Solid ledge overlain with coarse gravel; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.90 feet at 1.30 a. m. May 18 (discharge, 8,660 second-feet); minimum stage from water-stage recorder, 1.38 feet from 8 p. m. August 22 to 10 p. m. August 23 (0.05 foot backwater effect from logs on control, discharge, 44 second-feet).

1916–1923: Maximum stage from water-stage recorder, 10.0 feet at 8.15 a. m. April 12, 1922 (discharge, 13,900 second-feet); minimum stage from water-stage recorder, that of August 22 and 23, 1923.

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Large diurnal fluctuation due to logging operations during spring. Seasonal distribution of flow slightly affected by storage.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice from December to April, and by backwater from logs on control from June to September. Rating curve very well defined between 200 and 7,500 second-feet. Operation of water-stage recorder satisfactory except during periods indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained by averaging the hourly gage heights, or for days of considerable variations in stage, by averaging the hourly discharge. Records good, except during periods of ice and log effect and estimate, for which they are fair.

Discharge measurements of Hudson River at Gooley, near Indian Lake, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet.	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 26	E. B. Shupe	1.95	246	Apr. 26	E. B. Shupe	4.58	2,690
Jan. 11	do	[a]3.28	370	July 11	J. L. Lamson	[b]1.81	161
Feb. 19	J. L. Lamson	[a]2.76	161	Sept. 9	Lamson and Johnson	[b]1.76	164
Mar. 15	E. B. Shupe	[a]3.47	220				

[a] Stage-discharge relation affected by ice.
[b] Stage-discharge relation affected by logs on control.

Daily discharge, in second-feet, of Hudson River at Gooley, near Indian Lake, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		236	327			130	460	4,850	746		110	
2		227	400				400	2,440	976		110	
3		232	400				550	1,970	590		100	
4		241	280				800	1,490	986		95	
5		236	260				1,500	2,100	1,530	280	90	300
6		236	240	600		130	3,400	2,250	1,810		85	
7		306	240				4,800	1,550	1,170		85	
8		343	300				5,390	663	1,000	220	80	
9		354	300			200	3,940	2,250	1,200	200	75	150
10	190	376	240		190	190	3,700	3,210	1,400	190	70	140
11		388	260	360		190	3,180	2,300	1,300	170	70	160
12		370	220	360		200	3,320	1,860	1,100	160	65	180
13		343	200	340		240	3,040	1,660	900	150	60	170
14		316	190	280		240	2,620	1,850	750	140	55	150
15		316		260		220	2,620	600	550	130	55	130
16		359		300		300	2,110	2,640	440	180	55	120
17		388		300		420	1,540	4,120	400	200	50	120
18	227	418		300		480	1,310	4,980	380	180	48	110
19	223	412		300	160	550	1,200	2,940	340	170	46	100
20	215	406			150	550	1,190	2,960	320	160	46	100
21	211	430			160	500	2,560	1,750	260	150	46	180
22	207	537			140	460	5,030	1,620	240	140	46	260
23	211	495	170		140	480	6,330	2,110	220	130	44	420
24	245	516			140	600	5,210	1,990	200	120	44	420
25	254	488		280	130	750	4,510	1,630	200	120	46	320
26	245	450			110	750	3,420	1,280	200	120	46	260
27	245	502			100	700	3,180	1,130		120	48	240
28	245	430			120	700	3,040	747		110	55	200
29	241	430			-------	600	5,540	860	320	110	60	180
30	263	376			-------	600	5,730	332		M0	75	170
31	249	-------			-------	500	-------	1,060		110	150	-------

NOTE.—Discharge for the following periods estimated from comparison with record of Hudson River at North Creek and Indian River near Indian Lake: Oct. 1-17, Dec. 15-31, Jan. 1-10, 20-31, Feb. 1-18, Mar. 2-8, June 27-30, July 1-7, Sept 1-8, and Aug. 31, as indicated in above table; mean daily gage heights, Dec. 14, Jan. 19, July 8, and Sept. 9, estimated from automatic record; water-stage recorder not operating satisfactorily. Discharge, Dec. 3 to Apr. 7, determined from gage heights corrected for ice effect from three discharge measurements, study of gage-height graph and weather records, and comparison with North Creek and Indian Lake records. Discharge, June 8 to Sept. 3, determined from gage heights corrected for backwater effect from logs on control from two discharge measurements.

Monthly discharge of Hudson River at Gooley, near Indian Lake, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 418 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	263	-------	210	0.502	0.58
November	537	227	372	.890	.99
December	400	-------	218	.522	.60
January	-------	260	392	.938	1.08
February	-------	100	170	.407	.42
March	750	130	370	.885	1.02
April	6,330	400	3,050	7.30	8.14
May	4,980	332	2,040	4.88	5.63
June	1,810	200	683	1.63	1.82
July	-------	110	179	.428	.49
August	150	44	68.1	.163	.19
September	420	100	223	.533	.59
The year	6,330	44	664	1.59	21.55

HUDSON RIVER AT NORTH CREEK, N. Y.

LOCATION.—At two-span steel highway bridge in North Creek, Warren County, immediately above mouth of North Creek.

DRAINAGE AREA.—804 square miles.

RECORDS AVAILABLE.—September 21,1907, to September 30, 1923.

GAGE.—Chain at upstream side of left span of bridge; read by William Alexander.

DISCHARGE MEASUREMENTS.—Made from upstream side of highway bridge or by wading.

CHANNEL AND CONTROL.—Heavy gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.50 feet at 7.30 a. m. May 18 (discharge, 10,400 second-feet); minimum stage recorded, 1.92 feet at 7.30 a. m. and 5 p. m. September 2 (discharge, 128 second-feet).

1907–1923: Maximum stage recorded, 12.0 feet during evening of March 27, 1913 (discharge, about 30,000 second-feet); minimum stage recorded, that of September 2, 1923.

ICE.—Stage-discharge relation affected by ice.

REGULATION.—The numerous lakes and ponds in the basin of the upper Hudson have a decided effect on the low-water flow, especially the reservoir at Indian Lake. Many of the reservoirs are used to make flood waves in the spring in connection with log driving.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice from December to April. Rating curve well defined between 250 and 7,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records good except during log-driving season when mean daily gage height computed from two gage readings a day may be in error owing to large variations in stage caused by operation of sluice gates in logging dams above station. Records for period of ice effect, fair.

Discharge measurements of Hudson River at North Creek, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 22	A. W. Harrington	2.97	782	Mar. 14	E. B. Shupe	[a]4.18	628
27	E. B. Shupe	2.41	353	Apr. 25	do	5.95	6,030
Jan. 12	do	[a]3.52	552	May 25	A. W. Harrington	4.54	3,000
Feb. 17	J. L. Lamson	[a]4.23	799	Sept. 8	Lamson and Johnson	2.48	403

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Hudson River at North Creek, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	920	920	630	700	950	550	600	6,160	1,260	477	1,030	266
2	920	920	630	850	800	550	550	4,950	381	477	975	128
3	870	720	675	1,200	600	550	800	3,470	1,260	411	870	514
4	870	720	820	1,100	650	550	1,400	4,280	975	405	820	318
5	870	720	720	1,200	700	550	3,000	2,420	2,750	381	920	550
6	820	720	399	1,100	700	600	4,200	3,470	1,200	351	975	514
7	820	550	307	900	900	650	5,500	2,260	1,660	329	920	444
8	870	590	340	900	1,000	600	6,940	920	1,590	296	920	387
9	1,030	630	650	900	950	600	7,210	2,750	1,660	550	920	550
10	870	590	650	750	850	600	6,680	2,920	1,800	590	870	630
11	550	590	500	650	800	600	5,180	3,470	1,800	630	870	590
12	411	550	500	600	750	650	5,910	3,860	1,390	590	820	630
13	375	514	500	500	750	650	5,420	2,260	1,260	550	820	590
14	351	477	500	560	800	650	4,720	2,920	920	630	820	590
15	770	444	480	550	800	550	4,070	1,200	720	770	820	550
16	770	477	440	460	850	600	3,280	2,920	550	920	820	514
17	770	550	380	400	800	750	2,750	3,470	514	444	770	514
18	720	550	480	420	800	850	2,100	7,210	477	387	770	477
19	720	550	750	550	800	950	1,950	4,070	477	514	770	550
20	675	550	650	400	800	750	1,950	5,180	630	630	720	630
21	675	630	800	600	750	600	4,950	3,470	630	590	720	770
22	770	720	550	900	700	550	8,040	2,100	590	720	720	820
23	820	720	380	700	700	600	10,100	2,750	514	920	720	444
24	920	630	300	460	650	1,100	8,040	2,100	324	1,140	720	514
25	870	630	260	460	650	1,600	5,910	2,420	1,200	1,140	720	399
26	477	550	340	480	650	1,500	4,950	1,520	770	920	675	318
27	357	477	440	500	600	1,200	4,500	3,280	477	820	675	281
28	340	514	420	600	550	1,100	5,180	820	351	820	675	246
29	590	720	460	1,000	-------	1,000	8,320	1,520	550	590	720	218
30	720	630	360	900	-------	850	8,320	550	630	550	675	196
31	770	-------	340	950	-------	750	-------	477	-------	770	550	-------

NOTE.—Mean daily gage heights, Aug. 7–9, estimated by interpolation; chain gage out of order. Discharge, Dec. 8 to Apr. 7, determined from gage heights corrected for ice effect by means of three discharge measurements, study of gage-height graph and weather records, and comparison with records of Hudson River at Hadley and Schroon River at Riverbank.

Monthly discharge of Hudson River at North Creek, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 804 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,030	340	719	0.894	1.03
November	920	444	618	.769	.86
December	820	260	505	.628	.72
January	1,200	400	715	.889	1.02
February	1,000	550	761	.947	.99
March	1,600	550	763	.949	1.09
April	10,100	550	4,750	5.91	6.59
May	7,210	477	2,940	3.66	4.22
June	2,750	324	977	1.22	1.36
July	1,140	296	623	.775	.89
August	1,030	550	800	.995	1.15
September	820	128	471	.586	.65
The year	10,100	128	1,220	1.52	20.57

NOTE.—The monthly discharge in second-feet per square mile and run-off in inches shown by the table do not represent the natural flow from the basin because of artificial storage, mainly in Indian Lake reservoir. The yearly discharge and run-off doubtless represent more nearly the natural flow.

HUDSON RIVER AT HADLEY, N. Y.

LOCATION.—At Hadley, Saratoga County, a quarter of a mile above mouth of Sacandaga River and dam of Nuera Paper Co., and just below mouth of Lake Luzerne outlet.

DRAINAGE AREA.—1,660 square miles (from Fourth Annual Report of New York State Water Supply Commission).

RECORDS AVAILABLE.—July 15, 1921, to September 30, 1923. Comparable records at station at Thurman, 13 miles above, September 1, 1907, to September 30, 1920.

GAGE.—Gurley seven-day water-stage recorder on right bank installed August 9, 1921; inspected by J. F. Kelly.

DISCHARGE MEASUREMENTS.—Made from cable 100 yards above gage.

CHANNEL AND CONTROL.—Solid ledge about 200 feet below gage, with some large boulders, permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 12.91 feet at 7.30 p. m. April 9 (discharge, 18,700 second-feet); minimum stage from water-stage recorder, 1.19 feet at 9.30 a. m. September 3 (discharge, 362 second-feet).

1921–1923: Maximum stage recorded, 19.71 feet at 3.30 p. m. April 12, 1922 (discharge, 33,100 second-feet); minimum stage from water-stage recorder, that of September 3, 1923.

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Discharge regulated to some extent by the storage reservoirs at Indian, Schroon, and Brant lakes and mills on Schroon River.

ACCURACY.—Stage-discharge relation permanent, except as affected by ice. Rating curve well defined between 700 and 25,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph, or for days of considerable fluctuation by averaging discharge for intervals of the day. Records excellent.

Discharge measurements of Hudson River at Hadley, N. Y., during the years ending Sept. 30, 1921–1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1921		*Feet.*	*Sec.-ft.*	1922		*Feet*	*Sec.-ft.*
July 28	B. F. Howe	3.50	1,980	Apr. 19	Howe and Granger	11.45	15,500
Aug. 2	do	2.25	835	22	B. F. Howe	9.94	12,300
8	A. W. Harrington	3.01	1,460	23	do	7.21	7,550
Dec. 8	B. F. Howe	[a]5.77	2,850	24	do	6.95	7,100
15	Shupe and Howe	[a]3.80	1,260	May 3	Covert and Shupe	5.20	4,210
28	E.B. Shupe	[a]2.88	1,180	June 22	Granger and Shupe	8.95	10,700
1922				Sept. 20	A. W. Harrington	2.68	1,170
Jan. 27	C. C. Covert	[a]3.00	1,280	1923			
Feb. 25	do	[a]3.59	1,850	Jan. 9	E. B. Shupe	[a]2.92	1,330
Mar. 10	Covert and Granger	[a]5.05	3,630	26	do	[a]2.51	936
30	Shupe and Granger	9.68	11,600	Feb. 16	J. L. Lamson	[a]2.85	1,240
30	do	9.38	11,400	Mar. 12	E. B. Schupe	[a]2.76	1,080
Apr. 14	Howe and Granger	15.79	24,500	Apr. 23	do	11.29	15,100
15	do	13.50	20,100	Sept. 6	Lamson and Johnson	2.41	927
17	do	10.80	14,400				

[a] Stage-discharge relation affected by ice.

NOTE.—Gage heights for measurements made in 1921 and 1922 supersede the figures published in previous reports.

Daily discharge, in second-feet, of Hudson River at Hadley, N. Y., during the years ending Sept. 30, 1921–1923

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1921				1921			
1		1,180	1,220	16	2,720	1,320	1,140
2		890	1,220	17	2,360	1,100	1,180
3		824	1,220	18	2,080	1,020	1,180
4		978	1,140	19	1,920	1,060	1,140
5		1,020	872	20	2,240	1,010	1,180
6		992	971	21	2,780	971	1,180
7		964	1,140	22	2,360	950	1,220
8		1,400	1,100	23	2,020	926	1,180
9		1,400	1,100	24	1,750	1,100	1,180
10		1,320	1,140	25	1,600	1,180	1,100
11		1,270	1,270	26	1,450	1,140	1,100
12		1,650	1,220	27	1,800	1,270	1,100
13		1,500	1,220	28	2,190	1,320	1,220
14		1,400	1,140	29	2,140	1,320	1,360
15	2,910	1,360	1,100	30	1,970	1,320	1,360
				31	1,600	1,270	

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1921-22												
1	1,400	860	1,970	1,000	1,600	1,800	10,800	4,200	2,240	7,330	1,100	836
2	1,320	1,550	1,970	1,100	1,600	1,700	9,310	4,200	2,190	7,870	1,400	902
3	1,270	1,450	4,800	1,100	1,700	1,700	8,050	4,350	2,840	7,690	1,360	1,010
4	1,270	1,360	5,450	1,300	1,300	1,700	7,330	5,480	4,650	6,970	1,500	1,100
5	1,220	1,180	4,400	1,400	1,100	1,700	6,460	5,200	4,970	5,950	1,550	1,400
6	1,220	1,140	3,800	1,400	1,400	1,800	6,460	7,510	5,130	5,130	1,270	1,400
7	1,180	1,140	3,200	1,300	1,600	1,900	6,800	8,410	5,130	4,200	1,650	1,450
8	1,180	1,010	2,800	1,100	1,600	4,200	9,310	8,050	4,350	3,750	2,720	1,400
9	1,180	1,010	2,600	1,000	1,500	4,400	14,900	8,590	3,460	3,390	2,720	1,360
10	1,180	1,060	2,600	1,100	1,500	3,600	16,400	7,330	3,110	2,980	2,360	1,320
11	1,270	1,140	2,400	1,000	1,500	3,200	22,600	6,290	3,180	2,600	1,970	1,360
12	1,360	1,140	2,200	900	1,500	3,000	31,600	5,570	3,110	2,360	1,800	1,550
13	1,400	1,320	1,900	900	1,600	3,000	29,900	5,330	2,600	2,190	1,550	1,600
14	1,140	1,270	1,600	950	1,600	3,600	24,400	5,190	2,140	2,020	1,400	1,220
15	1,060	1,180	1,300	950	1,600	5,000	20,200	4,530	1,860	1,860	1,220	1,320
16	957	1,360	1,000	950	1,500	5,610	17,200	3,650	1,700	1,750	1,100	1,750
17	964	1,320	1,400	1,300	1,500	4,810	14,100	3,520	1,650	1,650	950	1,800
18	914	1,860	2,400	1,400	1,500	4,200	13,900	3,180	2,620	1,700	1,100	1,650
19	896	3,180	3,200	1,500	1,500	3,900	16,200	5,250	4,970	1,600	1,140	1,450
20	938	4,810	2,800	1,500	1,500	4,050	14,300	6,460	4,350	1,400	1,100	1,270
21	1,270	4,810	2,600	1,500	1,600	4,350	13,600	7,050	6,750	1,270	1,180	1,220
22	1,450	4,050	1,800	1,400	1,500	3,900	10,900	7,450	11,500	1,220	1,180	1,320
23	1,600	3,600	1,500	1,400	1,500	3,530	8,590	4,870	14,700	1,020	1,140	1,360
24	1,600	2,980	1,600	1,400	1,700	3,600	7,690	5,450	12,200	1,160	1,180	1,360
25	1,450	2,660	1,600	1,300	1,900	3,750	7,150	4,500	9,490	2,130	1,140	1,320
26	1,270	2,600	1,500	1,300	1,900	3,900	5,070	3,900	7,690	1,870	1,320	1,220
27	1,100	2,300	1,200	1,300	2,000	5,290	6,460	3,900	6,120	1,220	1,360	1,220
28	999	2,190	1,200	1,300	1,900	8,230	6,120	3,600	5,290	1,010	1,320	1,220
29	920	2,240	1,100	1,300	-------	13,400	7,860	3,320	5,610	896	1,270	1,220
30	866	2,080	1,100	1,500	-------	12,000	4,200	3,040	7,150	775	880	1,180
31	836	-------	1,000	1,600	-------	12,000	-------	2,540	-------	1,020	720	-------

Daily discharge, in second-feet, of Hudson River at Hadley, N. Y., for the years ending Sept. 30, 1921-1923—Continued

Date	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922-23												
1	1,270	1,270	1,060	850	1,300	1,100	1,900	12,000	2,510	1,220	1,180	872
2	1,060	1,270	1,140	2,000	1,400	1,100	1,800	10,800	1,800	1,010	1,360	617
3	1,180	1,320	985	2,000	1,400	1,100	1,800	7,520	2,620	1,060	1,270	604
4	1,140	1,180	1,100	1,900	1,300	1,100	2,600	6,460	1,770	1,020	1,140	681
5	1,140	1,180	1,270	1,700	1,200	1,200	5,500	5,700	2,880	1,020	1,220	684
6	1,140	1,220	1,180	1,700	1,300	1,300	9,500	5,610	3,220	1,010	1,220	932
7	1,060	1,400	742	1,500	1,300	1,200	13,000	5,290	3,260	978	1,220	937
8	1,140	1,270	615	1,300	1,400	1,200	14,900	3,930	2,600	932	1,220	1,020
9	1,270	1,220	742	1,300	1,500	1,200	16,800	4,280	2,840	878	1,180	1,100
10	1,550	1,220	850	1,300	1,400	1,200	14,100	6,180	3,040	1,140	1,180	1,140
11	1,220	1,180	850	1,200	1,400	1,200	12,600	5,810	3,040	1,180	1,140	1,010
12	964	1,100	800	1,100	1,300	1,100	13,900	5,780	2,720	1,140	1,270	964
13	860	1,060	850	1,100	1,400	1,100	12,800	4,200	2,480	1,100	1,180	992
14	842	971	850	1,000	1,300	1,100	11,100	5,130	2,140	1,060	1,060	938
15	1,030	950	850	1,000	1,400	1,100	10,000	3,790	1,860	1,060	1,060	872
16	1,220	944	800	1,100	1,300	1,200	8,770	4,390	1,500	1,360	1,060	908
17	1,220	957	750	1,000	1,300	1,400	7,510	7,330	1,320	1,320	1,140	836
18	1,140	957	750	900	1,300	1,600	6,460	11,500	1,220	836	1,100	764
19	1,060	978	750	900	1,300	1,900	5,780	7,690	1,140	753	1,060	731
20	1,060	992	1,100	950	1,300	1,900	5,450	7,150	1,100	848	1,020	824
21	1,060	1,020	1,000	1,100	1,300	1,500	7,870	6,460	1,220	878	1,020	1,330
22	1,060	1,020	1,100	1,200	1,200	1,500	12,200	4,970	1,140	1,100	1,100	1,650
23	1,220	1,060	800	1,600	1,200	1,700	14,900	5,290	1,100	1,360	1,060	1,500
24	1,400	1,060	650	1,400	1,200	3,000	14,100	3,820	1,060	1,400	1,060	1,140
25	1,400	992	600	1,100	1,300	3,400	11,300	4,650	1,700	1,450	1,020	1,010
26	1,270	844	650	1,000	1,200	3,000	10,600	3,250	1,500	1,320	1,140	812
27	902	827	750	1,000	1,200	2,600	8,410	4,700	1,270	1,100	971	661
28	819	858	700	950	1,200	2,400	8,230	2,780	999	1,180	990	650
29	786	957	550	950	-------	2,200	12,400	2,630	957	1,270	1,320	720
30	1,060	1,020	900	1,300	-------	2,200	13,900	2,250	1,360	938	1,060	650
31	1,140	-------	750	1,300	-------	2,000	-------	1,800	-------	808	964	-------

NOTE.—Discharge Sept. 1-3, Oct. 16, 17, 1921, Jan. 14, and May 13, 1923, determined from estimated mean daily gage heights; water-stage recorder not operating. Discharge July 15 to Aug. 8, 1921, ascertained from mean daily gage heights determined by plotting gage readings, obtained during construction, on recorder graph for later period.

Discharge Apr. 12, and 13, 1922, ascertained by use of mean daily gage heights determined from graph based on readings above or below a reference point and reduced to datum of gage; water-stage recorder removed to safety because of flood. Discharge Dec. 5, 1921, to Mar. 15, 1922, and Dec. 10, 1922, to Apr. 7, 1923, determined from gage heights corrected for ice effect by means of discharge measurements, study of gage-height graph and weather records, and comparison with records of stations in upper drainage. The records from July 15, 1921, to Sept. 30, 1922, supersede those published in Water-Supply Papers 521 and 541.

Monthly discharge of Hudson River at Hadley, N. Y., for the years ending Sept. 30, 1921–1923

[Drainage area, 1,660 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1921					
July 15–31	2,910	1,450	2,110	1.27	0.80
August	1,650	824	1,180	.711	.82
September	1,360	872	1,160	.699	.78
1921–22					
October	1,600	836	1,180	.711	.82
November	4,810	860	2,000	1.20	1.34
December	5,450	1,000	2,260	1.36	1.57
January	1,600	900	1,240	.747	.86
February	2,000	1,100	1,580	.952	.99
March	13,400	1,700	4,480	2.70	3.11
April	31,600	4,200	12,600	7.59	8.47
May	8,590	2,540	5,220	3.14	3.62
June	14,700	1,650	5,090	3.07	3.42
July	7,870	775	2,840	1.71	1.97
August	2,720	720	1,410	.849	.98
September	1,800	836	1,330	.801	.89
The year	31,600	720	3,430	2.07	28.04
1922–23					
October	1,550	786	1,120	.675	.78
November	1,400	827	1,080	.651	.73
December	1,270	550	854	.514	.59
January	2,000	850	1,250	.753	.87
February	1,500	1,200	1,310	.789	.82
March	3,400	1,100	1,640	.988	1.14
April	16,800	1,800	9,670	5.83	6.50
May	12,000	1,800	5,590	3.37	3.88
June	3,260	957	1,910	1.15	1.28
July	1,450	753	1,090	.657	.76
August	1,360	964	1,130	.681	.79
September	1,650	604	918	.553	.62
The year	16,800	550	2,290	1.38	18.76

HUDSON RIVER AT SPIER FALLS, N. Y.

LOCATION.—Half a mile below Spier Falls dam, Saratoga County, and 11½ miles below mouth of Sacandaga River.

DRAINAGE AREA.—2,800 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 7, 1912, to March 31, 1923, when station was discontinued. Shortly after 9 a. m. on March 29 the stage-discharge relation was affected by backwater from Sherman Island dam, 3 miles downstream.

GAGE.—Gurley two-day water-stage recorder on right bank; inspected by chief operator of power plant.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet downstream from gage or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and boulders. Control probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage during period, October 1, 1922, to 9 a. m. March 29, 1923, from water-stage recorder, 6.36 feet at 8.45 a. m. March 26 (discharge, 9,780 second-feet); minimum stage from water-stage recorder, 0.90 foot at 4 p. m. November 26 (discharge, 129 second-feet).

1912–1923: Maximum stage from water-stage recorder, 18.59 feet at 12.25 a. m. March 28, 1913 (discharge, about 89,100 second-feet); minimum stage, −0.12 foot at 4 p. m. September 23, 1917, observed during current-meter measurement (discharge, about 5.5 second-feet).

ICE.—Stage-discharge relation affected by ice for a short time during extremely cold periods.

REGULATION.—Large diurnal fluctuation in discharge is caused by operation of the Spier Falls power plant. Seasonal flow affected by storage at Indian Lake and many small lakes and reservoirs in the upper part of the drainage basin.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Rating curve well defined for all stages except about 9 feet where curve may be 4 or 5 per cent large. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by averaging results obtained by applying gage heights for one-hour intervals to rating table. Records good.

COOPERATION.—Record of hourly discharge from October 1 to January 31 computed by engineers of International Paper Co.

The following discharge measurement was made by Shupe and Harrington: November 26, 1922: Gage height, 0.95 foot; discharge, 145 second-feet.

Daily discharge, in second-feet, of Hudson River at Spier Falls, N. Y., for the period Oct. 1, 1922, to Mar. 31, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	650	1,650	1,750	2,500	2,540	1,840
2	2,000	2,090	2,090	4,850	2,960	2,000
3	1,860	1,800	1,200	5,420	2,510	2,390
4	1,310	2,100	1,600	5,700	2,110	1,400
5	1,480	1,370	2,440	5,380	1,930	2,140
6	1,380	1,990	1,650	4,790	2,330	2,470
7	1,310	2,410	1,760	4,100	2,290	2,310
8	1,240	2,360	1,250	4,170	1,990	2,670
9	2,320	2,490	1,100	3,440	2,390	2,330
10	2,870	2,310	870	3,210	2,910	2,790
11	2,760	2,630	1,600	3,090	1,420	1,760
12	2,870	1,320	1,320	2,700	2,470	2,330
13	2,390	2,350	1,670	2,940	1,980	2,160
14	2,320	1,740	1,580	1,560	2,080	2,230
15	1,360	1,680	1,570	2,420	1,960	2,100
16	2,310	1,900	1,620	2,170	1,820	2,450
17	1,820	1,910	597	2,250	2,560	2,990
18	2,140	2,510	1,360	2,150	1,680	1,830
19	1,960	1,100	1,400	2,000	1,970	4,080
20	1,700	2,300	1,550	2,620	1,960	4,130
21	2,180	1,990	1,700	1,470	2,480	3,940
22	1,220	1,990	1,670	3,130	1,540	3,730
23	2,070	2,080	2,000	3,340	1,780	3,820
24	2,040	2,050	601	3,550	2,350	5,780
25	2,420	2,490	1,300	2,900	1,110	7,430
26	2,020	825	1,430	2,910	1,730	7,330
27	1,800	2,000	1,400	3,350	1,660	6,920
28	1,840	1,550	1,670	1,600	1,900	6,510
29	1,200	1,580	1,310	2,770	-------	6,300
30	1,800	1,350	1,060	2,830	-------	5,900
31	1,860	-------	815	2,550	-------	5,500

NOTE.—Discharge for part of day estimated Oct. 2, 27, 29, 30, Nov. 13, 20, 27, 28, 30, Dec. 1, 3, 4, 6, 11, 16, 20, 21, 25, 31, Jan. 1, 2, 18, and 19; water-stage recorder not operating satisfactorily. Discharge, Mar. 29 and 31, estimated from comparison with records of Hudson and Sacandaga rivers at Hadley; stage-discharge relation affected by backwater from Sherman Island dam.

Monthly discharge of Hudson River at Spier Falls, N. Y., for the period Oct. 1, 1922, to Mar. 31, 1923

[Drainage area, 2,800 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,870	650	1,890	0.674	0.78
November	2,630	825	1,930	.689	.77
December	2,440	597	1,450	.518	.60
January	5,700	1,470	3,160	1.13	1.30
February	2,960	1,110	2,090	.746	.78
March	7,430	1,400	3,600	1.29	1.49

NOTE.—The monthly discharge in second-feet per square mile and run-off in inches shown by the table do not necessarily represent the natural flow from the basin because of artificial storage, mainly in Indian Lake reservoir, Schroon and Brant lakes.

HUDSON RIVER AT MECHANICVILLE, N. Y.

LOCATION.—At Duncan dam of West Virginia Pulp & Paper Co. in Mechanicville, Saratoga County, 3,700 feet above mouth of Anthony Kill, 1¼ miles below mouth of Hoosic River, and 9 miles above mouth of Mohawk River.

DRAINAGE AREA.—4,500 square miles.

RECORDS AVAILABLE.—1888 to September 30, 1923.

GAGE.—Water-stage recorder at the dam, installed in 1910; staff gage used previous to that date.

EXTREMES OF DISCHARGE.—Maximum daily discharge during year, 43,700 second-feet April 9; minimum daily discharge, 743 second-feet, October 8.

1888–1923: Maximum discharge recorded, 120,000 second-feet at 6 a. m. March 28, 1913. The plant is occasionally shut down and the flow of the river stored in the pond so that the discharge below the station at these times becomes practically zero.

DIVERSIONS.—Water is diverted from Hudson River through the Glens Falls feeder and the old Champlain canal into the summit level of the Barge Canal. A portion flows north into Lake Champlain. No correction has been made for this diversion.

ACCURACY.—Discharge over spillway determined from a rating curve based on coefficients derived by the United States Geological Survey for dams of ogee section. Discharge through turbines computed from records of their operation. Discharge at lock and through Barge Canal turbines at lock computed from records of the number of lockages per day.

COOPERATION.—Discharge over the spillway and through turbines of the West Virginia Pulp & Paper Co. furnished by Mr. W. J. Barnes, engineer of the company. Record of lockages obtained from the office of New York State Department of Public Works.

Daily discharge, in second-feet, of Hudson River at Mechanicville, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,110	1,940	2,270	7,040	3,630	2,240	7,120	30,600	3,500	2,260	1,700	1,380
2	1,320	2,030	1,820	10,200	4,160	2,720	7,480	26,600	3,290	2,410	1,410	1,270
3	1,580	2,030	1,360	8,160	4,540	2,840	9,390	21,800	3,660	2,370	1,460	1,260
4	1,720	1,870	2,110	6,680	3,160	2,350	13,600	16,000	3,960	1,960	1,540	1,370
5	1,610	1,780	2,660	6,060	4,020	4,330	27,300	15,800	3,890	1,990	1,680	1,910
6	1,460	2,190	2,710	5,610	3,060	4,640	38,500	14,000	4,100	1,780	1,410	1,610
7	1,210	3,020	2,180	3,550	3,040	4,480	38,000	12,900	5,900	2,230	1,270	1,150
8	743	3,380	2,350	5,400	2,820	4,070	42,200	10,500	8,120	1,460	1,490	1,320
9	1,280	3,310	1,670	5,420	3,650	4,030	43,700	9,410	9,470	1,830	1,620	951
10	3,630	3,020	1,330	5,470	3,480	3,720	39,700	12,600	7,750	1,680	1,400	1,380
11	4,050	2,860	1,680	4,430	2,640	2,800	33,600	13,300	8,410	1,650	1,450	1,130
12	3,660	2,190	1,860	4,920	3,180	3,750	32,400	12,300	7,180	1,570	1,270	1,400
13	3,460	2,350	2,320	4,420	3,230	4,400	30,200	12,500	5,680	1,970	1,240	1,610
14	3,020	2,980	2,210	2,980	2,820	3,630	27,800	11,000	5,210	1,830	1,260	1,190
15	2,030	3,300	1,870	3,380	2,760	3,750	24,400	11,000	4,540	1,410	1,430	1,590
16	2,460	2,410	1,610	3,370	2,760	4,760	22,400	9,490	3,520	1,690	1,480	1,500
17	2,910	2,670	1,260	3,110	2,400	8,710	19,000	14,000	2,530	2,410	1,340	1,390
18	2,990	2,320	1,490	2,960	2,140	6,870	15,700	18,100	2,720	2,210	1,340	1,260
19	2,620	1,740	1,600	3,090	3,240	9,040	14,500	17,300	2,700	2,000	1,010	1,380
20	2,790	2,260	1,890	2,780	3,160	8,150	12,900	14,600	2,840	1,610	1,090	1,660
21	2,500	3,060	1,790	2,950	2,920	8,030	15,800	16,000	1,920	1,510	1,070	1,950
22	1,750	2,800	1,910	5,400	2,720	7,760	23,400	13,700	1,460	853	1,270	1,960
23	1,880	2,600	1,640	5,860	2,740	15,200	28,900	11,900	1,320	1,260	1,200	1,920
24	2,770	2,350	1,690	5,920	2,220	18,500	30,400	11,200	1,940	1,340	1,110	2,970
25	3,230	2,430	1,130	5,790	1,900	16,700	27,300	9,660	1,540	1,460	1,150	2,790
26	3,150	1,830	1,580	5,250	2,610	14,500	23,800	9,900	2,600	1,660	909	2,080
27	3,040	1,700	1,820	4,850	2,280	11,900	20,500	6,170	2,560	1,820	1,020	1,900
28	2,740	2,130	1,900	4,960	2,060	10,400	20,900	8,930	2,280	2,820	991	1,900
29	1,510	2,200	1,960	4,220	-------	8,290	32,300	6,190	2,240	2,860	1,050	1,620
30	1,730	1,820	1,730	4,470	-------	8,470	32,700	4,980	2,270	2,330	1,340	1,260
31	1,870	-------	1,260	4,210	-------	8,470	-------	4,090	-------	1,670	1,390	-------

NOTE.—From Mar. 1–16, inclusive, flashboards were in bad condition from ice movements; at 4.50 p. m. Mar. 23, about 90 per cent of flashboards were carried away; from Apr. 1–3, inclusive, 95 per cent of flashboards were off the dam; between midnight Apr. 3 and 1 a. m. Apr. 4, the ice above the dam passed out, carrying away the remainder of the flashboards. Discharge estimated accordingly.

Monthly discharge of Hudson River at Mechanicville, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 4,500 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	4,050	743	2,320	0.516	0.59
November	3,380	1,700	2,420	.538	.60
December	2,710	1,130	1,830	.407	.47
January	10,200	2,780	4,930	1.10	1.27
February	4,540	1,900	2,980	.662	.69
March	18,500	2,240	7,080	1.57	1.81
April	43,700	7,120	25,200	5.60	6.25
May	30,600	4,090	13,100	2.91	3.36
June	9,470	1,320	3,970	.882	.98
July	2,860	853	1,870	.416	.48
August	1,700	909	1,300	.289	.33
September	2,970	951	1,600	.356	.40
The year	43,700	743	5,710	1.27	17.23

NOTE.—The monthly discharge in second-feet per square mile and run-off in inches shown by the table do not necessarily represent the natural flow from the basin because of artificial storage. See "Diversions," above.

INDIAN LAKE RESERVOIR NEAR INDIAN LAKE, N. Y.

LOCATION.—At masonry storage dam at outlet of Indian Lake, 2 miles south of Indian Lake Village, Hamilton County, and 7½ miles above mouth of Indian River.

DRAINAGE AREA.—131 square miles, including 9.3 square miles of water surface of Indian Lake at the elevation of crest of spillway (measured on topographic maps).

RECORDS AVAILABLE.—Records of stage and gate openings from July 22, 1900, to September 30, 1923.

GAGES.—Elevation of water surface in reservoir is determined by chain gage on dam near gate house; prior to November 17, 1911, a staff gage was used at same site. Mean elevation of crest of spillway is at gage height 33.38 feet. Widths of sluice gate openings determined by gage scales at sides of gate stems inside gatehouse. Gages read by Lester Savarie from October 1 to November 30 and by Frank Brown from December 1 to September 30.

EXTREMES OF STAGE.—Maximum elevation of water surface in reservoir, 33.8, feet June 19 and 20; minimum elevation, 5.9 feet March 20.

1900–1923: Maximum elevation recorded, 38.8 feet March 28, 1913; minimum elevation recorded, 2.0 feet March 9–18, 1907, and January 3–17, 1910.

REGULATION.—At ordinary stages discharge is completely regulated by operation of sluice gates. Water is held in storage until needed to supplement the flow of the upper Hudson during the low-water period. Storage capacity is about 4.7 billion cubic feet, equivalent to a flow of about 600 second-feet for 90 days.

COOPERATION.—Record of gate openings furnished by the Indian River Co.

Daily gage height, in feet, of Indian Lake reservoir near Indian Lake, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	20.75	15.2	15.8	13.9	16.0	9.6	8.55	29.0	33.7	32.55	27.3	16.45
2	20.35	15.0	15.7	14.2	15.9	9.4	8.85	29.4	33.7	32.6	26.9	16.45
3	20.0	14.9	15.7	14.5	15.7	9.2	9.05	29.35	33.7	32.6	26.55	16.45
4	19.65	14.75	15,65	14.8	15.5	8.9	9.3	29.3	33.75	32.6	26.35	16.5
5	19.3	14.6	15.6	15.1	15.3	8.7	9.65	29.5	33.2	32.7	25.9	16.5
6	18.95	14.55	15.6	15.3	15.2	8.5	9.95	29.7	33.1	32.7	25.5	16.55
7	18.65	14.65	15.65	15.45	15.1	8.4	10.75	30.0	33.15	32.65	25.15	16.6
8	18.4	14.75	15.65	15.55	14.9	8.2	11.95	30.2	33.2	32.65	24.7	16.65
9	18.15	14.85	15.6	15.65	14.4	7.9	13.35	30.35	33.35	32.55	24.3	16.65
10	18.1	14.95	15.55	15.8	14.0	7.65	14.4	30.6	33.45	32.45	23.9	16.55
11	18.3	15.0	15.5	15.9	13.9	7.4	15.2	30.9	33.55	32.25	23.5	16.4
12	18.4	15.05	15.45	15.95	13.55	7.15	15.95	31.15	33.65	32.1	23.1	16.2
13	18.45	15.1	15.4	16.0	13.3	6.9	16.6	31.35	33.7	31.9	22.8	16.0
14	18.25	15.15	15.35	16.1	13.0	6.7	17.4	31.55	33.7	31.75	22.4	15.8
15	18.0	15.2	15.3	16.2	12.7	6.5	17.95	31.75	33.7	31.5	22.0	15.65
16	17.8	15.3	15.25	16.25	12.5	6.2	18.45	31.9	33.75	31.25	21.65	15.4
17	17.6	15.4	15.2	16.3	12.35	6.35	18.85	32.2	33.75	31.1	21.3	15.2
18	17.45	15.5	15.15	16.35	12.2	6.25	19.05	32.8	33.75	31.15	20.9	15.0
19	17.3	15.55	15.05	16.4	11.9	6.0	19.3	33.2	33.8	31.0	20.5	14.8
20	17.15	15.6	14.9	16.5	11.65	5.9	19.45	33.45	33.8	30.8	20.25	14.5
21	16.95	15.65	14.65	16.5	11.4	6.1	19.65	33.55	33.65	30.6	19.85	14.25
22	16.65	15.7	14.3	16.5	11.1	6.2	20.3	33.4	33.55	30.4	19.45	14.15
23	16.4	15.75	14.3	16.4	10.9	6.35	21.95	33.5	33.4	30.0	19.1	14.15
24	16.2	15.8	14.3	16.45	10.7	6.6	23.75	33.6	33.2	29.6	18.7	14.2
25	16.1	15.85	14.25	16.5	10.45	7.0	24.55	33.6	32.8	29.2	18.3	14.2
26	16.1	15.9	14.2	16.55	10.2	7.2	25.3	33.65	32.65	28.8	18.0	14.25
27	16.15	15.9	14.1	16.6	10.0	7.45	26.0	33.65	32.5	28.5	17.8	14.3
28	16.1	15.85	14.05	16.65	9.8	7.6	26.55	33.7	32.55	28.2	17.5	14.35
29	15.95	15.85	14.0	16.4	-------	7.8	27.15	33.7	32.55	27.9	17.2	14.4
30	15.8	15.8	14.0	16.2	-------	8.0	28.2	33.7	32.5	27.8	17.0	14.5
31	15.5	-------	13.95	16.1	-------	8.3	-------	33.7	-------	27.65	12.75	-------

Gate openings, in inches, at Indian Lake reservoir near Indian Lake, N. Y., for the year ending Sept. 30, 1923

Date	Gate A	Gate B
Oct. 1, noon, to Oct. 9, 7 p. m	60	
Oct. 1, noon, to Oct. 10, 1 p. m		54
Oct. 13, 6 p. m., to Oct. 25, noon		54
Oct. 21, 2 p. m., to Oct. 24, 1 p. m	60	
Oct. 28, 1 p. m., to Nov. 6, 10 a. m		54
Oct. 30, 5 p. m., to Nov. 2, 11 a. m	60	
Nov. 27, 4 p. m., to Dec. 5, 4 p m	60	
Dec. 7, 1 p. m., to Dec. 21, 4 p. m	60	
Dec. 18, 11 a. m., to Dec. 21, 4 p. m		54
Dec. 24, 9 a. m., to Jan. 1, 2 p. m	60	
Jan. 20, 1 p. m., to Jan. 22, 3 p. m		54
Jan. 27, 9 a. m., to Mar. 15, 5 p. m		54
Feb. 6, 3 p. m., to Feb. 7, 10 a. m	34	
Feb. 7, 10 a. m., to Mar. 16, 3 p. m	60	
Mar. 16, 4 p. m., to Mar. 19, 11 a. m		54
Mar. 17, 4 p. m., to Mar. 19, 10 a. m	60	
Apr. 21, 8 a. m., to Apr. 21, 4 p. m	60	
Apr. 30, 7 p. m., to May 3, 6 p. m	60	
May 1, 8 a. m., to May 3, 7 p. m		54
May 21, 6 a. m., to May 21, 3 p. m		54
June 4, 7 a. m., to June 4, 7 p. m		54
June 5, 7 a. m., to June 5, 11 a. m		54
June 19, 11 a. m., to June 23, 8 a. m	30	
June 23, 8 a. m., to June 26, 11 a. m	60	
June 28, 12.30 p. m., to June 29, 10 a. m	60	
July 7, 5 p. m., to July 9, 5 p. m	30	
July 9, 5 p. m., to July 16, 10 a. m	60	
July 14, 2 p. m., to July 16, 10 a. m		24
July 17, 6 p. m., to July 18, 6 p. m	30	
July 18, 6 p. m., to Aug. 31, 8.30 a. m	60	
July 21, 12.30 p. m., to July 25, noon		54
July 25, noon, to July 28, noon		24
July 30, 6 p. m., to July 31, 9 a. m		42
July 31, 9 a. m., to Aug. 2, 9.30 a. m		54
Aug 2, 9.30 a. m., to Aug. 4, 10 a. m		30
Aug 4, 10 a. m., to Aug. 31, 9 a. m		54
Sept. 8, 9 a. m., to Sept. 22, 9 a. m		54
Sept. 18, 4 p. m., to Sept. 21, 10 a. m	60	
Sept. 29, 4 p. m., to Sept. 30, midnight		54

NOTE.—Small logway open 15 feet during following periods: 5 a. m. to 3 p. m. May 21; 7 a. m. to 7 p. m. June 4; 7 a. m. to 7.30 p. m. June 5; 4 a. m. to 2 p. m. June 24. Small logway open 8 feet 7 p. m. June 23 to 4 a. m. June 24.

INDIAN RIVER NEAR INDIAN LAKE, N. Y.

LOCATION.—Three-fourths of a mile below dam at outlet of Indian Lake, 2 miles south of Indian Lake village, Hamilton County, 1 mile above mouth of Big Brook, and 6½ miles above mouth of Indian River.

DRAINAGE AREA.—132 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 1, 1912, to June 30, 1914; June 5, 1915, to September 30, 1923; also miscellaneous measurements in 1911.

GAGE.—Gurley seven-day graph water-stage recorder; installed August 30, 1916, on right bank at same datum as staff gage previously used. Recorder inspected by Lester Savarie from October 1 to November 30, and by Frank Brown from December 1 to September 30.

DISCHARGE MEASUREMENTS.—Made from cable 75 feet below gage or by wading.

CHANNEL AND CONTROL.—Control is a reef of coarse gravel; permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 5.55 feet at 8.30 a. m. May 21 (discharge, 1,860 second-feet); minimum stage from water-stage recorder, 0.02 foot at 4 a. m. September 8 (discharge, 1.1 second-feet).

1912–1923: Maximum stage recorded, 7.8 feet at 4 p. m. March 28, 1913 (discharge, 3,460 second-feet); minimum discharge, 0.7 second-foot at midnight September 30, 1918.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Discharge is regulated by operation of sluice gates at Indian Lake dam.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 15 and 1,500 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph, or for days when there have been changes in openings of sluice gates at Indian Lake dam, by averaging the discharge for intervals of day. Records good except for periods during which recorder did not operate satisfactorily, for which they are fair.

Discharge measurements of Indian River near Indian Lake, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 18	J. L. Lamson	2.60	468	July 13	A. E. Johnson	2.38	391
Apr. 27	E. B. Shupe	.46	13.2	Sept. 9	Lamson and Johnson	2.38	399

Daily discharge, in second-feet, of Indian River near Indian Lake, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	684	545	176	100		385	1.9	749	172	10	810	2.9
2	684	448	174	5.8		375	1.8	897	168	9.9	681	1.8
3	664	356	174	3.5	360	363	1.9	729	168	9.9	584	1.6
4	664	353	174	2.7		353	5.5	28	1,010	9.5	694	1.3
5	643	353	124	2.3		344	16	27	851	9.5	788	1.2
6	643	148	5.8	2.3	400	334	17	27	23	9.5	788	1.2
7	623	4.2	68	2.3	550	328	13	28	22	62	767	1.2
8	623	2.9	178	2.1	550	322	13	28	22	286	767	214
9	563	2.3	178	2.1	540	319	9.5	28	21	313	767	379
10	210	1.9	176	1.9	530	316	6.2	29	20	402	746	379
11	2.9	1.8	176	1.9	520	310	6.8	29	20	402	746	375
12	1.6	1.7	172	1.9	510	307	9.9	28	18	402	746	372
13	51	1.6	172	1.9	510	301	6.2	29	18	388	725	369
14	382	1.6	172	1.8	500	295	5.0	29	18	486	725	369
15	382	1.7	172	1.8	490	248	4.2	29	18	643	704	360
16	379	1.9	172	1.8	480	129	3.5	29	19	259	704	360
17	379	1.8	170	1.8	480	221	3.5	31	19	68	704	360
18	375	1.8	351	1.8	470	286	3.5	33	19	293	684	420
19	372	1.8	526	1.8	453	135	3.3	35	167	369	684	550
20	372	1.8	508	129	436	3.5	3.3	39	304	369	664	550
21	410	1.8	384	344	436	2.7	276	774	301	550	664	440
22	564	1.8	3.3	249	418	2.3	8.6	232	304	800	643	177
23	564	1.7	2.1		418	3.9	6.2	234	483	800	643	3.1
24	469	1.6	88		415	8.3	4.7	232	992	800	623	1.6
25	206	1.6	156	2.0	411	6.8	6.2	232	453	700	623	1.7
26	3.8	1.6	154		405	4.2	9.0	232	209	600	603	1.7
27	1.9	37	154	220	398	3.5	13	222	11	600	603	1.7
28	126	176	152		392	3.1	16	200	154	469	584	1.8
29	363	176	154	360	-------	2.7	30	174	204	331	584	44
30	400	176	154		-------	1.9	121	172	11	488	584	310
31	545	-------	152		-------	1.9	-------	172	-------	810	254	-------

NOTE.—Discharge for the following periods estimated as follows, from gage-height graph and record of gate openings and water-surface elevations of Indian Lake reservoir: Jan. 23–26, Jan. 28 to Feb. 5, Feb. 6–18, June 6, 7, July 21–27, and Sept. 15–21, estimated as indicated in above table; water-stage recorder not operating satisfactorily.

Monthly discharge of Indian River near Indian Lake, N. Y., for the year ending Sept. 30, 1923.

[Drainage area, 132 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	684	1.6	398	3.02	3.48
November	545	1.6	93.6	.709	.79
December	526	2.1	180	1.36	1.57
January	----------	1.8	81.7	.619	.71
February	550	----------	447	3.39	3.53
March	385	1.9	184	1.39	1.60
April	276	1.8	20.9	.158	.18
May	897	27	186	1.41	1.63
June	1,010	11	207	1.57	1.75
July	810	9.5	379	2.87	3.31
August	810	254	674	5.11	5.89
September	550	1.2	202	1.53	1.71
The year	1,010	1.2	254	1.92	26.15

NOTE.—The monthly discharge in second-feet per square mile and run-off in inches shown by the table do not represent the natural flow from the basin because of artificial storage in Indian Lake reservoir.

SCHROON RIVER AT RIVERBANK, N. Y.

LOCATION.—At steel highway bridge near Riverbank post office, Warren County, near Tumblehead Falls, 9 miles below Schroon Lake and 9 miles above Warrensburg.

DRAINAGE AREA.—534 square miles.

RECORDS AVAILABLE.—September 2, 1907, to September 30, 1923.

GAGE.—Chain on upstream side of bridge; read by J. H. Roberts.

DISCHARGE MEASUREMENTS.—Made from upstream side of highway bridge or by wading.

CHANNEL AND CONTROL.—Gravel; occasionally shifting. Logs become lodged on control at times nearly every year.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.70 feet at 4 p. m. on April 12 and 13 (discharge, 4,670 second-feet); minimum stage recorded, 1.18 feet at 2 p. m. on September 2 and 5 (discharge, 111 second-feet).

1907–1923: Maximum stage recorded, 10.7 feet at 5 p. m. March 28, 1913 (discharge, about 13,500 second-feet); minimum stage recorded, 0.85 foot at 5 p. m. October 17, 1909 (discharge, 28 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Flow affected by storage in Schroon and Brant lakes.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice from December to April. The previous rating was revised below 500 second-feet to agree more closely with current discharge measurements, and new rating used throughout year. Rating curve well defined between 150 and 7,000 second-feet. Gage read to hundredths once daily, except during periods of high water when it is read twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records good except for days when the sluice gates in dams above station are operated, for which one gage reading per day may not give the true mean daily gage height. Records for period of ice effect, fair.

Discharge measurements of Schroon River at Riverbank, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 22	A. W. Harrington	1.76	241	Apr. 24	E. B. Shupe	6.15	3,890
Jan. 27	E. B. Shupe	a2.43	299	May 24	A. W. Harrington	4.00	1,600
Feb. 21	J. L. Lamson	a2.40	241	July 22	do	1.49	179
Mar. 13	E. B. Shupe	a2.52	252	Sept. 7	Lamson and Johnson	1.80	254

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Schroon River at Riverbank, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	190	246	231	160	240	200	460	3,640	860	293	158	112
2	203	246	231	240	240	220	500	3,520	860	424	153	111
3	190	231	231	220	240	240	550	3,040	800	512	163	114
4	203	231	231	190	220	220	700	2,800	800	920	165	112
5	190	231	220	190	200	200	920	2,360	535	800	170	111
6	172	246	220	190	200	170	1,740	2,040	490	800	163	125
7	155	246	220	200	200	170	2,580	1,940	585	772	153	261
8	160	261	200	200	200	170	3,520	1,740	772	277	170	231
9	261	261	190	190	200	180	4,150	1,740	860	745	163	231
10	261	293	190	220	190	180	4,410	1,740	800	745	165	246
11	277	310	180	200	200	190	4,670	1,640	1,060	310	153	231
12	277	293	180	220	200	220	4,670	1,550	800	293	151	217
13	261	293	170	240	200	240	4,670	1,740	920	277	149	203
14	261	293	170	240	220	240	4,540	1,640	990	277	153	190
15	155	277	160	260	220	220	4,020	1,550	635	293	140	190
16	151	277	160	280	240	240	3,760	1,640	585	327	132	151
17	158	293	150	280	240	260	3,280	1,940	535	327	130	140
18	177	277	160	280	240	280	2,800	2,040	490	327	130	142
19	203	261	160	280	240	260	2,470	1,940	468	293	128	140
20	217	277	160	280	220	240	2,360	1,940	424	190	121	130
21	231	261	150	280	240	240	2,250	1,840	402	177	123	153
22	190	261	150	240	240	260	3,160	1,940	402	175	121	163
23	277	261	160	180	240	320	3,520	1,550	662	165	123	151
24	261	246	160	180	240	360	3,890	1,550	468	177	119	155
25	261	246	140	180	220	400	3,760	1,370	445	177	116	151
26	246	231	140	200	220	360	3,400	1,370	445	172	119	151
27	246	231	160	280	220	380	2,920	1,210	718	177	118	147
28	246	246	130	260	200	360	2,690	1,060	690	190	121	151
29	246	231	140	260	-------	360	3,280	1,060	718	172	123	149
30	246	231	130	240	-------	380	3,520	1,060	690	165	121	140
31	246	-------	130	240	-------	360	-------	920	-------	153	119	-------

NOTE.—Mean daily gage height, Mar. 12, estimated by interpolation; gage height missing. Discharge Dec. 5 to Apr. 4, determined from gage heights corrected for ice effect by means of three discharge measurements, study of gage-height graph and weather records, and comparison with records of Hudson River, or North Creek and Hadley.

Monthly discharge of Schroon River at Riverbank, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 534 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	277	151	220	0.412	0.48
November	310	231	260	.487	.54
December	231	130	174	.326	.38
January	280	160	229	.429	.49
February	240	190	220	.412	.43
March	400	170	262	.491	.57
April	4,670	460	2,970	5.56	6.20
May	3,640	920	1,840	3.45	3.98
June	1,060	402	664	1.24	1.38
July	920	153	358	.670	.77
August	170	116	140	.262	.30
September	261	111	163	.305	.34
The year	4,670	111	624	1.17	15.86

NOTE.—The monthly discharge in second-feet per square mile and run-off in inches shown by the table do not necessarily represent the natural flow from the basin because of artificial storage in Schroon and Brant lakes.

SACANDAGA RIVER NEAR HOPE, N. Y.

LOCATION.—1½ miles below junction of East and West branches, 3¼ miles above Hope post office, Hamilton County, and 12 miles above Northville.

DRAINAGE AREA.—494 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 15, 1911, to September 30, 1923.

GAGE.—Staff in two sections on left bank, the lower inclined, the upper vertical; read by Melvin Willis.

DISCHARGE MEASUREMENTS.—Made from cable 100 feet below gage or by wading.

CHANNEL AND CONTROL.—Rocky; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.21 feet at 7.30 a. m. April 6 (discharge, 10,300 second-feet); minimum stage recorded, 1.28 feet at 7.15 p. m. on August 27 and September 6 (discharge, 65 second-feet).

1911–1923: Maximum stage recorded, 11.7 feet during flood of March 25 to 30, 1913, determined by leveling from flood marks (discharge, above limits of rating curve); minimum stage recorded, 1.17 feet at 7.55 a. m. September 30, 1913 (discharge, about 16 second-feet).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice from December to April. The previous rating was revised below 300 second-feet to agree more closely with current discharge measurements and new rating used throughout the year. Rating curve fairly well defined between 100 and 10,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except during period of ice effect, for which they are fair.

Discharge measurements of Sacandaga River near Hope, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 11	J. L. Lamson	2.32	379	July 7	Lamson and Johnson	2.17	342
Feb. 27	do	[a] 3.54	273	7	do	2.14	283
Apr. 28	Lamson and Harrington	5.31	4,740	Sept. 11	do	1.67	135

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Sacandaga River near Hope, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	127	235	350	1,800	550	300	1,500	4,480	370	465	122	122
2	127	227	400	2,600	500	320	1,500	3,990	350	438	116	103
3	122	258	375	2,400	480	360	1,700	3,130	350	400	110	87
4	118	266	350	2,200	460	440	3,000	2,560	325	410	105	79
5	114	258	335	1,900	440	550	6,500	2,230	288	360	99	70
6	114	275	330	1,700	440	600	9,900	1,940	258	310	92	66
7	110	438	320	1,500	460	600	8,830	1,680	258	284	89	70
8	122	525	300	1,300	440	550	8,490	1,440	590	258	84	114
9	171	465	320	1,100	440	600	8,160	1,680	820	220	80	227
10	310	395	300	900	420	550	7,530	1,680	590	201	76	171
11	465	370	300	700	400	550	4,990	1,560	454	188	73	145
12	495	340	300	600	380	600	4,990	1,440	370	182	79	122
13	405	320	280	550	380	600	4,730	1,280	335	171	103	108
14	350	301	280	500	400	600	4,730	1,110	288	160	103	103
15	320	370	260	500	420	650	4,230	910	246	150	96	97
16	350	465	260	500	380	800	3,540	910	220	180	92	90
17	385	443	260	550	340	1,000	2,930	960	201	201	85	96
18	350	421	260	550	300	1,300	3,130	1,680	188	171	79	85
19	301	400	240	550	280	1,300	3,330	2,560	174	162	79	85
20	284	421	220	600	280	1,200	4,230	2,230	165	155	73	114
21	270	460	220	900	300	1,100	6,070	1,940	155	145	76	660
22	266	400	240	1,100	340	1,200	7,230	1,680	150	136	96	700
23	262	350	320	950	320	1,600	6,930	1,440	150	129	82	600
24	400	340	360	850	300	1,800	6,070	1,330	155	122	76	500
25	370	310	340	800	260	1,800	4,990	1,010	150	114	73	380
26	320	279	340	750	260	2,000	4,480	740	145	103	68	300
27	301	235	340	700	280	1,900	4,230	660	400	99	66	240
28	279	204	340	700	300	1,900	4,480	525	320	114	160	230
29	266	210	300	650	-------	1,800	5,250	495	525	122	210	210
30	254	235	280	600	-------	1,600	4,990	438	590	114	165	171
31	243	-------	280	600	-------	1,400	-------	400	-------	129	136	-------

NOTE.—Discharge, Apr. 5, Sept. 11, and 23–28, estimated as indicated in above table, and mean daily gage heights Apr. 20–27, Sept. 21 and 22, estimated by comparison with record of Sacandaga River at Hadley; gage heights either missing or doubtful. Discharge, Dec. 7 to Apr. 5, determined from gage heights corrected for ice effect by means of one discharge measurement, study of gage-height graph and weather records, and comparison with Hadley record.

Monthly discharge of Sacandaga River near Hope, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 494 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	495	110	270	0.547	0.63
November	525	204	341	.690	.77
December	400	220	303	.613	.71
January	2,600	500	1,020	2.06	2.38
February	550	260	377	.763	.79
March	2,000	300	1,020	2.06	2.38
April	9,900	1,500	5,090	10.3	11.49
May	4,480	400	1,620	3.28	3.78
June	820	145	319	.646	.72
July	465	99	206	.417	.48
August	210	66	98.2	.199	.23
September	700	66	205	.415	.46
The year	9,900	66	903	1.83	24.82

SACANDAGA RIVER AT HADLEY, N. Y.

LOCATION.—Half a mile west of railroad station at Hadley, Saratoga County, 1 mile above mouth of river, and 4½ miles below site of proposed storage dam at Conklingville.

DRAINAGE AREA.—1,060 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1911, to September 30, 1923. September 13, 1907, to December 31, 1910, at upper bridge station; September 24, 1909, to midsummer of 1911, at lower bridge station.

GAGE.—Gurley seven-day repeating graphic water-stage recorder on left bank; inspected by J. F. Kelly.

DISCHARGE MEASUREMENTS.—Made from highway bridge half a mile below gage or by wading.

CHANNEL AND CONTROL.—Very rough but probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 10.12 feet at 11 p. m. April 8 (discharge, 20,000 second-feet); minimum stage from water-stage recorder, 2.38 feet at 4 p. m. August 27 and 2 a. m. on August 28 (discharge, 110 second-feet).

1911–1923: Maximum stage from water-stage recorder, 12.36 feet from 11 a. m. to noon March 28, 1913 (discharge, about 35,500 second-feet); minimum stage from water-stage recorder, 2.25 feet all day September 16, 1913 (discharge, about 61 second-feet).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice from December to April. The previous rating curve was revised below 500 second-feet to agree more closely with current discharge measurements, and new rating used throughout year. Rating curve well defined between 150 and 12,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. Records good except during period of ice effect, for which they are fair.

Discharge measurements of Sacandaga River at Hadley, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 28	E. B. Shupe	3.48	729	Mar. 13	E B. Shupe	[a] 4.61	1,030
Nov. 12	J. L. Lamson	3.67	885	May 7	Lamson and Shupe	5.75	3,900
Jan. 10	E. B. Shupe	[a] 4.96	1,590	7	do	5.72	3,870
26	do	[a] 5.23	1,670	Sept. 6	Lamson and Johnson	2.57	168
Feb. 16	J. L. Lamson	[a] 4.41	1,140	10	do	2.86	311

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Sacandaga River at Hadley, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	272	581	632	1,100	1,300	700	3,200	10,800	947	884	262	416
2	262	553	718	3,200	1,100	650	2,800	9,370	875	758	257	347
3	252	546	830	4,400	1,000	650	2,600	8,050	830	670	243	278
4	248	560	830	3,800	1,000	700	3,400	6,700	814	618	223	228
5	238	581	798	3,900	850	900	5,500	5,860	798	553	206	194
6	233	602	750	3,400	900	1,100	8,000	4,950	718	511	181	174
7	238	726	750	2,600	900	1,200	13,000	4,220	662	511	174	156
8	347	1,020	700	2,200	900	1,300	18,900	3,460	875	476	167	159
9	686	1,180	650	1,800	850	1,200	19,400	3,260	1,620	436	159	219
10	1,010	1,110	600	1,600	900	1,100	18,000	3,460	1,920	390	149	294
11	1,220	992	650	1,400	900	1,000	15,200	3,360	1,710	340	145	353
12	1,460	911	650	1,200	850	950	13,500	3,260	1,390	317	142	317
13	1,340	830	600	1,100	800	1,000	13,000	3,080	1,110	294	136	289
14	1,110	758	600	1,100	750	950	11,900	2,800	894	278	130	267
15	929	734	600	1,200	750	950	10,400	2,460	742	262	133	252
16	814	830	550	1,100	700	900	9,370	2,890	640	283	136	243
17	774	983	600	1,100	700	1,400	8,050	4,340	560	306	139	219
18	822	1,000	500	1,100	700	2,000	6,700	5,210	511	359	136	202
19	830	956	500	1,100	650	2,600	5,860	5,210	455	347	130	189
20	774	911	500	1,100	700	2,600	5,340	4,820	410	294	121	177
21	718	929	600	1,200	750	2,400	6,270	4,460	371	252	124	310
22	686	974	650	1,500	650	2,200	8,700	4,220	340	223	127	1,080
23	648	911	600	2,000	700	2,400	12,200	3,880	317	202	133	1,180
24	694	830	650	2,000	650	3,200	13,900	3,460	311	185	133	1,010
25	798	718	650	1,800	650	3,600	12,600	2,890	306	174	136	884
26	857	670	700	1,700	750	3,800	10,800	2,300	311	167	127	734
27	798	610	700	1,500	650	4,000	9,370	1,850	322	159	115	581
28	742	588	700	1,500	600	4,000	8,370	1,550	511	202	139	490
29	686	618	700	1,400	-------	3,800	9,710	1,330	790	248	365	490
30	648	618	550	1,400	-------	3,600	10,800	1,190	902	272	511	469
31	602	------	550	1,400	-------	3,400	--------	1,050	-------	267	490	-------

NOTE.—Mean daily gage heights Dec. 23–26, 29, 30, Jan. 13, 14, 23–25, and Sept. 8 estimated from recorder graph; water-stage recorder not operating. Discharge Dec. 6 to Apr. 6 determined from gage heights orrected for ice effect by means of four discharge measurements, study of gage-height graph and weather ecords, and comparison with records of Hudson River at Hadley and Spier Falls.

Monthly discharge of Sacandaga River at Hadley, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 1,060 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,460	233	701	0.661	0.76
November	1,180	546	794	.749	.84
December	830	500	647	.610	.70
January	4,400	1,100	1,840	1.74	2.01
February	1,300	600	807	.761	.79
March	4,000	650	1,940	1.83	2.11
April	19,400	2,600	9,890	9.33	10.41
May	10,800	1,050	4,060	3.83	4.42
June	1,920	306	765	.722	.81
July	884	159	363	.342	.39
August	511	115	186	.175	.20
September	1,180	156	407	.384	.43
The year	19,400	115	1,860	1.75	23.87

BATTEN KILL AT BATTENVILLE, N. Y.

LOCATION.—1 mile southwest of village of Battenville, Washington County, 3 miles below mouth of Whitaker Brook (outlet of Cossayuna Lake), and 11 miles above mouth, just above Schuylerville.

DRAINAGE AREA.—397 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1922, to September 30, 1923.

GAGE.—Gurley seven-day graph water-stage recorder on left bank; inspected by employee of Blandy Paper Co.

DISCHARGE MEASUREMENTS.—Made from cable 400 feet below gage or by wading.

CHANNEL AND CONTROL.—Solid rock ledge extending practically across channel, overlain with some gravel on right side; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 8.31 feet at 3 a. m. January 2 (stage-discharge relation affected by ice); maximum open-water stage recorded 8.13 feet at 1 a. m. April 7 (discharge, 5,630 second-feet); minimum stage from water-stage recorder, 1.79 feet at 5.30 p. m. August 16 and 8 p. m. August 18 (discharge, 55 second-feet).

ICE.—Stage-discharge relation seriously affected by ice.

REGULATION.—Some diurnal fluctuation, due to operation of mills at Battenville and above, is noticeable during low water.

ACCURACY.—Stage-discharge relation permanent except as affected by ice from December to March. Rating curve well defined between 80 and 6,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. Records good.

Discharge measurements of Batten Kill at Battenville, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 8	B. F. Howe	2.31	170	Apr. 6	J. L. Lamson	8.07	5,540
13	A. W. Harrington	2.46	262	10	E. B. Shupe	5.79	2,820
Nov. 7	E. B. Shupe	2.72	380	10	do	5.71	2,730
Dec. 13	J. L. Lamson	a2.40	203	May 3	J. L. Lamson	4.51	1,670
Jan. 8	E. B. Shupe	a3.80	780	3	do	4.49	1,600
24	do	a4.49	730	6	do	3.85	1,040
Feb. 8	do	a4.30	444	30	A. W. Harrington	2.93	501
22	J. L. Lamson	a4.01	335	June 8	J. L. Lamson	3.82	1,030
Mar. 8	do	a4.14	395	9	do	3.94	1,140
21	E. B. Shupe	a6.31	1,390	19	do	2.54	298
24	A. W. Harrington	6.57	3,710	July 22	A. W. Harrington	2.21	158
24	do	6.58	3,750	Aug. 26	E. B. Shupe	2.01	97.5
Apr. 4	J. L. Lamson	4.64	1,740	Sept. 3	Harrington and Lamson	1.95	86.5
4	do	4.78	1,920				
6	do	8.08	5,410				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Batten Kill at Battenville, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		202	230	1,100	550	300	830	2,830	436	198	214	141
2	150	202	290	2,600	550	280	798	2,040	402	183	190	116
3		270	300	1,500	480	280	882	1,640		183	169	98
4	154	239	270	1,100	480	440	1,650	1,390		183	177	124
5	148	206	257	1,100	460	600	2,880	1,230		186	176	122
6	154	206	234	900	420	550	5,330	1,120	500	194	148	111
7	172	300	198	800	440	400	4,820	980		156	140	113
8	190	355	190	750	400	360	3,860	882		153	139	123
9	257	335	252	650	500	400	3,500	915	1,310	147	136	250
10	310	340	266	480	500	380	2,830	1,190	1,160	147	135	242
11	325	310	220	500	400	380	2,220	1,120	772	136	129	194
12	285	315	220	420	400	380	1,950	1,020	582	131	106	149
13	252	295	260	420	400	380	1,820	1,230	496	129	136	153
14	230	295	260	340	400	360	1,590	1,120	452	129	125	144
15	222	305	220	340	320	300	1,390	1,020	414	120	121	153
16	210	397	220	280	340	650	1,230	1,080	392	448	120	130
17	202	350	220	300	340	1,700	1,080	1,230	365	513	117	130
18	190	280	220	300	320	1,900	980	1,120	330	266	102	110
19	202	280	240	380	320	2,000	915	948	305	206	93	122
20	194	315	240	320	340	1,500	882	850	275	176	116	114
21	190	397	220	380	340	1,400	1,130	980	262	170	134	185
22	183	370	200	1,000	340	1,400	1,820	1,190	244	168	124	360
23	218	295	200	750	340	2,410	2,000	1,080	234	157	113	289
24	325	305	180	750	340	3,740	1,720	948	226	138	104	252
25	325	290	190	700	340	3,050	1,310	837	234	143	103	252
26	295	248	240	550	360	2,220	1,080	746	234	165	92	202
27	262	230	240	700	340	1,720	1,020	672	239	148	119	186
28	239	226	240	650	320	1,430	1,340	618	218	220	104	158
29	222	230	170	650	-------	1,120	3,920	582	222	463	143	202
30	202	218	200	600	-------	1,160	4,340	518	230	392	198	218
31	190	-------	200	500	-------	980	-------	468	-------	266	173	-------

NOTE.—Mean daily discharge, Oct. 1–3, estimated by extrapolation; June 3–8, estimated from gage heights estimated on recorder graph; water-stage recorder not operating. Mean daily gage heights, Oct. 4–31, determined by plotting staff gage readings, obtained during construction, on recorder-graph sheets and a comparison with records from recorder after completion of installation. Mean daily gage heights for Oct. 15 and Nov. 3 and 4 estimated from recorder graph; recorder not operating. Discharge Dec. 11 to Mar. 22 determined from gage heights corrected for ice effect by means of seven discharge measurements and study of gage-height graph and weather records.

Monthly discharge of Batten Kill at Battenville, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 397 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	325	148	219	0.552	0.64
November	397	202	287	.723	.81
December	300	170	229	.577	.67
January	2,600	280	704	1.77	2.04
February	550	320	396	.997	1.04
March	3,740	280	1,100	2.77	3.19
April	5,330	798	2,040	5.14	5.74
May	2,830	468	1,080	2.72	3.14
June	1,310	218	434	1.09	1.22
July	513	120	207	.521	.60
August	214	92	135	.340	.39
September	360	98	171	.431	.48
The year	5,330	92	584	1.47	19.96

HOOSIC RIVER NEAR EAGLE BRIDGE, N. Y.

LOCATION.—1½ miles southeast of village of Eagle Bridge, Rensselaer County, half a mile below mouth of Walloomsac River, 2 miles above Owl Kill, and 22 miles above mouth, just below Stillwater.

DRAINAGE AREA.—512 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 13, 1910, to March 31, 1922, and July 25 to September 30, 1923. Comparable records at station at Buskirk, 4 miles below, September 25, 1903, to December 31, 1908.

GAGE.—Gurley seven-day graph water-stage recorder on left bank; inspected by J. E. Sherman.

DISCHARGE MEASUREMENTS.—Made from cable half a mile below gage or by wading.

CHANNEL AND CONTROL.—Gravel, somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder during the period, July 25 to September 30, 1923, 4.73 feet at 11 p. m. July 28 (discharge, 1,170 second-feet); minimum stage from water-stage recorder, 2.02 feet at 6 p. m. August 26 (discharge, 52 second-feet).

1910–1923: Maximum stage recorded, 13.5 feet at 7.30 a. m. July 9, 1915 (discharge, about 16,700 second-feet), possibly higher stages previous to August 17, 1914, as gage was inaccessible at extremely high water; minimum stage recorded, 6.1 feet (old datum) at 5 p. m. September 14, 1913 (discharge, practically zero).

ICE.—Stage-discharge relation usually affected by ice.

REGULATION.—During medium and low stages there is considerable diurnal fluctuation in flow caused by the power plant of the Walter A. Wood Co. at Hoosick Falls, about 3½ miles above gage, and by sawmills on Walloomsac River.

ACCURACY.—Stage-discharge relation practically permanent during the period. Rating curve fairly well defined between 50 and 10,000 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by averaging discharge for bi-hourly intervals of day. Records good.

Discharge measurements of Hoosic River near Eagle Bridge, N. Y., during the period July 25 to Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Aug. 17	Johnson and Shupe	2.72	160
Sept. 3	Harrington and Lamson	2.20	72.8

Daily discharge, in second-feet, of Hoosic River near Eagle Bridge, N. Y., for the period July 25 to Sept. 30, 1923

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1		271	185	11		159	233	21		136	300
2		228	121	12		108	222	22		136	580
3		224	114	13		178	243	23		140	341
4		212	150	14		216	243	24		165	442
5		157	199	15		182	174	25	208	122	381
6		169	174	16		169	130	26	324	90	293
7		169	148	17		156	172	27	219	122	264
8		199	156	18		152	167	28	549	154	262
9		198	441	19		151	157	29	753	576	347
10		152	382	20		133	177	30	467	410	294
								31	323	240	

Monthly discharge of Hoosic River near Eagle Bridge, N. Y., for the period July 25 to Sept. 30, 1923

[Drainage area, 512 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
July 25-31	753	208	406	0.793	0.21
August	576	90	189	.369	.43
September	580	114	250	.488	.54

MOHAWK RIVER AT VISCHER FERRY DAM, N. Y.

LOCATION.—At Vischer Ferry dam of Barge Canal (Lock No. 7), 1 mile above Stony Creek and Vischer Ferry, 7 miles below Schenectady, Schenectady County, and 11 miles above mouth.

DRAINAGE AREA.—3,430 square miles (measured on topographic maps).

RECORDS AVAILABLE.—Discharge, June 24, 1913, to September 30, 1919; water surface elevations only, October 1, 1919, to September 30, 1923.

GAGE.—Stevens continuous water-stage recorder (showing head on crest of spillway) in the southerly corner of the basin near upper end of Barge Canal lock. Staff gage in masonry of outer lock wall just above upper gates. Datum of staff gage 12.1 feet lower than that of recorder. Recorder inspected by engineers from the Albany office of the United States Geological Survey. Staff gage read by lock tenders.

CHANNEL AND CONTROL.—Control is crest of spillway.

EXTREMES OF STAGE.—Maximum stage from water-stage recorder for year ending September 30, 1920, 3.26 feet at 10.15 p. m. March 13 (caused by ice jam above station); minimum stage occurred during period from 3 a. m. May 2 to 8 p. m. May 5, when flood gates were opened and water drawn below crest of spillway.

Maximum stage from water-stage recorder for year ending September 30, 1921, 3.69 feet at 2.30 a. m. March 4 (caused by ice jam above station); minimum stage occurred during period, 2 a. m. March 6 to 6 a. m. March 7 when flood gates were opened and water drawn below crest of spillway.

Maximum stage from water-stage recorder for year ending September 30, 1922, 4.18 feet at 1.30 p. m. March 8 (caused by ice jam above station); minimum stage, −0.02 foot at 12.45 p. m. September 28.

Maximum stage from water-stage recorder for year ending September 30, 1923, 3.75 feet at 1.45 p. m. April 29; minimum stage, 0.18 foot at 4 p. m. December 5.

1913–1923: Maximum stage from water-stage recorder, 7.6 feet just before noon March 28, 1914, determined by leveling from flood marks. This stage lasted but a few moments and was caused by breaking of an ice jam near Schenectady. Minimum stage occurred during periods when the flood gates were opened and water drawn below crest of spillway.

EXTREMES OF DISCHARGE.—1913–1919: Maximum discharge, about 140,000 second-feet just before noon March 28, 1914 (estimated by engineers of the Department of New York State Engineer and Surveyor); minimum discharge, about 290 second-feet from 4 a. m. to 5 a. m. and 4 p. m. to 6 p. m. October 31, 1914.

DIVERSIONS.—Barge Canal Lock No. 7 at south end of dam was put in operation May 15, 1915. Discharge records included flow over spillway and through lock and water wheels.

REGULATION.—Considerable diurnal fluctuation is caused by operation of Lock No. 7 and movable dams upstream. Seasonal regulation affected by operation of Hinckley and Delta reservoirs.

Daily gage height, in feet, of Mohawk River at Vischer Ferry Dam, N. Y., for the years ending Sept. 30, 1920–1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	0.52	1.66	1.31	0.75	------	0.48	------	0.49	------	0.45	0.54	0.58
2	.56	1.66	1.16	.71	------	------	2.2	------	------	.49	.54	.48
3	.58	1.50	1.14	.66	------	------	2.1	------	------	.47	.56	.48
4	.59	1.16	------	.65	------	.40	1.67	------	------	.42	.56	.41
5	.53	1.60	------	.62	------	.41	1.43	------	------	.40	.45	.39
6	.55	1.44	------	.58	------	.44	2.1	.90	------	.41	.46	.38
7	.90	1.16	------	.62	------	------	1.33	.92	------	.42	.48	.36
8	.67	.98	.85	.65	------	------	.88	.82	0.52	.46	.45	.39
9	.77	.89	.94	.68	------	------	.50	.89	.59	.43	------	.35
10	.87	.85	1.45	.69	------	.85	.25	.93	.52	.44	------	.45
11	.95	.89	1.50	.68	0.55	.84	.19	.89	.48	.45	------	.45
12	.82	1.32	1.22	.64	.54	.86	.22	.82	.43	.44	------	.64
13	.70	1.43	1.12	.66	.54	1.87	.38	.88	.41	.44	------	1.81
14	.73	1.44	1.70	.66	.53	2.55	1.17	.78	.41	.55	------	.97
15	.67	1.22	------	.62	.54	1.95	.78	.81	.46	.52	.95	.79
16	.82	1.08	------	------	.49	1.84	.67	.70	.45	.62	.75	.66
17	1.11	.92	------	------	------	2.55	1.17	.63	.67	.51	.82	.69
18	.88	.88	------	.64	.49	2.75	1.00	.65	1.37	.47	.74	.64
19	.85	.84	------	.62	.50	------	.75	.77	1.25	.51	.69	.58
20	.80	.81	------	.65	.52	------	.44	.62	.92	.79	.64	.58
21	.78	.70	------	.69	.52	------	.30	.78	.78	.65	.65	.50
22	1.23	.69	------	.67	.52	------	1.24	.98	.71	.50	.62	.43
23	1.33	.96	------	.65	.51	------	1.41	.92	.69	.54	.55	.55
24	1.12	1.00	------	.64	.50	------	1.33	.75	.60	.53	.59	.55
25	.88	.90	------	.65	.51	------	1.09	.84	.54	.63	.55	.58
26	.97	.98	------	.64	.52	------	.63	.65	.49	.47	.53	.44
27	1.19	2.35	------	.62	------	------	------	.70	.38	.48	.50	.47
28	1.33	1.69	------	.58	------	------	------	.65	.43	.50	.48	.69
29	1.09	1.28	------	.57	.54	------	1.06	.57	.39	.46	.49	.73
30	1.09	1.37	.77	.56	------	------	.89	.52	.53	.49	.48	1.00
31	1.24	------	.75	.54	------	------	------	.52	------	.53	.43	------
1920-21												
1	2.9	.62	.68	.81	------	1.07	1.62	2.05	.57	.48	.46	------
2	1.25	.68	2.2	.81	------	1.33	1.66	1.26	------	.48	.47	------
3	.79	1.01	1.27	1.37	------	1.84	1.44	1.46	------	.41	.48	------
4	.93	1.08	.64	1.40	------	2.35	1.27	1.17	------	.48	.47	------
5	.97	.89	1.36	1.25	.64	.74	1.21	1.02	------	.40	.44	------
6	.80	.72	2.5	1.27	.79	------	1.13	.97	------	.38	.42	------
7	.77	.73	.87	------	.86	------	1.06	.93	.46	.41	.43	------
8	.73	.70	.25	------	.84	1.79	.79	.82	.46	.40	.41	------
9	.70	.70	.68	------	------	2.1	.82	.75	.45	.39	.38	------
10	.65	.66	.87	------	------	2.5	.82	.69	.42	.40	.45	------
11	.58	------	.89	------	------	1.57	------	.68	.41	.42	.45	------
12	.60	------	.83	------	------	1.20	------	.65	.41	.78	.51	------
13	.59	------	.81	------	------	1.15	------	.66	.39	.61	.58	------
14	.57	.58	.96	------	.64	1.20	------	.68	.29	.52	.55	------
15	.57	.61	2.55	------	------	.87	------	.68	.28	.70	.44	------
16	.52	.64	1.53	------	------	1.12	.50	.62	.27	.97	.45	------
17	.47	.82	1.00	------	------	1.35	------	.62	.24	.67	.46	------
18	.55	.82	.64	------	------	1.04	------	.59	------	.52	.52	------
19	.63	.22	.66	------	------	.80	------	.57	------	.59	.55	------
20	.59	.60	------	------	------	.84	------	.62	------	1.16	.59	------
21	.56	.70	------	.65	------	1.36	------	.53	.37	.97	.51	------
22	.57	.63	.92	.85	------	1.30	------	.54	.36	------	.47	------
23	.52	1.43	.89	1.12	------	1.08	------	.48	.31	------	.45	------
24	.53	1.40	1.07	1.06	------	1.20	------	.51	.31	------	.45	------
25	.45	.46	1.03	------	------	1.42	------	.57	.34	------	.45	------
26	.50	.61	------	------	.63	1.61	------	.65	.34	------	.43	------
27	.53	.93	------	------	.63	1.86	.94	.65	.32	------	.39	------
28	.62	.54	.51	------	.69	1.68	.82	.53	.32	------	.39	------
29	.73	.70	.74	------	------	1.62	.84	.52	.32	.44	.37	------
30	.67	.67	.77	------	------	1.49	1.67	.49	.32	.53	.36	------
31	.63	------	.79	.68	------	1.35	------	.50	------	.63	.35	------

24175—25†—WSP 561——11

Daily gage height, in feet, of Mohawk River at Vischer Ferry Dam, N. Y., for the years ending Sept. 30, 1920–1923—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1921–22												
1	-------	0.52	1.86	0.74	0.53	0.56	1.24	0.70	0.58	1.21	0.46	0.54
2	-------	.67	1.42	.81	.54	.88	1.11	.67	.53	1.43	.54	.44
3	-------	.92	2.35	-------	.69	.79	.95	.66	.85	1.47	.55	.49
4	-------	.81	1.17	.75	1.03	.80	1.10	.77	1.69	1.30	.53	.48
5	-------	.62	.74	.75	.99	.82	1.31	1.66	1.47	.95	.68	.41
6	-------	.78	.77	.87	.88	.85	2.2	1.85	1.05	1.01	.63	.42
7	-------	.63	.66	1.11	.84	1.04	2.3	1.55	.99	.86	1.00	.46
8	-------	.73	1.01	.92	.78	2.5	2.25	1.56	.67	.70	1.79	.40
9	-------	.63	1.03	.78	.75	1.88	2.2	1.38	.55	.70	1.30	.22
10	-------	.80	.91	.75	.70	1.50	1.94	1.20	.52	.74	1.06	.44
11	-------	.97	.87	.74	.65	1.17	1.99	.97	1.99	.67	.63	.34
12	-------	.88	.93	.64	.64	.83	3.2	.90	3.45	.55	.55	.32
13	-------	.83	.97	.60	.66	.75	2.5	.85	2.25	.50	.64	.42
14	-------	.77	.96	.58	.71	1.25	1.72	.68	1.63	.57	.62	.44
15	-------	.79	.95	.61	.69	2.5	1.44	.60	1.03	.52	.52	.37
16	-------	.96	-------	.59	.63	2.0	1.78	.71	.70	.50	.53	.52
17	-------	1.33	-------	-------	-------	1.17	1.28	.64	.42	.46	.50	.53
18	-------	1.89	-------	-------	-------	.59	1.35	.69	.63	.54	.53	.32
19	-------	1.73	-------	-------	.70	.25	1.51	.89	1.08	.66	.56	.36
20	-------	1.99	1.10	-------	.62	.74	1.17	1.39	.94	.55	.58	.35
21	-------	1.67	.93	.62	.81	1.72	.81	.94	1.37	.51	.55	.34
22	-------	1.47	-------	.65	1.11	1.22	.82	.87	2.7	.41	.45	.37
23	-------	1.13	-------	.65	1.05	.70	.91	.79	2.5	.44	.51	.27
24	-------	1.12	-------	.61	1.69	.47	.85	.74	2.05	.44	.54	.43
25	-------	1.25	-------	.59	1.70	.77	.67	.67	1.34	.62	.66	.29
26	-------	1.35	.67	-------	1.39	.78	.71	1.19	1.05	.64	.80	.27
27	-------	1.31	.68	-------	1.10	1.34	.57	.99	1.02	.43	.76	.40
28	-------	2.55	.66	.58	.70	1.83	.88	.75	.90	.56	.61	.30
29	-------	2.15	.70	.56	-------	2.5	.80	.66	1.17	.57	.66	.38
30	-------	1.44	.71	.53	-------	2.15	.76	.54	1.32	.56	.60	.48
31	0.44	-------	.71	.50	-------	1.48	-------	.49	-------	.50	.56	-------
1922–23												
1	.50	.49	-------	.55	.84	.64	-------	-------	.48	.50	.46	-------
2	.48	-------	-------	1.31	.80	.63	-------	-------	.47	.44	.45	-------
3	.48	-------	-------	1.62	.82	.65	-------	-------	.47	.40	.43	-------
4	.42	-------	-------	1.28	.82	.68	-------	-------	.48	.39	.41	-------
5	.41	-------	.47	1.03	.82	.87	-------	-------	.56	.35	.38	-------
6	.45	.47	.52	.96	.83	1.29	-------	-------	.55	.30	.36	.35
7	.44	.50	-------	.81	.84	1.42	-------	-------	.54	.32	.37	.35
8	.53	.59	-------	.66	.82	-------	-------	-------	1.14	.34	.33	.37
9	.67	.53	-------	.61	.80	-------	-------	.97	1.33	.35	.33	.41
10	.71	-------	-------	.68	.77	-------	-------	1.27	1.24	.33	.36	.44
11	.71	-------	-------	.65	.73	-------	-------	1.15	.80	.36	.36	.47
12	.69	-------	-------	.67	.68	-------	-------	1.12	.59	.37	.37	.45
13	.64	.49	-------	-------	.67	-------	-------	1.10	.63	.36	.36	.42
14	.53	-------	-------	-------	.68	-------	-------	1.02	.59	.36	-------	.44
15	.55	-------	-------	-------	.65	-------	-------	.96	.60	.36	-------	.41
16	.55	-------	-------	.63	.65	-------	-------	1.18	.58	.39	-------	.40
17	.47	-------	-------	.63	-------	-------	-------	1.94	.56	.59	-------	.40
18	.58	-------	-------	.64	-------	-------	-------	1.91	.52	.41	-------	.38
19	.53	-------	-------	.66	.65	-------	-------	1.46	.52	.41	-------	.38
20	.49	-------	-------	.69	.65	-------	-------	1.09	.53	.38	-------	.38
21	-------	-------	.85	.70	-------	1.45	-------	1.06	.51	.38	-------	.73
22	-------	-------	.84	.76	-------	-------	-------	1.19	.48	.39	-------	1.16
23	.45	-------	.67	1.21	-------	-------	-------	1.00	.46	.38	-------	.83
24	.48	-------	-------	1.08	-------	-------	-------	.93	.46	.37	-------	.62
25	.52	.52	-------	1.00	-------	-------	-------	.79	.42	.39	-------	.56
26	.57	.52	-------	.97	-------	-------	-------	.70	.43	.37	-------	.41
27	.52	-------	-------	.92	-------	-------	-------	.65	.45	.36	-------	.47
28	.52	-------	-------	.90	-------	-------	-------	.65	.53	.49	-------	.48
29	.48	-------	-------	.85	-------	-------	-------	.60	.51	.75	-------	.47
30	.43	-------	-------	.81	-------	-------	3.1	.66	.53	.39	-------	.52
31	.46	-------	.51	.84	-------	-------	-------	.61	-------	.43	-------	-------

NOTE.—Water level below crest of spillway part or all of the following days: Dec. 7, 1919; Apr. 27, 28, May 2–5, 1920; and from 2 a. m. Mar. 6 to 6 a. m. Mar. 7, 1921. No gage-height record Dec. 4–6, 15–29, 1919; Jan. 16, 17, Feb. 1–10, 17, 27, 28, Mar. 2, 3, 7–9, 19–31, Apr. 1, June 1–7, Aug. 9–14, Nov. 11–13, Dec. 20, 21, 26, 27, 1920; Jan. 7–20, 25–30, Feb. 1–4, 9–13, 15–25, Apr. 11–15, 17–26, June 2–6, 18–20, July 22–28, Sept. 1–30, Oct. 1–30, Dec. 16–19, 22–25, 1921; Jan. 3, 17–20, 26, 27, Feb. 17, 18, Oct. 21, 22, Nov. 2–5, 10–12, 14–24, 27–30, Dec. 1–4, 7–20, 24–30, 1922; Jan. 13–15, Feb. 17–18, 21–28, Mar. 8–20, 22–31, Apr. 1–29, May 1–8, Aug. 14–31, and Sept. 1–5, 1923; water-stage recorder not operating. Gage heights partially estimated from recorder graph Dec. 14, 1920; Mar. 19, 30, 31, Apr. 16, May 7, Oct. 31, 1921; Jan. 24, 25, 28, Feb. 25–27, Nov. 25, 1922; and Mar. 21, 1923.

MOHAWK RIVER AT CRESCENT DAM, N. Y.

LOCATION.—At Crescent dam of Barge Canal, 3 miles above mouth of river at Cohoes, Albany County.

DRAINAGE AREA.—3,490 square miles (furnished by the Department of State Engineer and Surveyor).

RECORDS AVAILABLE.—December 1, 1917, to September 30, 1923.

GAGE.—Au continuous water-stage recorder installed November 25, 1922, on left bank about 50 feet above guard gate at head of Waterford flight of locks and 200 yards from left end of spillway; inspected by operator from Barge Canal power house at the dam. Previous to this a Gurley seven-day graph water-stage recorder was installed at the same site. Recorders inspected by Mark Gribbon.

DISCHARGE MEASUREMENTS.—Made from steel highway bridge at Crescent, 1½ miles upstream.

CHANNEL AND CONTROL.—Control is crest of spillway.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 8.93 feet at 7 p. m. April 6 (discharge, 53,900 second-feet); minimum mean daily discharge, 1,040 second-feet, August 24.

1917–1923: Maximum stage recorded 9.24 feet at 4 p. m. March 27, 1920 (discharge, 67,200 second-feet); minimum stage recorded, 4.04 feet at 6 a. m. August 21, 1918 (discharge, 157 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Water is diverted at this point for canal purposes through Lock 6 and is not returned to the river. The following tables of discharge include the flow over spillway, through Barge Canal power house, and that diverted through and around Lock 6.

REGULATION.—Seasonal distribution of flow regulated by the Delta reservoir on the upper Mohawk, and by Hinckley reservoir on West Canada Creek. Large diurnal fluctuations occur during low water caused by operation of movable dams upstream.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined between 4,000 and 50,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge for spillway ascertained by applying to rating table mean daily gage height determined from inspection of recorder graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. To this is added the discharge through power plant, computed from records of run of turbines, and diversion through and around Lock 6. Records good.

Discharge measurements of Mohawk River at Crescent dam, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Apr. 7	Lamson and Harrington	8.48	46,400	May 17	Lamson and Shupe	6.27	16,700
				25	do	4.96	4,450
11	Shupe and Harrington	6.44	17,300	June 9	E. B. Shupe	5.85	12,600

Daily discharge, in second-feet, of Mohawk River at Crescent dam, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,880	2,170	2,070	2,500	3,960	2,860	6,500	16,300	2,910	2,300	1,950	1,310
2	1,780	2,280	3,380	8,030	4,230	2,920	5,860	10,500	2,350	2,110	1,860	1,290
3	1,650	2,250	3,470	13,500	4,650	3,170	6,850	8,160	2,300	1,900	1,700	1,320
4	1,400	2,260	2,300	9,480	5,010	3,480	14,500	7,570	2,390	1,790	1,590	1,280
5	1,260	2,290	2,640	6,600	4,940	5,830	32,100	6,550	2,950	1,640	1,570	1,220
6	1,480	2,300	2,910	6,100	4,940	9,750	51,800	5,570	2,580	1,430	1,390	1,230
7	1,580	2,370	2,630	4,710	4,650	11,600	45,400	4,750	2,790	1,360	1,440	1,200
8	1,910	2,990	2,430	3,820	4,510	9,390	34,900	4,080	7,190	1,530	1,200	1,270
9	2,950	2,660	2,370	3,230	4,650	7,440	29,300	5,510	10,300	1,530	1,170	1,540
10	3,500	2,430	2,560	3,490	4,650	6,180	21,500	9,230	9,320	1,520	1,250	1,740
11	3,260	2,480	3,000	3,420	4,280	5,620	17,900	8,030	5,090	1,640	1,340	1,800
12	3,830	2,540	2,400	3,820	3,750	5,320	17,900	7,750	3,260	1,680	1,430	1,760
13	3,170	2,450	2,990	3,240	3,620	5,160	16,200	7,870	2,880	1,610	1,430	1,650
14	2,030	2,470	2,090	2,990	3,550	4,860	15,200	6,580	2,480	1,570	1,340	1,660
15	2,170	2,640	2,200	2,930	3,360	5,090	14,100	6,170	2,140	1,570	1,560	1,450
16	2,130	4,160	1,760	3,120	3,300	5,240	12,100	7,190	2,320	1,800	1,400	1,310
17	1,750	4,080	3,310	3,370	3,230	12,000	10,800	16,300	2,470	2,880	1,310	1,290
18	2,070	3,260	3,880	3,310	3,100	24,600	9,480	17,500	2,110	2,230	1,290	1,260
19	2,280	3,170	4,040	3,310	3,180	22,100	8,570	12,100	2,280	1,770	1,320	1,210
20	2,170	2,830	4,510	3,490	3,120	19,100	4,880	7,640	2,420	1,530	1,250	1,250
21	1,840	2,660	4,130	3,490	3,180	14,100	7,140	6,280	2,410	1,580	1,250	3,200
22	2,020	2,790	4,680	3,630	3,180	13,400	10,200	7,720	2,190	1,470	1,210	7,290
23	2,040	3,070	2,770	7,970	3,120	17,900	15,800	6,150	2,140	1,430	1,100	4,570
24	2,370	2,800	2,640	7,880	3,170	40,900	14,600	5,440	2,160	1,430	1,040	3,160
25	2,340	2,530	2,560	6,270	3,160	33,100	11,200	4,370	1,990	1,600	1,270	2,620
26	2,960	2,280	2,420	5,710	3,000	22,100	9,280	3,680	1,870	1,490	1,270	1,790
27	2,300	1,840	2,520	5,330	2,740	16,200	7,510	3,370	2,090	1,450	1,320	1,670
28	2,330	1,760	2,700	5,080	2,800	11,800	8,900	3,500	2,440	2,080	1,290	1,830
29	2,290	1,940	2,190	4,660	-------	8,040	26,000	3,280	2,310	4,140	3,490	1,950
30	2,060	1,700	2,120	3,960	-------	7,280	21,500	3,120	2,440	1,880	1,780	2,170
31	1,970	-------	1,960	3,830	-------	7,960	--------	3,100	--------	1,740	1,290	-------

NOTE.—Above figures of daily discharge include flow over spillway, through power plant, and diversion through and around Lock 6.

Mean daily gage heights for the following days estimated from recorder graph and from four staff-gage readings a day at the dam: Oct. 19–21, 27–29, Nov. 18, May 29–31, June 1–9, 15–20, Aug. 27–31, and Sept. 1–5; water-stage recorder not operating satisfactorily.

Monthly discharge of Mohawk River at Crescent dam, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 3,490 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	3,830	1,260	2,220	0.636	0.73
November	4,160	1,700	2,580	.739	.82
December	4,680	1,760	2,830	.811	.94
January	13,500	2,500	4,910	1.41	1.63
February	5,010	2,740	3,750	1.07	1.11
March	40,900	2,860	11,800	3.38	3.90
April	51,800	4,880	16,900	4.84	5.40
May	17,500	3,100	7,290	2.09	2.41
June	10,300	1,870	3,150	.903	1.01
July	4,140	1,360	1,800	.516	.59
August	3,490	1,040	1,450	.415	.48
September	7,290	1,200	1,940	.556	.62
The year	51,800	1,040	5,050	1.45	19.64

WEST CANADA CREEK AT HINCKLEY, N. Y.

LOCATION.—A mile below Hinckley dam, Oneida County, and a quarter of a mile below New York Central Railroad bridge.

DRAINAGE AREA.—373 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 14, 1919, to September 30, 1923.

GAGE.—Gurley seven-day graph water-stage recorder on the right bank; inspected by Charles D. Cady.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above gage.

CHANNEL AND CONTROL.—Large boulders on solid rock bottom; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.63 feet at 12.30 p. m. April 23 (discharge 6,960 second-feet); minimum stage from water-stage recorder, 2.78 feet at 1 p. m. July 1 (discharge, 46 second-feet).

1919–1923: Maximum stage from water-stage recorder, 8.93 feet at 2 p. m. April 12, 1922 (discharge, 10,800 second-feet); minimum stage from water-stage recorder, 2.53 feet at 12.30 p. m. August 31, 1919 (discharge, 8 second-feet), caused by closing of gates in dam.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Seasonal flow regulated by storage in Hinckley reservoir, Consolidated Water Co.'s reservoir on Black Creek at Grey, and several small lakes. Diurnal flow affected slightly at low stages by operation of the Fibre Co.'s mill at Hinckley.

DIVERSIONS.—Consolidated Water Co. of Utica diverts water for Utica from Hinckley reservoir.

ACCURACY.—Stage-discharge relation permanent. The previous rating was slightly revised above 1,100 second-feet to agree more closely with current discharge measurements, and new rating used throughout the year. Rating curve well defined between 100 and 6,000 second-feet. Operation of water-stage recorder satisfactory, except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. Records excellent.

Discharge measurements of West Canada Creek at Hinckley, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Mar. 24	J. L. Lamson	4.45	960	Apr. 27	Lamson and Harrington	6.38	4,080
Apr. 24	Lamson and Harrington	7.02	5,530	Aug. 5	Lamson and Johnson	3.69	364
25	do	6.66	4,540				

Daily discharge, in second-feet, of West Canada Creek at Hinckley, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	461	664	611	510	736	671	1,000	4,270	611	362	380	386
2	687	656	597	522	728	648	940	3,160	604	490	380	397
3	687	664	597	542	728	611	940	2,620	590	490	386	397
4	664	664	597	548	720	604	1,050	2,280	583	510	386	397
5	656	664	597	548	720	604	1,140	2,200	583	529	375	392
6	656	664	548	555	710	604	1,310	1,960	576	529	375	392
7	648	664	516	555	850	597	1,450	1,740	576	529	375	386
8	648	664	516	555	871	590	1,540	1,490	583	529	380	414
9	640	671	516	548	861	597	1,600	1,670	583	529	392	402
10	633	679	516	542	843	583	1,670	2,530	576	529	397	402
11	633	679	516	542	843	576	1,400	2,280	590	529	397	402
12	633	679	516	548	834	569	1,530	1,960	569	522	386	402
13	633	671	522	555	824	562	3,100	1,820	569	522	386	397
14	633	656	529	555	815	562	3,250	1,600	576	522	380	397
15	633	656	529	555	806	548	2,880	1,460	576	522	380	397
16	633	664	522	548	796	542	2,440	2,040	576	529	380	392
17	633	664	516	555	787	542	1,960	5,340	576	522	380	386
18	625	605	510	555	770	548	1,570	4,600	576	516	380	392
19	625	383	503	555	753	583	1,360	3,160	576	522	380	397
20	625	604	496	555	753	778	1,270	2,120	576	522	380	402
21	625	611	490	548	753	900	2,190	1,890	569	516	380	397
22	625	604	490	625	744	920	5,550	1,740	569	484	380	402
23	625	611	496	728	728	930	6,620	1,490	583	472	397	402
24	648	611	490	753	728	930	5,740	1,310	576	460	375	397
25	671	506	490	753	728	950	4,480	1,220	542	460	375	392
26	671	290	496	753	728	960	3,960	1,210	522	454	375	397
27	671	611	496	753	702	980	3,960	1,210	522	454	375	392
28	679	611	490	744	679	1,020	4,060	1,200	522	454	380	386
29	687	604	496	736	-------	1,130	5,110	1,000	522	436	380	386
30	671	604	496	744	-------	950	5,620	625	536	436	380	386
31	671	-------	503	744	-------	970	-------	618	-------	386	375	-------

NOTE.—Discharge Dec. 2, 3, and Feb. 3–7, estimated as indicated in above table from recorder graph; water-stage recorder not operating satisfactorily.

Monthly discharge of West Canada Creek at Hinckley, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 373 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	687	461	643	1.72	1.98
November	679	290	619	1.66	1.85
December	611	490	523	1.40	1.61
January	753	510	607	1.63	1.88
February	871	679	769	2.06	2.14
March	1,130	542	728	1.95	2.25
April	6,620	940	2,690	7.21	8.04
May	5,340	618	2,060	5.52	6.36
June	611	522	570	1.53	1.71
July	529	362	492	1.32	1.52
August	397	375	382	1.02	1.18
September	414	386	396	1.06	1.18
The year	6,620	290	872	2.34	31.70

NOTE.—The monthly discharge in second-feet per square mile and run-off in depth in inches shown by the table do not represent the natural flow from the basin because of artificial storage mainly in Hinckley reservoir. The yearly discharge and run-off doubtless represent very nearly the natural flow.

WEST CANADA CREEK AT KAST BRIDGE, N. Y.

LOCATION.—500 feet below highway bridge in hamlet of Kast Bridge, Herkimer County, and 4 miles above mouth at Herkimer.

DRAINAGE AREA.—575 square miles (from report of State engineer).

RECORDS AVAILABLE.—May 15, 1905, to December 31, 1910; January 1, 1912, to December 31, 1913; and October 1, 1920, to September 30, 1923.

GAGE.—Gurley seven-day graph water-stage recorder on left bank, inspected by engineers from the Department of State Engineer and Surveyor. A tape gage at highway bridge was used 1905 to 1913.

DISCHARGE MEASUREMENTS.—Made from downstream side of highway bridge or by wading.

CHANNEL AND CONTROL.—Small boulders and coarse gravel; shifting occasionally.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 5.17 feet at 7 a. m. April 5 (discharge, 7,260 second-feet); minimum stage from water-stage recorder, 1.27 feet at 3 a. m. August 6 (discharge, 168 second-feet).

1920–1923: Maximum stage from water-stage recorder, 7.30 feet at 11 a. m. June 21, 1922 (discharge, about 16,500 second-feet); minimum stage from water-stage recorder, 1.20 feet at 10.30 p. m. September 3, 1922 (discharge, 140 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Seasonal flow regulated by storage in Hinckley reservoir, Consolidated Water Co.'s reservoir on Black Creek at Gray, and several small lakes. Diurnal flow affected by operation of mills and power plants upstream.

DIVERSIONS.—Consolidated Water Co. of Utica diverts water for Utica from Hinckley reservoir. Water is diverted below Trenton Falls power plant during the navigation season through the Ninemile feeder and Ninemile Creek into the Barge Canal.

A continuous record of the amount of diversion through the Ninemile feeder from West Canada Creek at Trenton Falls during the navigation season is published as a separate station, "Ninemile feeder near Holland Patent, N. Y."

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice from December to March. Rating curve well defined between 200 and 5,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. Records good, except during periods of ice effect and estimate, for which they are fair.

Discharge measurements of West Canada Creek at Kast Bridge, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 1	B. F. Howe	1.65	375	Apr. 16	Lamson and Harrington	3.43	2,970
1	do	1.49	279	25	do	4.32	4,750
1	do	1.43	257	27	do	3.98	4,040
Jan. 14	J. L. Lamson	a 2.56	935	May 28	J. L. Lamson	2.55	1,510
Feb. 7	A. W. Harrington	a 2.85	1,010	Aug. 6	Lamson and Johnson	1.63	401
Mar. 12	J. L. Lamson	a 2.32	783				
26	do	2.80	1,790				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of West Canada Creek at Kast Bridge, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	429	866	1,160	1,900	950	800	1,320	5,240	685	381	312	295
2	547	851	1,250	2,800	900	850	1,380	3,740	740	370	288	307
3	668	857	766	1,800	1,000	900	1,950	2,910	620	419	294	310
4	652	894	683	1,500	850	1,100	3,580	2,560	674	422	350	348
5	636	784	916	1,400	950	950	6,370	2,380	614	470	277	330
6	643	878	842	1,200	850	1,200	6,540	2,220	587	481	280	296
7	668	911	704	950	1,000	1,000	5,090	2,030	658	491	356	307
8	735	917	826	900	1,000	900	4,460	1,780	1,030	385	305	460
9	806	908	1,060	950	1,000	900	3,480	2,200	1,170	464	292	485
10	914	881	756	900	1,000	900	2,640	2,730	663	446	306	372
11	960	851	714	850	850	850	2,640	2,820	630	446	307	332
12	778	760	868	800	1,000	900	2,730	2,560	586	423	360	303
13	836	875	671	800	900	850	3,100	2,380	563	438	423	311
14	808	762	750	750	950	800	3,580	2,090	571	478	338	322
15	768	1,220	800	800	900	750	3,380		536	366	313	315
16	839	1,210	800	850	950	1,100	3,000	4,000	504	707	308	342
17	857	988	650	700	950	1,900	2,470		476	520	323	309
18	818	973	800	700	850	1,800	2,110		560	446	292	279
19	784	666	650	800	950	1,800	1,820	3,680	554	417	318	310
20	782	925	600	700	850	1,300	1,780	2,730	529	420	344	353
21	798	985	800	950	850	1,500	2,140	2,470	519	461	326	1,070
22	740	875	750	1,400	850	1,700	4,160	2,220	499	326	320	996
23	833	857	750	1,300	800	3,600	6,080	1,900	567	381	312	492
24	1,000	905	750	1,200	800	3,210	6,380	1,610	501	384	288	370
25	947	863	800	1,100	800	2,300	5,090	1,490	549	355	304	394
26	893	576	750	1,000	800	1,980	4,000	1,380	592	354	276	343
27	872	593	750	1,100	800	1,740	3,780	1,340	644	357	334	329
28	878	842	750	900	800	1,480	4,000	1,380	484	674	497	351
29	848	784	600	1,100	-------	1,330	4,830	1,270	599	349	486	356
30	866	788	600	950	-------	1,510	5,780	844	524	390	298	314
31	857	-------	600	900	-------	1,340	-------	674	-------	371	302	-------

NOTE.—Discharge, May 15–18, estimated, and Apr. 14, 15, 16, and May 19, as indicated in above table, from automatic record and comparison with record of West Canada Creek at Hinckley; water-stage recorder not operating. Discharge, Dec. 14 to Mar. 23, determined from gage heights corrected for ice effect by means of three discharge measurements, study of gage-height graph and weather records, and comparison with Hinckley record.

Monthly discharge of West Canada Creek at Kast Bridge, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 575 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,000	429	789	1.37	1.58
November	1,220	576	868	1.51	1.68
December	1,250	600	780	1.36	1.57
January	2,800	700	1,100	1.91	2.20
February	1,000	800	898	1.56	1.62
March	3,600	750	1,390	2.42	2.79
April	6,540	1,320	3,660	6.37	7.11
May	5,240	674	2,470	4.30	4.96
June	1,170	476	618	1.07	1.19
July	707	326	432	.751	.87
August	497	276	327	.569	.66
September	1,070	279	390	.678	.76
The year	6,540	276	1,140	1.98	26.99

NOTE.—The monthly discharge in second-feet per square mile and run-off in depth in inches shown by the table do not represent the natural flow from the basin because of artificial storage, mainly in Hinckley reservoir. The yearly discharge and run-off doubtless represent very nearly the natural flow, except for the diversion out of the basin, during the navigation season, through the Ninemile feeder and Ninemile Creek into the Barge Canal.

NINEMILE FEEDER NEAR HOLLAND PATENT, N. Y.

LOCATION.—At mouth of Ninemile feeder, 4 miles east of Holland Patent, Oneida County, half a mile below highway bridge near farm of P. A. Wade, which is 4 miles south and 1 mile west from Barneveld.

RECORDS AVAILABLE.—June 5, 1919, to September 30, 1923. Operation of station was assumed by Department of State Engineer and Surveyor July 1, 1921.

GAGE.—Gurley seven-day graph water-stage recorder on right bank; inspected by D. G. Humphrey.

DISCHARGE MEASUREMENTS.—Made from highway bridge half a mile above gage or by wading.

CONTROL.—Suppressed weir of concrete with a lip about 1.5 feet high and a spillway inclined about 1:2; permanent.

REGULATION.—Flow in the feeder is regulated by gates at the intake of the canal just below the power plant at Trenton Falls.

ICE.—Feeder canal not in operation during winter.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 30 and 200 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage heights determined by inspection of gage-height graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. Records excellent.

Discharge measurements of Ninemile feeder near Holland Patent, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
June 3	J. L. Lamson	1.02	51.5	Aug. 6	Lamson and Johnson	1.82	117
28	A. W. Harrington	1.84	120	21	A. W. Harrington	1.84	117

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Daily discharge, in second-feet, of Ninemile feeder near Holland Patent, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	June	July	Aug.	Sept.
1	122		--------	110	116	118
2	124		--------	118	116	118
3	124	5	--------	118	116	118
4	123		56	117	116	118
5	122	6	116	118	115	118
6	120	6	118	117	116	118
7	120	5	119	117	117	118
8	119	5	124	117	115	121
9	118	5	121	118	116	118
10	120	4	118	117	117	118
11	118	4	118	117	118	117
12	90	4	118	117	118	116
13	8	4	118	118	118	116
14	8	4	118	118	117	115
15	7	14	118	118	117	116
16	7	13	118	122	117	114
17	8	7	118	118	117	113
18	6	6	118	118	118	114
19	6	5	118	118	118	115
20	6	6	117	118	118	116
21	5	5	117	118	118	118
22	5	5	117	116	118	117
23	6	4	118	117	118	113
24	8	6	119	117	118	113
25	6	--------	118	117	118	113
26	5	--------	122	117	118	113
27	5	--------	119	118	118	112
28	5	--------	120	121	119	112
29	4	--------	119	117	118	113
30	4	--------	118	117	118	110
31	4	--------	--------	117	118	--------

NOTE.—Discharge, Nov. 1–4, estimated, and Oct. 12, as indicated in above table, from recorder graph; mean daily gage heights Oct. 13, 14, Nov. 5, 6, and 7 estimated from recorder graph; automatic record either faulty or missing.
Diversion discontinued for winter Oct. 12, 1922.

Monthly discharge of Ninemile feeder near Holland Patent, N. Y., for the year ending Sept. 30, 1923

Month	Discharge in second-feet		
	Maximum	Minimum	Mean
October	124	4	49.5
November 1–24	14	4	5.8
June 4–30	124	56	116
July	122	110	117
August	119	115	117
September	121	110	116

NOTE.—See footnote to table of daily discharge.

POESTEN KILL NEAR TROY, N. Y.

LOCATION.—500 feet below steel highway bridge on Troy-Eagle Mills road, 1½ miles west of Eagle Mills, Rensselaer County, 3 miles east of Troy, and 4½ miles below mouth of Quaken Kill.

DRAINAGE AREA.—Not determined.

RECORDS AVAILABLE.—July 15 to September 30, 1923.

GAGE.—Gurley seven-day graph water-stage recorder installed August 15, 1923, on left bank. Recorder inspected by students of Rensselaer Polytechnic Institute, under direction of Department of Geodesy and Surveying.

DISCHARGE MEASUREMENTS.—Made from cable 500 feet below gage or by wading.

CHANNEL AND CONTROL.—Solid rock ledge; permanent.

EXTREMES OF DISCHARGE.—Maximum stage during period July 15 to September 30, 1923, from water-stage recorder, 2.13 feet at 10 a. m. August 29 (discharge, 178 second-feet); minimum stage recorded, 0.89 foot at 5 p. m. July 23 and 7.30 a. m. July 24 (discharge, 4.5 second-feet).

ICE.—Stage-discharge relation probably affected by ice.

REGULATION.—Some regulation on Quaken Kill due to storage reservoirs for water supply for city of Troy.

DIVERSIONS.—The city of Troy diverts water for its water supply from Quaken Kill about 1 mile below Quakenkill. During low water this diversion amounts to the entire flow of the Quaken Kill at this point.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined between 2 and 2,000 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. Records good.

Discharge measurements of Poesten Kill near Troy, N. Y., during the period July 14 to Sept. 30, 1923

[Made by E. B. Shupe]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
July 14	1.09	7.38	Aug. 1	1.21	14.3	Sept. 10	1.55	52.2
29	1.75	88.4	11	.92	4.70	13	1.65	66.3
30	1.53	49.5	16	1.08	9.50			
31	1.34	22.9	19	.99	5.89			

Daily discharge, in second-feet, of Poesten Kill near Troy, N. Y., for the period July 15 to Sept. 30, 1923

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1		15	16	11		5.0	32	21	5.0	6.3	23
2		16	11	12		5.0	20	22	4.7	6.0	44
3		11	9.3	13		28	51	23	4.6	6.3	40
4		9.8	9.3	14		23	42	24	4.7	6.3	47
5		16	8.0	15	8.6	14	23	25	7.3	5.4	36
6		16	7.3	16	16	11	18	26	7.0	5.3	25
7		14	6.0	17	26	8.3	16	27	8.6	5.3	19
8		8.3	16	18	15	6.7	12	28	47	7.0	18
9		6.0	115	19	8.6	5.9	10	29	84	124	68
10		5.3	58	20	5.6	6.0	9.6	30	47	71	55
								31	26	29	

NOTE.—Discharge, July 15 to Aug. 15, ascertained from mean daily gage heights determined from plotting staff gage readings, obtained during construction, on recorder graph sheets and a comparison with records from recorder after completion of installation.

Monthly discharge of Poesten Kill near Troy, N. Y., for the period July 15 to Sept. 30, 1923

Month	Discharge in second-feet		
	Maximum	Minimum	Mean
July 15–31	84	4.6	20.4
August	124	5.0	16.2
September	115	6.0	28.8

NOTE.—The above figures do not represent the natural flow from the basin because of the diversion from the Quaken Kill by the city of Troy for water-supply purposes.

WALLKILL RIVER AT PELLETS ISLAND MOUNTAIN, N. Y.

LOCATION.—At highway bridge in Pellets Island Mountain, Orange County, 4½ miles south of Middletown and 5½ miles below mouth of Pochuck Creek.

DRAINAGE AREA.—385 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 29, 1919, to September 30, 1923.

GAGE.—Chain gage on downstream side of highway bridge, installed January 17, 1920. Previous readings were made on temporary staff gage attached to pile on right bank under bridge. Gage read by Michael Meduski.

DISCHARGE MEASUREMENTS.—Made from downstream side of highway bridge or by wading 2 miles below.

CHANNEL AND CONTROL.—Channel mostly silt and control coarse gravel; probably fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.0 feet (0.70 foot backwater effect from ice) at 5. p. m. March 19 (discharge, 5.200 second-feet); minimum stage recorded, 7.39 feet from 5 p. m. August 20 to 7 a. m. August 24 (discharge, 18 second-feet).

1920–1923: Maximum stage recorded, 20.7 feet at 7.30 a. m. March 16, 1920 (discharge, 8,350 second-feet); minimum stage recorded, that of August 20–24, 1923.

ICE.—Stage-discharge relation usually affected by ice.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice. Rating curve well defined between 30 and 3,500 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good, except during period of ice effect, for which they are fair.

Discharge measurements of Wallkill River at Pellets Island Mountain, N.Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 25	B. F. Howe	[a] 10.99	983	Apr. 13	J. L. Lamson	9.85	651
Feb. 11	J. L. Lamson	[a] 9.13	350	14	do	9.70	557
27	B. F. Howe	[a] 8.71	211				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Wallkill River at Pellets Island Mountain, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	60	53	56	190	550	200	1,000	690	138	74	66	26
2	60	56	53	485	500	240	770	538	119	66	59	26
3	60	60	53	502	550	280	770	418	119	66	52	26
4	60	60	56	612	550	600	730	323	148	82	52	26
5	60	71	53	690	550	1,200	815	294	294	82	52	26
6	60	84	53	700	500	1,300	1,250	239	308	86	38	26
7	60	84	60	600	460	1,400	1,250	202	770	82	38	26
8	76	92	101	420	420	1,600	1,200	202	1,250	66	38	32
9	92	92	84		400	1,600	1,050	168	1,100	66	38	66
10	119	84	53		380	1,500	950	214	730	66	38	138
11	138	84	87	309	360	1,400	860	294	485	66	35	101
12	179	84	81		320	1,400	730	252	385	66	32	91
13	179	71	92		300	1,500	650	451	308	54	28	52
14	138	68	92	260	300	1,700	538	538	226	52	26	45
15	110	71	84	280	300	1,700	468	294	202	45	26	38
16	101	65	71	280	240	1,700	434	226	190	45	26	32
17	92	56	68	260	300	2,600	401	338	158	45	26	26
18	84	53	68	240	280	3,600	369	323	138	38	25	26
19	81	60	71	220	200	5,000	308	338	128	38	22	26
20	76	60	76	180	200	4,800	308	323	119	38	20	26
21	68	68	81	180	220	4,700	279	354	119	32	18	32
22	68	76	84	360	220	4,500	279	612	119	26	18	59
23	60	68	68	800	200	4,310	252	385	91	26	18	91
24	92	60	68	800	180	4,130	226	502	82	26	20	148
25	76	53	68	1,000	180	3,770	202	434	82	26	22	128
26	81	53	71	900	180	3,100	179	385	82	32	22	119
27	84	53	81	900	200	2,340	179	279	82	52	22	86
28	65	53	110	850	200	1,930	179	226	91	66	22	79
29	71	46	158	850	------	1,350	401	190	99	82	26	66
30	65	53	190	750	-------	1,250	690	179	99	82	26	64
31	53	-------	190	650	-------	1,150	-------	148	-------	74	26	-------

NOTE.—Discharge, Jan. 9–13, estimated; gage heights doubtful. Discharge, Jan. 6 to Mar. 19, determined from gage heights corrected for ice effect by means of three discharge measurements and study of gage-height graph and weather records.

Monthly discharge of Wallkill River at Pellets Island Mountain, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 385 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	179	53	86.1	0.224	0.26
November	92	46	66.4	.172	.19
December	190	53	83.3	.216	.25
January	1,000	180	499	1.30	1.50
February	550	180	330	.857	.89
March	5,000	200	2,190	5.69	6.56
April	1,250	179	591	1.54	1.72
May	690	148	334	.868	1.00
June	1,250	82	275	.714	.80
July	86	26	56.4	.146	.17
August	66	18	31.5	.082	.09
September	148	26	58.4	.152	.17
The year	5,000	18	385	1.00	13.60

HACKENSACK RIVER BASIN

HACKENSACK RIVER AT NEW MILFORD, N. J.

LOCATION.—At pumping plant of Hackensack Water Co., New Milford, Bergen County, 3½ miles below mouth of Dwars Kill.

DRAINAGE AREA.—115 square miles (measured on topographic map).

RECORDS AVAILABLE.—October 28, 1921, to September 30, 1923.

GAGE.—Vertical staff in pool about 30 feet above South spillway dam and 500 feet north of pumping station; read by Edward L. Weidig.

DISCHARGE MEASUREMENTS.—Measured from highway bridge at Oradell, half a mile upstream.

CHANNEL AND CONTROL.—The two spillways and sluice gates at the pumping plant forebay form the control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 3.60 feet at 10 a. m. March 17 (discharge, 1,450 second feet); no water going over dams during a great part of the time (see table of daily discharge).

1922–1923: Maximum stage recorded, that of March 17, 1923; no water going over dams during a great part of each year.

DIVERSIONS.—Water is diverted above the control by the Hackensack Water Co. This diversion is measured by Venturi meter and included in the table of monthly discharge.

REGULATION.—Flow is regulated at the storage dam of the Hackensack Water Co. at Oradell, 1 mile upstream. Monthly discharge, January to September, 1923, corrected for storage; no correction prior to January 1, 1923.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined between 40 and 900 second-feet. Gage read to even hundredths once a day. Daily discharge ascertained by applying to rating table daily gage height. Records fairly good.

COOPERATION.—Gages read by an employee of the Hackensack Water Co.

Discharge measurements of Hackensack River at New Milford, N. J., during the year ending Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Jan. 25	2.06	348	Jan. 25	2.76	822
25	2.41	568	26	2.04	337

Daily discharge, in second-feet, of Hackensack River at New Milford, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1			0	114	114	99	79	562	18	0	0	
2			0	530	107	37	66	274	0	7	7	
3			7	918	114	66	72	129	14	0	0	
4			0	284	114	66	79	129	10	7	0	
5			1	137	114	263	263	59	10	4	1	
6			0	66	99	700	466	59	1	0	0	
7			0	10	107	630	344	48	7	0	0	
8		0	0	14	92	562	170	14	4	0	7	
9			0	14	114	373	162	22	10	7	7	
10			114	18	107	154	162	0	7	0	4	
11			4	7	122	145	225	54	7	0	0	
12				14	114	154	145	42	42	0	7	
13				14	92	497	99	42	37	7	0	
14				14	72	497	99	244	37	1	14	
15		99		0	99	497	92	85	37	0	1	
16	0	234		129	99	735	107	66	10	0	0	0
17		305		274	99	1,310	107	66	14	14	1	
18		274		0	92	1,310	85	54	10	10	0	
19		7		14	92	1,230	85	66	10	1	0	
20		0		22	99	995	54	137	10	0	0	
21		137	0	129	92	434	54	85	7	0	1	
22		122		466	92	434	54	295	0	0	10	
23		1		700	92	434	54	48	0	27	0	
24		7		253	54	373	54	54	10	0	0	
25				253	54	466	48	22	0	7	0	
26				316	48	466	48	54	14	0	14	
27		0		66	42	404	37	32	0	0	0	
28				188	107	284	54	27	10	0	0	
29				179	-------	274	27	22	1	0	0	
30			37	170	-------	225	842	27	0	14	0	
31		-------	32	99	-------	234	------	18	-------	0	0	-------

Monthly discharge of Hackensack River at New Milford, N. J., for the year ending Sept. 30, 1923

[Drainage area, 115 square miles]

Month	Discharge in second-feet						Run-off in inches
	Observed			Gain or loss in storage at Oradell reservoir plus diversion	Corrected for storage and diversion		
	Maximum	Minimum	Mean		Mean	Per square mile	
October	0	0	0	58.9	58.9	0.512	0.59
November	305	0	39.5	56.6	96.1	.836	.93
December	114	0	6.29	55.9	62.2	.541	.62
January	918	0	175	87	262	2.28	2.63
February	122	42	94.4	47.6	142	1.23	1.28
March	1,310	37	463	66	529	4.60	5.30
April	842	27	141	62	203	1.77	1.98
May	562	0	91.5	55.5	147	1.28	1.48
June	42	0	11.2	57.1	68.3	.594	.66
July	27	0	3.4	31.0	34.4	.299	.34
August	14	0	2.4	19.4	21.8	.190	.22
September	0	0	0	48.4	48.4	.421	.47
The year	1,310	0	85.9	54.1	140	1.22	16.50

NOTE.—No storage correction for October, November, and December.

PASSAIC RIVER BASIN

PASSAIC RIVER NEAR MILLINGTON, N. J.

LOCATION.—At highway bridge known as Davis Bridge, 1 mile above Millington, Somerset County, 1½ miles below mouth of Black Brook, and three-fourths mile above gaging station formerly maintained at Millington.

DRAINAGE AREA.—55 square miles (measured on topographic map).

RECORDS AVAILABLE.—November 10, 1921, to September 30, 1923. At Millington three-fourths mile downstream, November 25, 1903, to July 15, 1906.

GAGE.—Inclined staff gage on right bank 400 feet below Davis Bridge until September 1, 1923, when gage was destroyed; read by Mrs. A. H. Schmidt.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading near gage.

CHANNEL AND CONTROL.—Channel coarse gravel and rock; control is narrow section in channel and rocky riffle just below, 100 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year not determined. Water above gage several days in March (maximum mean discharge estimated 700 second-feet March 18); minimum stage recorded 3.29 feet August 21 (discharge, 3.0 second feet).

1903–1906; 1922–1923: Maximum stage recorded, 7.50 feet, March 8, 1904 (discharge, 2,000 second-feet); minimum stage, that of August 21, 1923. Stage of October, 1903, flood unknown.

ICE.—Stage-discharge relation usually not seriously affected by ice during winter.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 5 and 500 second-feet. Gage read to hundredths twice a day. Discharge ascertained by applying to rating table mean daily gage height, and estimated by comparison with records for near-by stations.

Discharge measurements of Passaic River near Millington, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 15	Otto Lauterhahn	3.47	8.2	July 25	Otto Lauterhahn	3.69	19.0
15	do	3.47	8.0	Aug. 16	do	3.32	4.2
Jan. 12	do	4.17	52	16	do	3.32	4.3
Feb. 9	do	3.97	35.5	31	J. W. Bones	3.38	7.0
Mar. 29	do	4.83	106	Sept. 28	Otto Lauterhahn	(a)	6.1

[a] Gage covered.

Daily discharge, in second-feet, of Passaic River near Millington, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
1	11	8	7	259	48	51	68	315	10	6	7
2	9	8	7	360	48	55	59	222	9	6	6
3	7	12	7	286	59	108	59	135	10	8	6
4	7	12	10	210	68	210	68	97	27	8	6
5	7	11	12	169	55	438	108	82	19	15	6
6	7	14	12	114	44	259	160	64	12	16	6
7	7	15	14	64	40	199	151	51	21	9	6
8	11	10	14	51	40	199	128	48	48	10	5
9	14	9	14	51	37	128	114	48	40	10	5
10	17	9	11	64	48	102	97	44	25	8	5
11	15	9	11	51	51	143	77	40	15	7	5
12	14	9	14	51	36	169	64	40	12	6	5
13	12	9	9	51	40	345	59	48	11	6	5
14	10	9	9	40	37	406	51	40	9	5	5
15	10	10	14	36	37	375	48	37	10	5	5
16	11	11	12	36	44	375	48	36	9	17	4
17	11	9	14	36	48	650	44	44	8	23	4
18	11	7	14	36	44	700	40	33	7	17	4
19	10	7	11	33	40	588	40	29	7	13	4
20	8	8	8	27	33	430	36	26	7	8	4
21	8	7	14	68	29	330	34	44	6	5	3
22	8	8	11	121	30	234	30	44	6	5	4
23	9	7	11	114	29	246	29	36	6	7	5
24	12	7	11	114	21	246	28	24	6	10	4
25	12	7	11	121	36	222	24	19	6	16	4
26	11	7	11	121	48	188	24	16	6	14	4
27	9	7	12	121	48	160	23	14	5	13	5
28	9	7	44	92	51	135	23	13	5	10	5
29	8	7	59	77	------	121	234	12	6	10	6
30	9	7	77	68	------	92	375	10	6	9	10
31	8	------	169	59	------	82	------	10	------	8	6

NOTE.—Daily discharge estimated Oct. 24, 25, Dec. 25, Jan. 14, Feb. 18, Mar. 17, 18, and 20. Gage destroyed Sept. 1; mean discharge estimated for September, 9 second-feet.

Monthly discharge of Passaic River near Millington, N. J., for the year ending Sept. 30, 1923

[Drainage area, 55 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	17	7	10.1	0.184	0.21
November	15	7	8.9	.162	.18
December	169	7	21.1	.384	.44
January	360	27	100	1.82	2.10
February	68	21	42.5	.773	.80
March	700	51	258	4.69	5.41
April	375	23	78.1	1.42	1.58
May	315	10	55.5	1.01	1.16
June	48	5	12.5	.227	.25
July	23	5	10.0	.182	.21
August	10	3	5.1	.0927	.11
September	----------	----------	9.0	.164	.18
The year	700	3	51.2	.931	12.63

NOTE.—Mean discharge for September estimated by comparison with records for near-by streams.

ROCKAWAY RIVER AT BOONTON, N. J.

LOCATION.—At dam of Jersey City waterworks at Boonton, Morris County.

DRAINAGE AREA.—119 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1906, to September 30, 1923.

GAGES.—Elevation of water surface in reservoir determined by measuring from a reference point on dam to water surface with a graduated rod. Read once daily by an employee of Jersey City waterworks.

Automatic water-stage recorder on left bank about one-quarter of a mile below dam, operated by an employee of Jersey City waterworks.

DETERMINATION OF DISCHARGE.—Discharge over dam, January 1, 1906, to March 18, 1918, determined from elevation of water surface in the reservoir and rating curve for spillway. Discharge since March 3, 1918, determined at gaging station below dam.

DISCHARGE MEASUREMENTS.—For gaging station made by wading near water-stage recorder.

CHANNEL AND CONTROL.—For gaging station coarse gravel, probably permanent.

REGULATION.—Records are corrected for storage above dam.

DIVERSION.—Water diverted to Jersey City through pipe line measured by Venturi meter. Records corrected for this diversion.

COOPERATION.—Gage-height records and records of diversion furnished by the bureau of water, Department of Streets and Public Improvements, Jersey City, N. J.

Discharge measurements of Rockaway River at Boonton, N. J., during the year ending Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft*		*Feet*	*Sec.-ft.*
Nov. 6	1.95	223	Nov. 9	1.45	119	Nov. 13	0.22	0.3
6	1.80	188	9	1.07	54	13	.80	22.7
6	1.60	148	9	.68	13.4	13	.89	32.2

Monthly discharge of Rockaway River at Boonton, N. J., for the year ending Sept. 30, 1923

[Drainage area, 119 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	118		52.9	0.445	0.51
November			48.4	.407	.45
December	254	0.6	66.1	.555	.64
January	758	66	230	1.93	2.22
February	232		132	1.11	1.16
March	1,100	144	523	4.39	5.06
April	702	96	257	2.16	2.41
May	431	51	190	1.60	1.84
June	798		136	1.14	1.27
July	71	2.5	39.2	.329	.38
August			16.3	.137	.16
September			40.0	.336	.37
The year	1,100		145	1.22	16.56

NOTE.—No correction made for evaporation from surface of reservoir.

WHIPPANY RIVER AT MORRISTOWN, N. J.

LOCATION.—At Morristown sewage-disposal plant, three-fourths mile below Morristown, Morris County, and 8 miles above mouth of river.

DRAINAGE AREA.—29 square miles (measured on topographic map).

RECORDS AVAILABLE.—August 26, 1921, to September 30, 1923.

GAGE.—Vertical staff on left bank 150 feet above chlorination house of sewage disposal plant; read under direction of William H. Frapwell.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Channel sand and fine gravel; control is riffle 50 feet below gage. Right bank is overflowed at very high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 4.90 feet during night of March 16–17 (discharge estimated, about 600 second-feet); minimum stage recorded, 0.82 foot several days in August and September (discharge, 7 second-feet).

1921–1923: Maximum stage 5.40 feet from estimated graph about 5 p. m. July 1, 1922 (discharge, estimated 700 second-feet); minimum stage recorded, 0.80 foot at 5.30 p. m. October 5 and 7, 1921 (discharge, 6.3 second-feet).

ICE.—Stage-discharge relation affected by ice during extreme cold.

ACCURACY.—Stage-discharge relation permanent, except for few days in January and February when morning gage readings were ice affected. Rating curve well defined between 8 and 350 second-feet. Gage read to hundredths twice daily. Discharge ascertained by applying to rating table mean daily gage height. Records good.

COOPERATION.—Gage read by an employee of the commissioner of streets and sewers, city of Morristown.

Discharge measurements of Whippany River at Morristown, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 10	Otto Lauterhahn	1.13	27.2	Aug. 31	J. W. Bones	0.87	10.6
Mar. 29	do	1.59	70				

Daily discharge, in second-feet, of Whippany River at Morristown, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	17	16	16	309	32	39	50	60	23	14	14	8
2	17	16	16	116	33	48	57	53	23	13	13	8
3	17	31	14	49	41	81	58	50	31	16	12	8
4	17	23	14	41	40	163	70	51	38	32	36	8
5	17	19	33	34	33	163	129	46	27	33	32	8
6	17	18	23	33	29	70	156	46	23	20	16	7
7	22	20	17	29	29	76	76	43	116	18	14	8
8	30	19	20	31	20	57	70	41	178	16	12	27
9	30	17	25	29	22	49	65	50	50	14	12	25
10	39	16	22	29	21	52	58	45	34	14	10	16
11	28	16	16	23	20	57	56	41	29	14	10	9
12	21	16	19	26	26	178	52	44	27	14	10	9
13	18	17	18	23	35	142	52	52	25	12	10	9
14	18	17	16	23	42	149	49	40	25	12	10	8
15	18	18	19	29	38	98	48	38	28	18	8	7
16	18	21	18	30	33	309	49	40	25	22	8	7
17	18	17	24	34	26	411	47	48	22	15	8	7
18	17	16	25	20	25	178	46	36	22	14	8	7
19	16	16	22	23	25	178	45	35	21	12	10	7
20	16	18	16	22	25	122	44	33	17	12	11	7
21	16	17	17	57	24	116	43	59	17	11	8	45
22	16	16	19	142	24	116	42	43	16	11	10	20
23	17	16	18	60	23	116	39	35	16	19	8	15
24	22	16	18	42	25	142	38	31	18	12	7	22
25	18	14	18	54	25	98	38	31	16	16	7	14
26	17	14	20	39	25	92	36	27	14	13	7	11
27	16	14	25	37	33	81	35	22	23	11	7	11
28	16	16	86	33	39	76	35	25	16	13	10	11
29	16	16	50	32	------	58	326	23	17	15	26	11
30	16	16	34	29	------	65	86	22	14	14	13	8
31	16	------	23	31	------	65	------	22	------	15	10	------

NOTE.—Stage-discharge relation affected by ice Dec. 30, Jan 30, Feb. 6, 8, 12, 15–18, 20, and 24. Daily discharge estimated by comparison with records for near-by streams.

Monthly discharge of Whippany River at Morristown, N. J., for the year ending Sept. 30, 1923

[Drainage area, 29 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	39	16	19.3	0.666	0.77
November	31	14	17.4	.600	.63
December	86	14	23.3	.803	.97
January	309	20	48.7	1.68	1.94
February	42	20	29.0	1.00	1.04
March	411	39	118	4.07	4.69
April	326	35	66.5	2.29	2.56
May	60	22	39.7	1.37	1.58
June	178	14	31.7	1.09	1.22
July	33	11	15.6	.538	.62
August	36	7	12.2	.421	.49
September	45	7	12.3	.424	.47
The year	411	7	36.2	1.25	16.98

RAMAPO RIVER NEAR MAHWAH, N. J.

LOCATION.—At concrete highway bridge 1 mile west of Mahwah, Bergen County, three-fourths mile below mouth of Mahwah River.

DRAINAGE AREA.—118 square miles.

RECORDS AVAILABLE.—February 10, 1903, to July 31, 1914, and from September 1, 1922, to September 30, 1923. Records from 1907 to 1914 consist of gage heights only published by United States Weather Bureau.

GAGE.—Chain gage on downstream side of bridge used from 1903 to 1914. Automatic water-stage recorder on right bank just below bridge, installed September 1, 1922; operated by Clarence Wanamaker.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading 150 feet downstream.

CHANNEL AND CONTROL.—Coarse gravel; control is gravel riffle 150 feet below bridge, probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage during period September 1, 1922, to September 30, 1923, from water-stage recorder, 6.47 feet at 9 p. m. March 17 (discharge, 1,330 second-feet); minimum stage, 1.57 feet at 9 a. m. September 20, 1923 (discharge, 11 second-feet).

ICE.—Stage-discharge relation affected by ice only during short periods of extreme weather.

REGULATION.—Daily distribution of flow affected by water powers at points upstream.

ACCURACY.—Stage-discharge relation probably permanent, except as affected by ice during short periods. Rating curve well defined between 10 and 1,100 second-feet. Daily discharge determined from automatic records by use of discharge integrator. Records very good.

Discharge measurements of Ramapo River near Mahwah, N. J., during the period Sept. 1, 1922, to Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1922		*Feet*	*Sec.-ft.*	1923		*Feet*	*Sec.-ft.*
Sept. 7	Otto Lauterhahn	2.95	187	Jan. 31	Otto Lauterhahn	2.82	160
8	do	2.83	158	Mar. 10	do	3.37	302
15	do	2.57	109	21	do	4.73	709
Oct. 6	do	2.21	59.9	22	do	4.83	751
6	do	2.13	47.6	Apr. 2	do	3.27	270
Dec. 16	do	2.22	60	July 21	do	1.81	23.8
				Sept. 20	O. W. Hartwell	1.63	12.5

Daily discharge, in second-feet, of Ramapo River near Mahwah, N. J., for the period Sept. 1, 1922, to Sept. 30, 1923

Day	Sept.	Day	Sept.	Day	Sept.
1	80	11	93	21	60
2	60	12	128	22	37
3	43	13	130	23	57
4	352	14	97	24	35
5	388	15	88	25	55
6	186	16	75	26	52
7	180	17	58	27	54
8	142	18	77	28	45
9	112	19	61	29	40
10	99	20	68	30	36

Daily discharge, in second-feet, of Ramapo River near Mahwah, N. J., for the period Sept. 1, 1922, to Sept. 30, 1923—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	34	37	32	530	160	83	266	436	78	39	20	24
2	35	38	25	1,020	178	96	254	337	70	41	18	24
3	36	41	26	603	188	151	250	282	73	42	19	18
4	36	35	26	384	177	406	276	254	124	43	19	17
5	38	28	34	297	154	677	406	256	140	59	24	16
6	40	36	46	244	164	607	575	236	146	60	19	16
7	46	38	35	197	132	477	460	179	325	52	19	16
8	37	51	31	174	131	427	379	156	360	42	19	23
9	47	39	51	190	124	315	332	204	248	40	34	40
10	74	34	28	175	117	280	285	200	187	36	27	52
11	99	57	38	146	105	261	252	163	142	36	19	46
12	92	36	36	147	137	367	227	164	118	34	21	24
13	73	37	46	161	116	494	208	231	105	31	18	23
14	62	36	34	136	120	542	188	180	100	26	20	23
15	35	34	48	137	138	472	171	148	95	26	19	20
16	50	40	44	121	122	670	167	168	90	25	17	19
17	54	39	38	113	111	1,300	152	258	73	25	18	19
18	45	41	49	81	86	1,200	140	191	74	24	17	19
19	36	31	40	105	102	1,040	134	154	66	23	17	18
20	38	38	38	94	88	840	131	136	59	24	17	18
21	31	42	33	225	83	720	122	236	51	23	18	27
22	38	39	47	650	80	770	110	263	48	22	19	27
23	47	37	55	655	75	1,120	105	201	44	20	17	78
24	40	27	31	480	70	1,270	98	167	41	19	17	103
25	37	38	45	417	63	1,040	90	141	40	21	16	69
26	48	25	53	335	96	775	86	123	39	20	13	60
27	36	27	65	262	82	625	83	110	45	29	16	48
28	40	30	95	222	82	520	97	103	72	28	18	37
29	29	28	65	200	-------	404	777	98	53	26	23	30
30	33	23	60	180	-------	379	671	90	47	18	20	24
31	29	-------	55	160	-------	332	-------	84	-------	17	20	-------

NOTE.—Stage-discharge relation affected by ice Dec. 29, 31, Jan. 29 to Feb. 1, and Feb. 24 Discharge determined from one discharge measurement, study of weather records, and comparison with records for near-by streams. Discharge estimated by comparison with records for near-by streams for June 14–16 and July 22 and 23.

Monthly discharge of Ramapo River near Mahwah, N. J., for the period Sept. 1, 1922, to Sept. 30, 1923

[Drainage area, 118 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1922					
September	388	35	99.6	0.844	0.94
1922–23					
October	99	29	45.6	.386	.44
November	57	23	36.1	.306	.34
December	95	25	43.5	.369	.43
January	1,020	81	285	2.42	2.79
February	188	63	117	.992	1.03
March	1,300	83	602	5.10	5.88
April	777	83	250	2.12	2.36
May	436	84	192	1.63	1.88
June	360	39	105	.890	.99
July	60	17	31.3	.265	.31
August	34	13	19.3	.164	.19
September	103	16	32.6	.276	.31
The year	1,300	13	147	1.25	16.95

RAMAPO RIVER AT POMPTON LAKES, N. J.

LOCATION.—At municipal hydroelectric plant in Borough of Pompton Lakes, Passaic County, 1½ miles above mouth of Ramapo River.

DRAINAGE AREA.—160 square miles.

RECORDS AVAILABLE.—October 29, 1921, to September 30, 1923.

GAGES.—Head on spillway is indicated by an automatic water-stage recorder at right end of dam. A vertical staff gage is located in tailrace 30 feet below draft tubes of turbines. This gage is read hourly, and together with automatic recorder above dam indicates head on turbines. On September 24, 1923, a water-stage recorder was installed in tailrace. Wicket-gate opening for each turbine is recorded hourly from indicators on turbine governors. Recorders operated and gages read by power-house operators.

DISCHARGE MEASUREMENTS.—Made from temporary footbridge over tailrace and from cable 300 feet below dam.

DETERMINATION OF DISCHARGE.—Flow at this station determined by computing discharge over spillway and through each of two turbines.

EXTREMES OF DISCHARGE.—Maximum stage during period October 1, 1921, to September 30, 1923, indicated by high-water mark 2.37 feet at midnight March 27, 1922 (discharge about 5,900 second-feet).

REGULATION.—Record indicates flow as released by power plant. No correction made for storage in pond or for evaporation from its surface.

ACCURACY.—Rating curve for spillway well defined between 100 and 2,500 second-feet. Discharge rating for turbines is variable. Discharge over spillway determined by applying mean daily gage height to rating table and by use of discharge integrator. Discharge through turbines determined from hourly records of gate opening and discharge rating turbine. Discharge so determined subject to sliding correction because of variations in turbine rating. Records fairly good.

COOPERATION.—Borough of Pompton Lakes has provided shelter for water-stage recorder, and furnishes power-plant records for computation of discharge.

Measurements of discharge over spillway on Ramapo River at Pompton Lakes, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet.	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 6	Otto Lauterhahn	0.30	139	Apr. 19	Otto Lauterhahn	0.26	114
24	do	.16	71	20	do	.29	136
Sept. 14	do	.20	53	May 19	do	.30	147

Discharge measurements of Ramapo tailrace at Pompton Lakes, N. J., during the period Oct. 7, 1921, to Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1921		*Feet*	*Sec.-ft.*	1922		*Feet*	*Sec.-ft.*
Oct. 7	Otto Lauterhahn	6.75	10.9	Sept. 15	Otto Lauterhahn	8.62	121
				15	do	8.52	115
1922				16	do	7.76	56
Sept. 13	do	8.49	112	16	do	7.79	59
13	do	7.95	68	Oct. 4	do	7.65	55
13	do	7.89	64	4	do	7.48	46.3
14	O. W. Hartwell	8.06	75	4	do	7.32	34.6
14	do	8.04	71	22	do	6.40	4.1
14	do	8.38	102	22	do	6.40	4.1
14	Otto Lauterhahn	8.49	113	Nov. 14	do	7.30	34.6
14	do	8.35	99	14	do	7.29	35.3
14	do	8.17	84				
15	do	7.75	60	1923			
15	do	7.52	42.9	Apr. 13	do	8.11	77.6
15	do	7.68	54	Aug. 17	do	5.97	.08

Monthly discharge of Ramapo River at Pompton Lakes, N. J., for the years ending Sept. 30, 1922 and 1923

[Drainage area, 160 square miles]

Month	Discharge in second-feet		Run-off in inches	Month	Discharge in second-feet		Run-off in inches
	Mean	Per square mile			Mean	Per square mile	
1921–22				1922–23			
November	73.5	0.459	0.51	October	56.4	0.352	0.41
December	170	1.06	1.22	November	45.4	.284	.32
January	85.2	.532	.61	December	50.4	.315	.36
February	242	1.51	1.57	January	376	2.35	2.71
March	880	5.50	6.34	February	171	1.07	1.11
April	480	3.00	3.35	March	870	5.44	6.27
May	375	2.34	2.70	April	343	2.14	2.39
June	301	1.88	2.10	May	263	1.64	1.89
July	227	1.42	1.64	June	133	.831	.93
August	134	.838	.97	July	45.6	.285	.33
September	122	.762	.85	August	28.5	.178	.21
				September	37.8	.236	.26
				The year	203	1.27	17.19

NOTE.—No correction made for storage in pond or for evaporation from its surface.

GREENWOOD LAKE AT THE GLENS, N. J.

LOCATION.—On Erie Railroad bridge, 100 feet above dam at The Glens, Passaic County.

DRAINAGE AREA.—27.1 square miles.

RECORDS AVAILABLE.—June 1, 1898, to November 16, 1903, and June 1, 1907, to September 30, 1923.

GAGE.—Vertical staff gage on trestle of railroad bridge; read to half-tenths once daily by A. Pepitone.

CONTROL.—A masonry dam with two wooden sluice gates. Average elevation of spillway crest at gage height 100.0 feet.

EXTREMES OF STAGE.—Maximum stage recorded during year, 101.00 feet several days in March; minimum stage recorded, 97.1 feet September 30.

1898–1903; 1907–1923: Maximum stage recorded, 102.37 feet several days in March, 1902 (also gage height was reported as "2 feet over stage"—approximately 104.0 feet October 9–14, 1903); minimum stage recorded, 93.25 feet several days in November, 1900.

REGULATION.—Greenwood Lake dam was constructed to provide a storage reservoir for water supply of Morris Canal. Sluice gates are operated to augment dry-weather flow of Wanaque River.

COOPERATION.—Records furnished by John H. Cook, hydraulic engineer of the Society for Establishing Useful Manufactures, Paterson, N. J., and the Morris Canal & Banking Co.

Daily gage height, in feet, of Greenwood Lake at The Glens, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	99.75	98.9	98.2	98.2	100.0	100.4	100.8	100.4	100.15	99.9	99.25	98.0
2	99.65	98.9	98.2	98.2	100.0	100.45	100.8	100.4	100.1	99.9	99.2	97.9
3	99.65	98.9	98.2	98.2	100.0	100.7	100.7	100.4	100.1	99.8	99.15	97.8
4	99.6	98.8	98.2	98.2	100.0	100.7	100.7	100.35	100.15	99.8	99.15	97.8
5	99.6	98.8	98.1	98.4	100.0	100.7	100.7	100.35	100.2	99.8	99.05	97.75
6	99.55	98.7	98.1	98.5	100.1	100.7	100.6	100.3	100.3	99.8	99.05	97.7
7	99.5	98.7	98.1	98.6	100.1	100.65	100.6	100.3	100.35	99.8	99.0	97.7
8	99.5	98.7	98.1	98.6	100.1	100.6	100.5	100.3	100.35	99.7	99.0	97.7
9	99.5	98.6	98.1	98.8	100.1	100.6	100.5	100.3	100.35	99.65	98.95	97.7
10	99.5	98.6	98.1	98.8	100.2	100.6	100.5	100.3	100.35	99.65	98.9	97.7
11	99.5	98.6	98.05	98.8	100.2	100.6	100.45	100.3	100.3	99.65	98.9	97.7
12	99.45	98.5	98.05	99.0	100.2	100.6	100.45	100.3	100.25	99.65	98.85	97.6
13	99.45	98.5	98.05	99.0	100.2	100.6	100.4	100.3	100.2	99.6	98.8	97.6
14	99.4	98.5	98.0	99.3	100.2	100.6	100.4	100.3	100.2	99.6	98.7	97.5
15	99.35	98.5	98.0	99.3	100.25	100.6	100.3	100.3	100.2	99.7	98.7	97.5
16	99.3	98.45	98.0	99.3	100.3	100.6	100.3	100.3	100.15	99.7	98.65	97.4
17	99.3	98.45	98.0	99.3	100.3	100.6	100.25	100.3	100.15	99.7	98.6	97.3
18	99.25	98.45	98.0	99.4	100.3	100.7	100.25	100.3	100.15	99.65	98.6	97.3
19	99.2	98.45	98.05	99.4	100.3	101.0	100.25	100.3	100.1	99.6	98.6	97.25
20	99.2	98.4	98.05	99.4	100.3	101.0	100.25	100.3	100.1	99.6	98.55	97.25
21	99.15	98.4	98.1	99.45	100.3	101.0	100.2	100.3	100.05	99.55	98.5	97.2
22	99.1	98.4	98.1	99.5	100.35	101.0	100.2	100.4	100.05	99.5	98.45	97.2
23	99.1	98.4	98.15	99.5	100.35	100.95	100.2	100.4	100.05	99.5	98.4	97.25
24	99.05	98.35	98.15	99.6	100.4	100.9	100.2	100.35	100.0	99.45	98.35	97.3
25	99.05	98.35	98.15	99.6	100.4	100.9	100.2	100.35	100.0	99.4	98.3	97.3
26	99.0	98.3	98.2	99.7	100.4	100.9	100.15	100.3	99.9	99.4	98.2	97.25
27	99.0	98.3	98.2	99.7	100.4	100.8	100.15	100.3	99.9	99.4	98.1	97.2
28	98.95	98.25	98.2	99.7	100.4	100.8	100.1	100.3	99.9	99.3	98.05	97.15
29	98.95	98.2	98.2	99.8	-------	100.8	100.3	100.25	99.9	99.3	98.0	97.15
30	98.9	98.2	98.2	99.9	-------	100.8	100.4	100.25	99.9	99.3	98.0	97.1
31	98.9	-------	98.2	99.9	-------	100.8	-------	100.2	-------	99.25	98.0	-------

WANAQUE RIVER AT GREENWOOD LAKE, N. J.

LOCATION.—Just below dam at outlet of Greenwood Lake, at The Glens, Passaic County.

DRAINAGE AREA.—27 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 13, 1919, to September 30, 1923.

GAGE.—Vertical staff on left bank 600 feet below dam. Read by an employee of the North Jersey District Water Supply Commission.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Coarse gravel and boulders. Control is riffle of small boulders 200 feet below gage, probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.54 feet at 4 p. m. March 18 (discharge, 248 second-feet).

1919–1923: Maximum stage recorded, 3.3 feet at 5 p. m. March 14, 1920 (discharge, about 440 second-feet); minimum stage occurs whenever the gates at Greenwood Lake are closed and no water is passing over spillway.

ICE.—Stage-discharge relation probably not affected by ice.

REGULATION.—Flow regulated by operation of sluice gates at outlet of lake, which is a storage reservoir of Morris Canal.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 5 and 200 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying rating table to mean daily gage height. Records good.

COOPERATION.—Gage heights observed under direction of the North Jersey District Water Supply Commission, and furnished by that commission for publication.

Discharge measurements of Wanaque River at Greenwood Lake, N. J., during the year ending Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Feb. 12	0.53	15.8	Aug. 3	0.35	10.8	Aug. 4	0.95	39.7
Aug. 3	.50	15.8	4	.69	24.8	4	.33	9.6
3	.23	6.9	4	.95	40.7			

Daily discharge, in second-feet, of Wanaque River at Greenwood Lake, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar	Apr.	May	June	July	Aug.	Sept.
1	30	26	26	16	17	17	86	58	24	14	25	31
2	29	26	26	16	18	17	76	58	23	14	25	31
3	29	26	26	16	18	18	72	54	25	14	25	31
4	29	26	26	16	18	18	67	50	30	14	26	31
5	29	26	26	16	18	43	72	46	32	14	29	39
6	29	26	26	16	18	92	102	46	34	14	28	46
7	29	26	26	16	18	142	102	42	46	14	28	46
8	29	26	26	16	18	142	92	37	54	14	28	46
9	29	26	26	16	18	127	86	34	54	20	28	46
10	29	26	26	16	18	114	81	34	50	26	27	46
11	29	26	26	16	18	108	76	34	43	25	27	36
12	29	26	26	16	18	108	72	36	40	23	27	26
13	29	26	26	16	18	108	67	43	36	23	27	31
14	28	26	26	16	18	114	58	41	32	23	27	38
15	28	26	26	16	17	114	50	38	33	23	27	38
16	28	26	20	16	17	120	43	40	29	23	26	38
17	28	26	15	16	17	210	43	46	25	23	26	38
18	28	26	15	16	17	240	41	43	22	23	30	38
19	28	26	15	16	17	240	40	41	21	23	34	38
20	27	26	15	16	17	220	38	39	20	22	41	38
21	27	26	15	16	17	201	36	46	18	22	50	38
22	27	26	15	17	17	192	35	50	17	22	50	38
23	27	26	15	17	17	192	32	46	16	22	50	38
24	26	26	15	17	17	192	30	46	16	22	50	38
25	26	26	15	17	17	174	27	43	16	22	50	38
26	26	26	15	17	17	174	25	41	16	23	46	38
27	26	26	15	17	17	158	23	40	16	25	46	38
28	26	26	15	17	17	134	21	36	16	25	46	38
29	26	26	15	17	-------	114	43	33	15	25	46	38
30	26	26	15	17	-------	102	58	30	14	25	39	38
31	26	-------	16	17	-------	92	-------	26	-------	25	31	-------

Monthly discharge of Wanaque River at Greenwood Lake, N. J., for the year ending Sept. 30, 1923

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October	30	26	27.8	May	58	26	41.8
November	26	26	26.0	June	54	14	27.8
December	26	15	20.5	July	26	14	20.9
January	17	16	16.3	August	50	25	34.4
February	18	17	17.5	September	46	31	37.7
March	240	17	131				
April	102	21	56.5	The year	240	14	38.4

WANAQUE RIVER AT WANAQUE, N. J.

LOCATION.—100 feet below Erie Railroad bridge and 400 feet below highway bridge in Wanaque, Passaic County.

DRAINAGE AREA.—91 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 16, 1903, to December 31, 1905; May 1, 1912, to May 1, 1915; and May 13, 1919, to September 30, 1923.

GAGE.—Gurley seven-day water-stage recorder on left bank, 100 feet below railroad bridge, in operation since April 2, 1922. Operated by an engineer of the North Jersey District Water Supply Commission. Vertical staff gage on left bank 100 feet above railroad bridge May 1, 1912, to April 1, 1922. Chain gage on upstream side of highway bridge 300 feet above railroad bridge, used 1903 to 1905. Each gage at different datum.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading 150 feet below water-stage recorder.

CHANNEL AND CONTROL.—Sand and fine gravel. Control is gravel riffle 50 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 4.17 feet at 3 a. m. March 17 (discharge, 1,220 second-feet); minimum stage recorded, 0.58 foot December 20 (discharge, 26 second-feet).

1903–1905, 1912–1915, 1919–1923: Maximum stage recorded, 8.35 feet July 22 or 23, 1919, determined by level from high-water marks (discharge, about 2,100 second-feet); minimum discharge, 16 second-feet several days in August, 1921.

REGULATION.—Flow regulated by operation of sluice gates at Greenwood Lake, 11 miles upstream. See record of Wanaque River at Greenwood Lake, N. J., for effect of this regulation.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Station maintained and gage heights furnished by North Jersey District Water Supply Commission.

Discharge measurements of Wanaque River at Wanaque, N. J., during the year ending Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 5	0.67	33.4	Mar. 21	2.43	517	Apr. 2	1.50	223
Mar. 7	1.96	388	21	2.46	555	Sept. 13	.66	33.2
8	2.05	414	29	1.89	362			
20	2.75	671	31	1.68	278			

Daily discharge, in second-feet, of Wanaque River at Wanaque, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	39	45	60	200	116	66	240	290	74	34	38	40
2	44	46	50	440	126	72	223	240	68	33	38	39
3	45	48	50	223	129	87	223	208	68	33	37	39
4	45	49	40	180	120	250	223	192	87	34	33	39
5	45	49	40	140	102	440	256	174	105	37	38	40
6	45	50	46	122	83	470	440	168	89	34	39	54
7	48	52	33	100	94	420	344	154	192	32	38	55
8	72	54	49	83	96	400	308	137	223	31	38	75
9	70	54	49	109	96	344	290	142	171	29	37	105
10	77	55	40	105	91	273	256	180	132	38	35	64
11	81	56	30	91	90	256	223	148	109	49	34	60
12	63	58	49	91	90	325	208	142	88	40	35	40
13	58	58	44	91	87	400	192	192	87	38	37	35
14	49	60	32	90	96	440	186	159	79	37	35	44
15	42	62	42	96	112	362	162	140	89	42	34	45
16	42	63	33	83	79	560	151	145	79	40	33	45
17	42	64	36	74	72	1,090	137	192	68	37	33	45
18	42	64	40	66	70	830	124	159	62	34	32	45
19	41	66	32	81	74	795	119	140	54	34	41	45
20	41	72	26	77	68	655	112	129	50	34	46	45
21	41	74	37	200	72	590	105	192	46	33	55	64
22	41	74	32	400	70	590	88	208	44	32	63	58
23	41	74	30	290	66	760	94	162	40	32	62	66
24	41	74	30	192	52	955	87	145	38	31	60	89
25	41	72	30	240	50	690	81	132	35	34	58	62
26	42	66	34	174	62	560	77	119	42	33	56	55
27	41	63	35	156	64	470	74	109	64	34	56	54
28	42	70	83	140	68	440	72	88	44	37	58	50
29	42	70	54	122	-------	344	655	94	41	40	68	49
30	44	70	44	107	-------	325	400	85	38	39	62	48
31	44	-------	40	96	-------	290	-------	77	-------	38	44	-------

NOTE.—Daily discharge estimated because of no gage-height record; Dec. 1-5, 10, 17, 24, 25, 31, June 1, 7, 14, 21, 28, Feb. 4, 11, 12, 18, 22, 25, and Mar. 4.

Monthly discharge of Wanaque River at Wanaque, N. J., for the year ending Sept. 30, 1923

[Drainage area, 91 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	81	39	48.1	0.529	0.61
November	74	45	61.1	.671	.75
December	83	26	41.0	.451	.52
January	440	66	150	1.65	1.90
February	129	50	85.5	.940	.98
March	1,090	66	469	5.15	5.94
April	655	72	205	2.25	2.51
May	290	77	156	1.71	1.97
June	223	35	80.2	.881	.98
July	49	29	35.6	.391	.45
August	68	32	44.3	.487	.56
September	105	35	53.1	.584	.65
The year	1,090	26	120	1.32	17.82

PEQUANNOCK RIVER AT MACOPIN INTAKE DAM, N. J.

LOCATION.—At Macopin intake dam of Newark waterworks, 3 miles above Butler, Morris County.

DRAINAGE AREA.—63.7 square miles (measured on topographic map). In September, 1911, a small brook was permanently diverted into the Pequannock basin, increasing the drainage area from 62.7 square miles to 63.7 square miles.

RECORDS AVAILABLE.—January 1, 1892, to September 30, 1923.

GAGE.—Head on spillway at dam indicated by water-stage recorder in gate house. Water diverted measured by Venturi meter. Elevation of water surface in various storage reservoirs indicated by staff gage. All gages read by employees of Newark Water Department.

DETERMINATION OF DISCHARGE.—Rating for spillway of intake dam determined by constructing weir at head of pond and making a series of simultaneous observations of head on the weir and dam. Discharge determined in millions of gallons per week. In converting discharge to monthly units, the division of overlapping weeks was made after a graphic comparison with the temperature and precipitation records.

DIVERSIONS.—Water diverted from the stream at intake dam only and is measured by Venturi meter. Diversion included in the records. No correction made for evaporation from reservoirs.

REGULATION.—Flow above dam regulated by several reservoirs. These records corrected for such regulation.

COOPERATION.—Monthly discharge computed from records furnished by Morris R. Sherrerd, consulting engineer to city of Newark.

Monthly discharge of Pequannock River at Macopin intake dam, N. J., for the year ending Sept. 30, 1923

[Drainage area, 63.7 square miles]

Month	Discharge in second-feet		Run-off in inches	Month	Discharge of second-feet		Run-off in inches
	Mean	Per square mile			Mean	Per square mile	
October	22.4	0.352	0.41	May	92.8	1.46	1.68
November	23.8	.374	.42	June	50.4	.791	.88
December	23.6	.370	.43	July	10.3	.162	.19
January	156	2.45	2.82	August	9.66	.152	.18
February	65.7	1.03	1.07	September	18.5	.290	.32
March	311	4.88	5.63				
April	149	2.34	2.61	The year	78.0	1.22	16.64

ELIZABETH RIVER BASIN

ELIZABETH RIVER AT ELIZABETH, N. J.

LOCATION.—Just above Westfield Avenue Bridge in Elizabeth, Union County, and 2½ miles above mouth.

DRAINAGE AREA.—20 square miles (measured on topographic map).

RECORDS AVAILABLE—October 5, 1921, to September 30, 1923.

GAGE.—Automatic water-stage recorder installed May 18, 1923, on left bank about 10 feet above dam. Prior to this the hook gage in a stilling well on left wing wall of dam, 75 feet above Westfield Avenue Bridge. Gage read and recorder inspected by L. Gallagher.

DISCHARGE MEASUREMENTS.—Made by wading just below bridge.

CONTROL.—Concrete dam, with crest 48.5 feet long, at elevation 5.00 feet, referred to datum of gage. There is a sluice gate 24 inches in diameter the invert of which is at elevation 0.3 foot gage datum.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.94 feet at 4.15 p. m. March 16 and 5.20 p. m. March 23 (discharge, 396 second-feet).

1921–1923: Maximum stage recorded that of March 23, 1923; no flow during part of each year.

DIVERSIONS.—The Elizabethtown Water Co. diverts water from Elizabeth River above this point, at the Ursina Lake pumping station and through wells at its Hummock pumping station.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined up to 80 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except during period when sluice gate was opened, May 17 to July 3, when records were fair.

Discharge measurements of Elizabeth River at Elizabeth, N. J., during the year ending Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 15	5.057	1.46	May 2	4.25	[a]28.0	May 2	1.11	[a]6.18
Jan. 12	5.123	4.98	2	3.70	[a]25.6	June 30	.845	[a]1.35
26	5.284	18.7	2	2.96	[a]22.0	July 16	5.08	[b]3.59
26	5.268	17.4	2	1.88	[a]15.2	17	5.008	.08
Apr. 18	5.183	9.91	2	1.14	[a]7.41	Aug. 17	4.68	[b].004

[a] Sluice gate open.

[b] Leakage through sluice gate.

Daily discharge, in second-feet, of Elizabeth River at Elizabeth, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5.7	4.4	2.1	224	9.5	24	11	7.9	2.7			
2	5.0	3.8	4.4	119	9.5	29	15	7.1	1.4	0.5		
3	5.0	9.5	3.8	15	38	41	19		15	4.6		
4	5.0	6.4	2.6	5.7	13	36	23		13	13		
5	5.0	5.0	1.6	5.0	10	29	23		2.4	11		
6	5.0	5.0	1.6	6.4	9.5	26	25		2.7	6.7	0.1	
7	15	7.9	2.1	5.7	11	31	19		11	1.0		
8	21	7.1	5.0	3.8	12	19	21		18	1.0		
9	26	5.0	3.8	7.9	12	23	19		3.1	1.7		
10	31	6.4	3.8	9.5	13	16	13	6.0	3.5	1.0		
11	28	5.7	.4	9.5	13	16	11		3.5	1.0		0.1
12	9.5	5.0	2.6	7.9	9.5	13	10		2.4	1.0		
13	5.7	5.7	5.7	8.7	11	110	12		3.6	1.0		
14	5.0	5.0	2.6	7.9	33	28	11		3.1	1.0		
15	5.0	7.1	2.6	9.5	14	21	11		5.1	1.0		
16	3.8	6.4	3.2	10	11	162	11		3.1	20		
17	3.8	5.0	2.6	7.9	13	73	11		4.0			
18	4.4	6.4	2.6	8.7	14	11	11	3.6	3.6			
19	3.2	6.4	2.6	7.9	14	12	7.9	2.4	2.7			
20	5.0	4.4	1.6	7.9	15	23	7.9	6.0	2.7			
21	7.9	5.7	2.6	38	16	21	7.9	23	1.6			27
22	6.4	5.0	2.1	13	10	9.5	7.9	7.2	.5			4.4
23	6.4	5.0	2.1	13	7.9	153	7.9	4.8	.3	22		5.7
24	4.4	2.6	2.6	23	8.7	59	5.0	5.3	.5			3.8
25	3.8	3.8	1.6	44	13	11	6.4	4.8	.5	10		2.6
26	9.5	1.6	2.1	16	11	7.9	5.0	4.0	1.1			3.2
27	7.1	2.1	3.2	13	11	7.9	5.0	5.3	1.6			2.6
28	5.0	3.8	188	10	11	8.7	6.4	3.8	1.9			2.1
29	5.0	1.6	9.5	11		7.9	19	2.9	2.2	2.6	1.6	3.2
30	5.0	2.6	3.8	7.9		9.5	9.5	2.7	1.4	.4	.4	5.0
31	4.4		3.8	10		8.7		4.4				

NOTE.—Mean discharge May 3–17 estimated by comparison with records for near-by streams. Sluice gate opened May 17 to July 3. Leakage through sluice gate estimated 1.0 second-feet July 4 to 16. No flow on days for which no discharge is given.

Monthly discharge of Elizabeth River at Elizabeth, N. J., for the year ending Sept. 30, 1923

[Drainage area, 20 square miles]

Month	Discharge in second-feet					Run-off in inches
	At gage			Plus diversions		
	Maximum	Minimum	Mean	Mean	Per square mile	
October	31	3.2	8.45	18.4	0.920	1.06
November	9.5	1.6	5.05	15.0	.750	.84
December	188	.4	8.99	18.8	.940	1.08
January	224	3.8	22.2	30.0	1.50	1.73
February	38	7.9	13.3	21.4	1.07	1.11
March	162	7.9	33.7	41.4	2.07	2.39
April	25	5.0	12.4	19.5	.975	1.09
May	23	2.4	5.97	14.8	.740	.85
June	18	.3	3.94	14.4	.720	.80
July	22	0	3.24	12.8	.640	.74
August	1.6	0	.07	9.6	.480	.55
September	27	0	1.99	11.2	.560	.62
The year	224	0	9.96	19.0	.950	12.86

RAHWAY RIVER BASIN

RAHWAY RIVER AT RAHWAY, N. J.

LOCATION.—At Church Street Bridge in Rahway, Union County, half a mile above mouth of Robinsons Branch of Rahway River.

DRAINAGE AREA.—41 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 10, 1908, to April 29, 1915, and October 1, 1921, to September 30, 1923.

GAGE.—Vertical staff gage attached to tree on right bank 40 feet below bridge; read W. M. Ritchie.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel is fine gravel; control head of riffle about 300 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.50 feet at 7 a. m. March 17 (discharge, about 613 second-feet); minimum stage recorded, 0.48 foot at 6.30 p. m. September 6 (discharge, 2 second-feet).

1908–1915; 1922–1923: Maximum mean daily gage height, 4.85 feet March 13, 1912, and February 1, 1914; minimum stage, zero December 1, 1912.

ICE.—Stage-discharge-relation not seriously affected by ice.

DIVERSIONS.—Water is diverted from Rahway River above Rahway by Orange Water Co.; South Orange Waterworks (wells); Short Hills Water Co. (wells); Springfield station of Elizabethtown Water Co. (wells); and Rahway Waterworks. The total flow diverted is about 17 second-feet.

ACCURACY.—Stage-discharge relation fairly permanent except for children constructing dam at control. Rating table fairly well defined. Gage read to hundredths twice a day. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Discharge measurements of Rahway River at Rahway, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Dis-	Date	Made by—	Gage height	Dis-
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 15	Otto Lauterhahn	0.72	9.3	June 15	Otto Lauterhahn	0.78	12.4
Feb. 14	do	1.06	55	July 17	do	.57	5.8
Mar. 23	do	1.11	70	Aug. 17	do	.64	9.5
Apr. 18	do	.77	23.1	Sept. 20	O. W. Hartwell	.52	3.3
May 14	do	.75	19.2				

Daily discharge, in second-feet, of Rahway River at Rahway, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4	5	6	233	19	46	31	45	38	6	13	6
2	3	6	6	278	30	61	31	32	15	6	9	6
3	4	21	7	71	61	153	31	27	16	7	10	4
4	4	17	12	55	69	255	34	23	42	26	7	3
5	3	8	16	28	30	233	82	21	23	93	11	4
6	2	9	9	23	14	135	99	20	17	23	18	2
7	10	8	8	20	71	69	76	19	31	25	10	5
8	36	9	8	32	22	76	86	18	72	14	8	4
9	18	10	10	18	19	52	51	20	26	11	8	4
10	23	8	10	22	15	48	39	19	19	8	9	8
11	17	9	7	18	15	42	31	19	20	10	8	5
12	9	10	7	15	16	172	32	18	19	10	10	5
13	9	8	8	16	31	338	31	31	16	8	10	5
14	7	8	6	20	60	313	28	20	14	8	6	5
15	7	10	8	22	88	313	28	16	30	10	6	5
16	8	16	14	18	55	400	26	21	10	61	5	5
17	9	11	26	30	21	533	26	21	15	15	4	5
18	7	10	26	17	15	182	22	21	18	11	4	5
19	6	9	13	9	12	144	21	19	13	8	4	4
20	6	14	7	10	15	126	22	17	10	9	4	3
21	5	15	8	52	13	95	21	31	25	9	4	48
22	5	8	10	325	15	78	22	27	13	13	5	39
23	7	6	8	233	18	71	18	19	10	28	5	28
24	22	6	9	118	14	182	17	16	10	15	5	20
25	16	6	8	144	15	79	17	15	7	28	5	11
26	8	7	7	81	15	63	19	13	9	15	5	6
27	6	6	7	38	22	57	17	13	21	11	5	6
28	6	7	107	35	51	48	23	21	9	11	6	6
29	6	7	111	38	-------	43	233	19	6	13	26	4
30	11	7	35	26	-------	39	101	17	7	10	10	3
31	8	-------	13	14	-------	52	-------	12	-------	11	6	-------

Monthly discharge of Rahway River at Rahway, N. J., for the year ending Sept. 30, 1923

[Drainage area, 41 square miles]

Month	Discharge in second-feet					Run-off in inches
	At gage			Plus diversions		
	Maximum	Minimum	Mean	Mean	Per square mile	
October	36	2	9.4	25.2	0.615	0.71
November	21	5	9.4	25.2	.615	.69
December	111	6	17.3	33.5	.817	.94
January	325	9	66.4	83.5	2.04	2.35
February	88	12	30.0	48.1	1.17	1.22
March	533	39	145	162	3.95	4.55
April	233	17	43.8	61.4	1.50	1.67
May	45	12	21.0	38.1	.929	1.07
June	72	6	19.4	36.3	.885	.99
July	93	6	17.2	34.2	.834	.96
August	26	4	7.9	25.2	.615	.71
September	48	2	8.8	26.2	.639	.71
The year	533	2	33.1	50.1	1.22	16.57

24175—25†—WSP 561——13

ROBINSONS BRANCH OF RAHWAY RIVER AT GOODMANS, N. J.

LOCATION.—At Lehigh Valley Railroad station in Goodmans, Union County, 2¾ miles above dam and pumping station of Middlesex Water Co. near Rahway, and 4½ miles above mouth of stream.

DRAINAGE AREA.—12.7 square miles (measured on topographic map).

RECORDS AVAILABLE.—October 27, 1921, to September 30, 1923 (fragmentary).

GAGE.—Vertical staff attached to tree on right bank 100 feet below highway bridge at Goodmans station; read by A. N. Robblee.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel fine gravel. Banks high. Control is riffle of rocks probably artificial, 50 feet below gage, and is drowned out by backwater from reservoir at medium and high stages when reservoir is full.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.25 feet at 7.30 a. m. March 17 (discharge, not determined); minimum discharge, about 0.5 second-foot all day September 20.

REGULATION.—Swamp just above station gives natural storage.

ACCURACY.—Stage-discharge relation affected by backwater from reservoir at medium and high stages and by variable accumulation of small débris. Rating curve well defined to 10 second-feet. Daily gage height subject to variable corrections because of débris on control. Daily discharge ascertained by applying mean daily gage height to rating table, except as noted in footnote to table of daily discharge. Records fair.

Discharge measurements of Robinsons Branch of Rahway River at Goodmans, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct 6	Otto Lauterhahn	0.26	1.3	Apr. 18	Otto Lauterhahn	0.34	4.6
Dec. 15	do	.38	3.9	May 14	do	.38	5.6
15	do	.36	3.6	June 15	do	.24	2.1
Feb 14	do	1.29	39.2	July 17	do	.27	2.7
14	do	1.33	40.1	Aug. 17	do	.14	.8
Mar. 23	do	.63	15.6	Sept. 30	O. W. Hartwell	[a].28	.5

[a] Control obstructed by leaves.

Daily discharge, in second-feet, of Robinsons Branch of Rahway River at Goodmans, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1.6	2.8	3.1	120	8.0	18	5.7	11	1.9	1.5	2.0	1.4
2	1.5	4.0	3.1	44	12	20	5.0	6.4	1.9	1.4	1.8	
3	1.4	8.0	2.8	20	16	30	6.4	5.0	1.9	2.0	1.6	
4	1.3	6.8	3.1	16	15	65	10	4.0	2.6	1.9	1.5	
5	1.4	5.3	16	14	12	65	36	3.3	2.0	6.4	1.4	
6	1.3	5.3	9.2	13	8.8	34	52	2.9	1.9	2.0	1.4	
7	1.4	4.6	5.0	13	6.4	28	20	2.9	17	1.8	1.4	
8	6.4	4.6	8.0	9.2	5.7	17	14	2.6	63	1.6	1.4	
9	3.8	3.6	10	9.6	5.7	12	14	2.9	12	1.5	1.4	
10	7.2	3.6	8.0	14	7.2	13	10	2.9	3.3	1.4	1.3	
11	5.3	3.3	4.3	14	7.6	24	8.0	2.6	2.3	1.7	1.3	1.0
12	3.8	3.3	8.0	10	7.2	50	6.8	2.6	2.0	1.6	1.2	
13	3.3	3.1	5.7	8.8	12	70	6.0	7.2	1.9	1.5	1.4	
14	2.9	3.1	3.3	6.4	18	75	6.8	5.7	1.8	1.5	1.2	
15	3.1	5.0	4	10	15	45	6.0	3.8	1.9	1.5	1.2	
16	3.3	6.8	4	13	12	80	6.0	3.8	1.8	9.6	1.2	
17	3.3	4.3	8	10	9.2	180	5.3	5.0	1.6	2.3	1.2	
18	2.9	4.0	9	6.4	5.3	70	5.0	3.3	1.6	1.6	1.0	
19	2.9	3.8	6	6.8	4.3	45	4.6	2.9	1.5	1.4	1.0	
20	2.9	3.6	3.8	5.7	3.3	19	4.0	2.6	1.4	1.3	1.0	0.5
21	2.9	3.1	4.0	22	3.3	16	4.0	12	1.4	1.2	.9	10
22	3.1	2.8	4.6	50	3.6	16	2.6	8.0	1.3	2.0	1.1	8
23	3.3	2.8	3.8	25	3.8	16	3.3	4.3	1.4	3.6	1.2	5.0
24	8.8	2.8	4.3	18	3.3	50	3.1	3.3	1.4	2.0	1.1	5.7
25	6.0	2.8	4.3	22	3.3	28	2.9	2.6	1.4	3.1	1.1	3.3
26	4.6	2.6	5.7	18	5.0	16	2.9	2.3	1.4	2.0	1.1	3.1
27	3.8	2.4	5.7	17	14	13	2.9	2.2	1.6	1.4	1.1	2.9
28	3.6	2.8	41	15	18	10	2.9	2.0	1.5	2.4	1.8	2.9
29	3.1	2.9	31	14	-------	9.2	100	2.0	1.6	5.3	1.8	2.6
30	2.8	2.9	16	10	-------	8.0	26	2.0	1.5	2.9	1.6	2.6
31	2.8	------	6.4	8.0	-------	8.0	-------	1.9	-------	2.2	1.4	-------

NOTE.—Because of backwater from reservoir and small débris causing change in control, discharge was determined by indirect method and by comparison with records for other streams on Oct. 1-7, 26-31, Nov. 1 to Dec. 3, Dec. 15-19, Jan. 1-4, 21-27, Feb. 3-5, 13-16, 27, 28, Mar. 1-5, 12-18, 24, Apr. 7 to June 7, and Sept. 2-12. Discharge estimated Sept. 13-19.

Monthly discharge of Robinsons Branch of Rahway River at Goodmans, N. J., for the year ending Sept. 30, 1923

[Drainage area, 12.7 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	8.8	1.3	3.41	0.269	0.31
November	8.0	2.4	3.89	.306	.34
December	41	2.8	8.10	.638	.74
January	120	5.7	18.8	1.48	1.71
February	18	3.3	8.75	.689	.72
March	180	8.0	37.1	2.92	3.37
April	100	2.9	12.8	1.01	1.13
May	12	1.9	4.06	.320	.37
June	63	1.3	4.66	.367	.41
July	9.6	1.2	2.37	.187	.22
August	2.0	.9	1.33	.105	.12
September	10	.5	2.20	.173	19
The year	180	.5	8.99	.708	9.63

RARITAN RIVER BASIN

SOUTH BRANCH OF RARITAN RIVER NEAR HIGH BRIDGE, N. J.

LOCATION.—1 mile above High Bridge, Hunterdon County, and 4 miles above mouth of Spruce Run.

DRAINAGE AREA.—65 square miles (revised measurement on topographic map).

RECORDS AVAILABLE.—February 24, 1919, to September 30, 1923.

GAGE.—Gurley water-stage recorder on left bank just above large pine tree 1 mile above High Bridge; operated by an engineer of the Taylor-Wharton Iron & Steel Co. Prior to September 30, 1921, reference stake 2 inches square driven into bed of stream at same point.

DISCHARGE MEASUREMENTS.—Made by wading near gage for low stages and at highway bridge one-third mile upstream for high stages.

CHANNEL AND CONTROL.—Channel very rough with many boulders. Control is a well-defined riffle of rock and boulders 100 feet below gage; permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 8.82 feet at 5 p. m. January 1 (discharge, 1,510 second-feet); minimum stage, 4.82 feet at 8 p. m. September 14 (discharge, 16 second-feet).

1919–1923: Maximum stage recorded from water-stage recorder, 10.97 feet at 10.30 a. m. February 2, 1922 (discharge, 3,600 second-feet); minimum stage 4.80 feet 6.30 a. m. October 3, 1921 (discharge, 9 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—None immediately above.

REGULATION.—Daily distribution of flow affected by small water powers at points upstream.

ACCURACY.—Stage-discharge relation permanent, except as affected by ice, as noted in footnote to table of daily discharge. Rating curve well defined between 20 and 2,500 second-feet. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by use of discharge integrator except for periods indicated in footnote to table of daily discharge. Records good.

COOPERATION.—Shelter for water-stage recorder erected and instrument operated by Taylor-Wharton Iron & Steel Co.

Discharge measurements of South Branch of Raritan River near High Bridge, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 6	Otto Lauterhahn	[a]6.07	109	Aug. 29	J. W. Bones	5.13	32.9
7	do	[a]6.04	54	29	O. W. Hartwell	5.24	39.1

Daily discharge, in second-feet, of South Branch of Raritan River near High Bridge, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	42	45	46	500		180	143	151	66	39	40	27
2	49	42	49	343		147	153	132	61	44	42	25
3	41	50	39	145		346	153	120	107	43	39	27
4	48	60	45	115		570	182	118	140	55	36	27
5	43	43	63	92		475	370	112	83	106	38	30
6	42	45	64	87		235	437	108	76	55	39	27
7	42	43	48	70		193		105	86	46	38	29
8	55	46	47	83		181		103	294	42	39	32
9	69	46	48	89		156		167	152	41	34	40
10	77	42	54	78		150	250	135	105	44	38	39
11	103	39	51	90		156		108	90	45	34	32
12	69	38	48	70		354		107	79	41	36	30
13	51	45	62	73		411		171	76	40	54	28
14	49	44	100			411	138	123	67	40	38	26
15	50	41	78		90	294	132	108	77	34	38	26
16	50	43	46			690	134	113	69	59	35	23
17	47	47	48			828	121	193	55	48	34	27
18	48	40	57			460	119	121	62	44	30	28
19	44	39	74			430	118	103	56	38	27	29
20	47	42	65			307	115	89	53	39	25	25
21	41	42	45			292	104	203	54	35	30	86
22	39	38	65	75		308	100	150	55	34	30	46
23	47	41	63			339	105	114	49	41	29	115
24	52	44	41			373	94	95	48	33	30	77
25	46	39	45			268	95	93	54	61	28	44
26	44	36	52			239	88	80	46	48	26	37
27	47	38	51			217	89	84	47	39	25	35
28	43	43	190			199	114	81	48	40	30	34
29	37	41	114		-------	170	541	78	44	38	31	33
30	44	36	110		-------	177	200	69	50	41	27	30
31	40	-------	120		-------	167	-------	69	-------	42	28	-------

NOTE.—Stage-discharge relation affected by ice Dec. 20–22, 30, 31, Jan. 1, and Jan. 14 to Mar. 1; discharge estimated from study of weather records and two discharge measurements. Discharge for Apr. 7–13 estimated by comparison with South Branch of Raritan River at Stanton, N. J.

Monthly discharge of South Branch of Raritan River near High Bridge, N. J., for the year ending Sept. 30, 1923

[Drainage area, 65 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	103	37	49.9	0.768	0.89
November	60	36	42.6	.655	.73
December	190	39	65.4	1.01	1.16
January	-------	-------	103	1.58	1.82
February	-------	-------	90	1.38	1.44
March	828	147	314	4.83	5.57
April	541	88	186	2.86	3.19
May	203	69	116	1.78	2.05
June	294	44	78.3	1.20	1.34
July	106	33	45.0	.692	.80
August	54	25	33.8	.520	.60
September	115	23	37.1	.571	.64
The year	828	23	96.9	1.49	20.23

NOTE.—Mean discharge for February estimated by comparison with records for near-by streams

SOUTH BRANCH OF RARITAN RIVER AT STANTON, N. J.

LOCATION.—At highway bridge near Lehigh Valley Railroad station in Stanton, Hunterdon County, half a mile above mouth of Prescott Brook and 5 miles below mouth of Cakepoulin Creek.

DRAINAGE AREA.—147 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 2, 1903, to December 31, 1906; and from July 1, 1919, to September 30, 1923.

GAGE.—Chain gage on downsteam side of bridge near left end; read by E. H. Smith.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed and banks, gravel. Banks are overflowed at high stages. Control is slight riffle about 100 feet below bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.00 feet at 5.30 p. m. March 16 (discharge, 2,890 second-feet). A stage of 7.90 feet was reached on January 22, but stage-discharge relation was affected by ice. Discharge was probably higher on March 16. Minimum stage recorded, 1.90 feet several times in July, August, and September (discharge, 27 second-feet).

1903–1906 and 1919–1923: Maximum stage recorded, 10.5 feet October 9 1903 (discharge, not determined); minimum stage recorded, 1.85 feet at 5 p. m. September 16, 1921 (discharge, about 24 second-feet).

ICE.—Stage-discharge relation affected by ice during winter.

REGULATION.—Distribution of flow slightly affected by small water powers at points upstream.

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined between 35 and 1,200 second-feet. Gage read to even hundredths twice a day. Daily discharge ascertained by applying to rating table mean daily gage height. Records good, except during period given in footnote to table of daily discharge.

Discharge measurements of South Branch of Raritan River at Stanton, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 7	Otto Lauterhahn	[a] 4.06	191	Mar. 16	Otto Lauterhahn	6.43	2,430
Mar. 16	do	[b] 3.72	571	Aug. 29	J. W. Bones	2.14	57

[a] Stage-discharge relation affected by ice.
[b] Only one wooden trestle in stream about 10 feet from right shore.

Daily discharge, in second-feet, of South Branch of Raritan River at Stanton, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	55	78	67	970		500	239	267	87	41	51	
2	60	73	73	470		600	263	251	100	47	54	
3	64	83	68	271		1,200	243	224	82	54	43	
4	51	96	121	201		1,030	292	255	224	55	61	
5	89	89	93	174		1,030	595	187	124	209	50	
6	70	70	71	116		595	1,090	163	137	80	43	
7	73	60	102	143		422	545	187	292	53	40	
8	85	78	87	137		312	398	160	231	51	41	
9	85	73	78	194		267	398	263	209	45	40	
10	108	52	65	170		271	812	224	160	43	36	
11	143	82	96	184		271	271	167	106	98	34	
12	143	50	60	157		1,350	271	180	95	71	33	
13	82	78	131			970	251	259	90	41	106	
14	60	98	111		190	860	224	180	90	41	60	
15	60	111	75			722	243	157	126	33	38	50
16	68	73	114			2,890	224	154	68	36	38	
17	87	73	70			1,630	227	200	68	52	33	
18	89	60	104			860	187	255	68	41	35	
19	78	60	121			695	209	191	80	31		
20	98	82	104			570	167	146	57	31		
21	65	93	98	180		620	187	167	75	35	35	
22	60	60	118			545	170	259	60	33		
23	62	70	116			570	151	148	71	39		
24	118	76	111			670	131	143	57	78		
25	85	67	121			445	151	137	71	93		
26	89	41	111			422	146	126	68	50	29	
27	82	40	131		260	376	126	121	60	51	43	
28	62	42	292		400	312	131	98	53	48	43	
29	45	60	194		-------	231	1,030	91	41	50	50	
30	71	50	148		-------	333	398	91	43	68	85	
31	93	-------	160		-------	271	-------	96	-------	50	62	-------

NOTE.—Stage-discharge relation affected by ice Jan. 18 to Feb. 26. Mean discharge estimated from one discharge measurement, study of weather records, and comparison with records for South Branch of Raritan River at High Bridge. Daily discharge estimated by comparison with records for near-by streams for Apr. 22, May 17, June 10, 12, 13, 14, Aug. 5, 19–25, and Sept. 1–30.

Monthly discharge of South Branch of Raritan River at Stanton, N. J., for the year ending Sept. 30, 1923

[Drainage area, 147 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	143	45	80.0	0.544	0.63
November	111	40	70.6	.480	.54
December	292	60	110	.746	.86
January	----------	116	213	1.45	1.67
February	----------	----------	200	1.36	1.42
March	2,890	231	705	4.80	5.53
April	1,090	126	309	2.10	2.34
May	267	91	179	1.22	1.41
June	292	41	103	.701	.78
July	209	31	56.4	.384	.44
August	106	29	44.9	.205	.35
September	----------	----------	50.0	.340	.38
The year	2,890	29	177	1.20	16.35

RARITAN RIVER AT MANVILLE, N. J.

LOCATION.—At highway bridge between Manville and Finderne, Somerset County, 1¼ miles above mouth of Millstone River and 4½ miles below confluence of North and South branches of Raritan River.

DRAINAGE AREA.—490 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 27, 1903, to March 31, 1907; August 10, 1908, to April 30, 1915; and from August 19, 1921, to September 30, 1923.

GAGE.—Gurley seven-day water-stage recorder installed August 15, 1923, on left bank 5 feet downstream from bridge. Prior to 1923 chain gage fastened to downstream side of bridge at same datum was used. Recorder operated by William B. Patten.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Red sandstone on left side; sand and gravel on right side, fairly permanent, affected by vegetal growth during summer. Banks are overflowed at very high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, 13.5 feet at midnight, March 16, estimated from hydrograph (discharge, about 17,200 second-feet), minimum stage from water-stage recorder, 3.24 feet at 9. p. m. September 19 (discharge, 36 second-feet).

1903–1907; 1921–1923; Maximum stage recorded, 15.9 feet October 10, 1903 (discharge, estimated 25,000 second-feet), minimum stage, that of September 19, 1923.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—The Johns-Manville Co. diverts about 2 second-feet from the Raritan at a point about one-fourth mile above gage.

REGULATION.—Distribution of flow affected by water powers at Somerville and other points upstream.

ACCURACY.—Stage-discharge relation not permanent; affected by grass in channel during summer and by ice during winter. Daily discharge estimated by applying rating table to mean daily gage height. Variable correction applied to mean daily gage height on account of grass and ice. Records fair.

Discharge measurements of Raritan River at Manville, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 11	Otto Lauterhahn	[a] 3.66	131	June 15	Otto Lauterhahn	[a] 3.84	233
Jan. 13	do	[b] 4.34	308	July 14	do	[a] 3.67	110
Feb. 8	do	[b] 4.59	350	Aug. 15	do	[a] 3.66	92
Apr. 4	O. W. Hartwell	4.44	766	Sept. 19	O. W. Hartwell	[a] 3.38	54
May 17	do	4.31	553				

[a] Stage-discharge relation affected by weeds. [b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Raritan River at Manville, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	144	139	147	3,280	456	700	703	960	245	127	97	103
2	167	139	150	2,960	472	1,080	600	860	233	103	105	91
3	150	119	153	960	321	2,760	580	860	225	95	103	69
4	144	167	150	789	703	3,280	481	681	515	210	99	73
5	134	164	185	600		2,800	860	560	359	352	114	73
6	134	164	241	498		2,660	1,730	551	274	241	101	68
7	139	144	210			1,640	1,240	481	284	127	62	69
8	147	142	217			1,180	1,180	456	671	119	68	95
9	161	142	206		350	860	960	424	560	119	61	346
10	179	134	210	310		725	800	570	289	87	73	144
11	189	142	210			789	756	456	294	144	66	112
12	199	139	206			4,220	714	472	279	142	62	105
13	170	114	147		560	3,360	660	630	250	112	82	71
14	155	114	213		1,080	3,710	620	570	229	97	114	74
15	147	139	199			1,860	570	432	221	117	89	84
16	153	134	264			4,110	551	472	221	139	87	73
17	150	139	229			11,100	515	590	217	122	74	46
18	147	142	310	240		3,020	515	464	206	107	64	68
19	132	139	279			2,760	489	464	167	93	78	66
20	129	117	352			1,600	489	472	164	99	114	66
21	132	137	203		340	1,540	448	600	155	99	76	714
22	127	139	274	3,140		910	472	789	134	71	78	333
23	132	122	206	2,760		1,660	402	489	155	203	82	279
24	142	122	206	1,020		2,960	359	424	156	105	76	506
25	144	144	210	1,420		1,300	340	409	153	114	82	229
26	137	142	196	1,080		1,240	340	346	132	122	82	158
27	134	114	199	800		1,130	359	294	132	112	61	134
28	134	161	456			1,130	333	315	144	99	134	127
29	142	137	725	590	-------	1,130	5,840	299	132	237	170	122
30	139	142	340		-------	800	1,660	310	119	179	132	107
31	132	-------	498		-------	800	-------	269	-------	105	114	-------

NOTE.—Stage-discharge relation affected by ice Jan. 7–21, 28–31, Feb. 5–12, 15–28. Mean discharge estimated from discharge measurements, study of weather record, and comparison with records of other stations in the basin. Discharge Mar. 1 estimated.

Monthly discharge of Raritan River at Manville, N. J., for the year ending Sept. 30, 1923

[Drainage area, 490 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	199	127	147	0.300	0.35
November	167	114	138	.282	.31
December	725	147	251	.512	.59
January	3,280	240	831	1.70	1.96
February	1,080	321	398	.812	.85
March	11,100	700	2,220	4.53	5.22
April	5,840	333	852	1.74	1.94
May	960	269	515	1.05	1.21
June	671	119	244	.498	.56
July	352	71	132	.269	.31
August	170	61	90.3	.184	.21
September	714	46	153	.312	.35
The year	11,100	46	500	1.02	13.86

24175—25†—WSP 561——14

NORTH BRANCH OF RARITAN RIVER NEAR FAR HILLS, N. J.

LOCATION.—At dam of Somerset Lake & Game Club, 2 miles north of Far Hills, Somerset County, and 2 miles above mouth of Peapack Brook.

DRAINAGE AREA.—26 square miles (measured on topographic map).

RECORDS AVAILABLE.—February 15, 1922, to September 30, 1923.

GAGE.—Hook gage in stilling box at left end of dam; read by C. H. Meyers.

DISCHARGE MEASUREMENTS.—Made by wading 200 feet below dam.

CONTROL.—Masonry dam with flat crest having low-water notch 26 feet long with crest at elevation of gage height 1.696 feet. Remainder of spillway 137 feet long with crest at elevation of gage height 2.204 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.47 feet at 6.30 p. m. March 16 (discharge, about 750 second-feet); minimum stage recorded 1.79 feet at 9.30 a. m. August 27 (discharge, 4 second-feet).

DIVERSIONS.—Small turbine takes water from the pond above dam for operation of a pump. This turbine is operating continuously and uses about 2 second-feet. This diversion is included in the following tables of daily and monthly discharge.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined up to 150 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of North Branch of Raritan River near Far Hills, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 7	Otto Lauterhahn	[2] 2.032	15.7	Aug. 16	Otto Lauterhahn	1.818	3.2
Nov. 15	do	1.985	11.6	16	do	1.818	3.4
15	do	1.984	11.5	31	J. W. Bones	1.866	5.0
Mar. 14	O. W. Hartwell	2.487	125				

Discharge measurements of tailrace on North Branch of Raritan River near Far Hills, N. J., during the year ending Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Discharge
	Sec.-ft.
Nov. 15	1.93
Aug. 16	1.78

Daily discharge, in second-feet, of North Branch of Raritan River near Far Hills, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun	July	Aug.	Sept.
1	17	15	12	403	28	32	41	56	19	12	12	7
2	17	10	12	63	30	43	56	49	19	11	11	7
3	17	12	12	41	34	201	56	45	26	15	11	6
4	17	25	12	36	28	237	63	45	38	30	10	6
5	17	16	30	34	30	145	150	43	25	16	11	6
6	17	16	19	28	19	70	156	38	21	15	10	6
7	18	17	15	25	27	70	124	38	84	14	10	5
8	23	16	15	22	22	43	84	38	94	12	10	17
9	23	15	22	27	25	56	70	41	34	11	9	27
10	28	12	15	26	25	63	66	38	27	11	8	11
11	27	13	15	23	23	63	63	38	22	11	8	8
12	19	14	15	22	22	178	63	40	22	11	8	8
13	17	13	12	16	40	150	49	49	20	10	12	8
14	17	12	11	15	45	167	60	38	20	10	9	7
15	17	14	10	26	24	109	49	34	26	16	7	6
16	17	14	11	23	24	427	47	36	20	27	5	6
17	16	14	23	17	22	276	45	63	19	19	5	6
18	16	12	16	16	19	178	45	34	16	15	5	6
19	15	13	12	22	19	184	43	30	16	11	5	7
20	15	12	9	17	23	140	45	27	16	10	5	7
21	15	13	14	43	23	114	41	47	16	9	5	27
22	15	12	14	167	22	114	40	30	14	10	6	20
23	14	12	14	49	20	124	36	27	13	11	5	22
24	18	12	12	32	20	134	36	27	14	10	5	26
25	17	12	12	45	24	104	36	27	14	23	5	12
26	17	11	15	28	23	104	34	27	15	14	5	11
27	16	11	17	30	28	104	34	23	14	11	5	10
28	16	11	109	29	49	89	38	22	13	11	8	10
29	17	11	27	28	-------	74	237	21	13	14	17	9
30	16	11	23	32	-------	74	70	20	12	12	11	9
31	15	-------	19	30	-------	70	------	19	-------	12	8	------

Monthly discharge of North Branch of Raritan River near Far Hills, N. J., for the year ending Sept. 30, 1923

[Drainage area, 26 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	28	15	17.6	0.677	0.78
November	25	11	13.4	.515	.57
December	109	9	18.5	.712	.82
January	403	15	45.6	1.75	2.02
February	49	19	26.4	1.02	1.06
March	427	32	127	4.88	5.63
April	237	34	65.9	2.53	2.82
May	63	19	35.8	1.38	1.59
June	94	12	24.1	.927	1.03
July	30	9	13.7	.527	.61
August	17	5	8.1	.312	.36
September	27	5	10.8	.415	.46
The year	427	5	34.0	1.31	17.75

NORTH BRANCH OF RARITAN RIVER AT MILLTOWN, N. J.

LOCATION.—At Milltown, Somerset County, 1½ miles above junction of North and South branches of Raritan River.

DRAINAGE AREA.—190 square miles.

RECORDS AVAILABLE.—June 14 to September 30, 1923.

GAGE.—Inclined staff gage on right bank 300 feet above highway bridge at Milltown; read by Joseph Van Fleet.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Channel, clay and fine gravel. Control is remains of foundation of an old dam.

EXTREMES OF DISCHARGE.—Maximum stage during period June 14 to September 30, 2.92 feet at 5 p. m. July 4 (discharge, 356 second-feet); minimum stage, 1.98 feet several times in August and September (discharge, 25 second-feet).

REGULATION.—Probably some slight diurnal fluctuation owing to small water-power plants upstream.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 30 and 1,600 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of North Branch of Raritan River at Milltown, N. J., during the period June 14 to Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
July 7	Otto Lauterhahn	2.26	58	Aug. 31	O. W. Hartwell	2.16	43.4
Aug. 29	J. W. Bones	2.49	124				

Daily discharge, in second-feet, of North Branch of Raritan River at Milltown, N. J., for the period June 14 to Sept. 30, 1923

Day	June	July	Aug.	Sept.	Day	June	July	Aug.	Sept.
1		44	44	37	16	79	190	36	36
2		47	44	40	17	69	63	37	35
3		46	46	37	18	69	50	35	36
4		153	44	34	19	63	44	32	32
5		195	43	34	20	63	42	44	35
6		72	47	34	21	50	44	30	180
7		49	42	33	22	50	40	33	125
8		60	39	44	23	49	56	34	63
9		50	40	170	24	56	44	33	185
10		52	33	69	25	52	85	28	112
11		67	36	50	26	46	69	30	85
12		56	30	50	27	49	44	33	79
13		46	79	52	28	49	46	34	65
14	95	44	43	44	29	50	63	102	60
15	102	44	40	42	30	46	60	79	47
					31		46	52	

Monthly discharge of North Branch of Raritan River at Milltown, N. J., for the period June 14 to Sept. 30, 1923

[Drainage area, 190 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
June 14–30	102	46	61.0	0.321	0.20
July	195	40	64.9	.342	.39
August	102	28	42.6	.224	.26
September	185	32	64.8	.341	.38

BLACK RIVER NEAR POTTERSVILLE, N. J.

LOCATION.—1 mile above highway bridge and former gaging station at Pottersville, Somerset County.

DRAINAGE AREA.—33 square miles (measured on topographic map).

RECORDS AVAILABLE.—November 8, 1921, to September 30, 1923.

GAGE.—Automatic water-stage recorder on right bank 1 mile above bridge at Pottersville; inspected by Theodore Bush. Chain gage on downstream side of highway bridge at Pottersville used November 8, 1921, to June 30, 1922.

DISCHARGE MEASUREMENTS.—Made by wading 100 feet above gage.

CHANNEL AND CONTROL.—Gravel and boulders very rough. Control is riffle of boulders just below gage; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from automatic water-stage recorder 3 feet at 1 p. m. March 16 (discharge, about 450 second-feet); minimum stage from water-stage recorder, 0.83 foot at 2 p. m. August 9 (discharge, 5 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Daily fluctuations caused by operations at small mills upstream.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined up to 120 second-feet. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Black River near Pottersville, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft*			*Feet*	*Sec.-ft.*
Oct. 7	Otto Lauterhahn	1.23	20.6	Mar. 14	J. W. Bones	2.06	112
7	do	1.23	22.7	28	Otto Lauterhahn	1.83	92
Feb. 9	do	*1.68	32.3				

*Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Black River near Pottersville, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	24	22	18	430	30	28	70	102	22	15	15	11
2	22	22	18	230	26	51	69	98	21	14	15	10
3	22	28	18	100	22	126	68	83	28	14	14	10
4	23	26	18	90	30	158	67	69	32	22	14	9.3
5	23	22	28	80	34	136	90	53	29	22	14	9.0
6	22	30	24	69	34	108	110	45	30	19	13	8.6
7	22	29	24	55	34	86	110	40	46	19	13	8.6
8	22	32	24	53	34	81	106	32	58	18	12	22
9	27	27	28	37	32	76	97	45	54	18	11	19
10	34	26	25	31	32	78	85	43	66	17	9.6	21
11	35	25	28	36	32	85	72	42	72	16	10	26
12	37	25	23	32	34	136	69	49	69	15	13	28
13	38	23	20	36	34	158	64	57	53	15	14	26
14	39	19	18	72	34	136	57	50	39	14	12	19
15	39	24	18	60	32	120	54	46	34	26	12	14
16	36	23	20	37	30	210	51	53	27	20	11	13
17	28	22	20	36	28	255	49	69	26	16	11	12
18	29	21	20	34	26	224	48	54	24	15	10	10
19	27	24	17	34	26	210	46	49	22	14	9.6	9.6
20	26	26	14	50	26	170	45	49	19	14	9.3	9.6
21	24	21	15	102	24	147	42	67	18	14	7.3	24
22	22	20	16	122	24	136	41	54	17	13	8.2	22
23	24	19	18	95	22	147	39	48	17	13	8.2	38
24	22	19	17	98	24	147	37	45	17	13	8.6	42
25	24	18	18	66	22	126	35	42	16	22	8.6	35
26	24	18	20	61	18	114	34	36	16	16	8.6	33
27	24	17	23	45	22	102	34	34	17	14	10	29
28	24	17	60	44	28	88	65	30	17	15	11	22
29	24	17	44	43	-------	82	156	26	16	16	12	18
30	24	17	60	40	-------	78	106	24	15	15	12	15
31	22	-------	24	34	-------	72	-------	23	-------	15	11	-------

NOTE.—Stage-discharge relation affected by ice Dec. 13–15, 19–21, Jan. 18–20, Jan. 30 to Feb. 1, Feb. 10 to Mar. 1. Daily discharge determined from one discharge measurement, study of weather records, and comparison with records for near-by streams.

Monthly discharge of Black River near Pottersville, N. J., for the year ending Sept. 30, 1923

[Drainage area, 33 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	39	22	26.9	0.815	0.94
November	32	17	23.0	.697	.78
December	60	14	23.8	.721	.83
January	430	31	75.9	2.30	2.65
February	34	18	25.6	.776	.81
March	255	28	125	3.79	4.37
April	156	34	67.2	2.04	2.28
May	102	23	50.2	1.52	1.75
June	72	15	31.2	.945	1.05
July	26	13	16.4	.497	.57
August	15	7.3	11.2	.339	.39
September	42	8.6	19.1	.579	.65
The year	430	7.3	41.7	1.26	17.07

MILLSTONE RIVER AT BLACKWELLS MILLS, N. J.

LOCATION.—At highway bridge in Blackwells Mills, Somerset County, one-quarter mile below mouth of Middlebrush Brook, 1¾ miles above Millstone, and 5 miles above mouth of Millstone River.

DRAINAGE AREA.—258 square miles (measured on topographic map).

RECORDS AVAILABLE.—August 4, 1921, to September 30, 1923. A station was maintained at Millstone 1¾ miles downstream from June 28, 1903, to December 31, 1904; and from June 7, 1912, to April 30, 1915.

GAGE.—Vertical staff in two sections on downstream side of left bridge abutment; read by Alex Barna.

DISCHARGE MEASUREMENTS.—Made by wading 200 feet downstream from gage or from highway bridge at Millstone.

CHANNEL AND CONTROL.—Channel clay. Banks are overflowed at high stages. Control is foundation of old stone and timber dam 100 feet below gage; not permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.2 feet at 6 a. m. March 17 (discharge, 3,840 second-feet); minimum stage recorded, 0.0 all day September 16 (discharge, about 5 second-feet).

1921-1923: Maximum stage recorded, 8.55 feet August 8, 1921 (discharge, 4,190 second-feet); minimum stage recorded, that of September 16, 1923.

ICE.—Stage-discharge relation probably not affected by ice.

DIVERSIONS.—The Delaware and Raritan Canal takes water from Delaware River and flows northeastward to Raritan River. It passes along right bank of Millstone River for 15 miles above gaging station and for 5 miles below. Canal is above river at all points and loses water to river by leakage, seepage, and by discharge from spillways.

REGULATION.—Carnegie Lake and several small mills above gage slightly affect distribution of flow.

ACCURACY.—Stage-discharge relation not permanent. Base rating tables fairly well defined, variable correction for shifting control determined from periodic discharge measurements. Daily discharge ascertained by applying corrected mean daily gage height to base rating. Records fairly good.

Discharge measurements of Millstone River at Blackwells Mills, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 11	Otto Lauterhahn	1.95	170	May 17	O. W. Hartwell	1.61	197
Feb. 8	do	1.79	197	June 14	Otto Lauterhahn	1.28	94
8	do	1.80	203	July 14	do	.89	56
Mar. 28	do	2.35	507	Aug. 15	do	1.24	103
Apr. 18	O. W. Hartwell	1.98	311	Sept. 19	O. W. Hartwell	.90	76

Daily discharge, in second-feet, of Millstone River at Blackwells Mills, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	70	82	94	1,240	246	662	302	567	138	32	86	86
2	93	94	154	1,680	236	506	306	394	133	32	79	44
3	93	89	123	1,240	314	448	310	322	114	83	64	79
4	96	80	128	727	420	826	318	290	131	86	66	83
5	89	78	203	476	306	760	598	268	106	97	43	89
6	94	118	206	368	394	476	1,020	246	104	88	64	89
7	89	82	194	322	197	420	760	219	114	74	79	91
8	105	100	185	322	194	318	598	212	128	49	71	88
9	116	293	188	290	176	322	567	206	114	79	63	59
10	118	208	138	322	179	368	448	206	106	76	70	97
11	123	168	176	345	162	630	394	185	110	91	66	176
12	105	163	188	322	171	1,430	345	176	108	76	21	232
13	101	138	165	298	420	2,270	318	246	108	73	50	133
14	86	103	203	345	1,020	2,210	318	257	106	70	82	35
15	100	103	162	250	1,380	1,530	420	212	103	37	116	13
16	96	128	182	253	1,850	1,910	420	185	97	88	108	5
17	86	123	191	222	1,430	3,490	345	182	89	68	106	43
18	86	123	243	200	1,020	2,210	310	182	106	72	94	87
19	83	125	226	174	567	1,330	278	168	97	70	29	94
20	82	121	194	149	264	860	264	149	100	68	97	94
21	62	123	200	920	257	662	239	179	91	65	125	212
22	80	101	200	2,210	182	598	239	200	91	24	112	257
23	94	96	182	920	154	970	226	185	76	27	110	286
24	88	116	185	630	91	2,810	206	162	65	65	112	314
25	89	100	160	1,630	154	1,170	194	151	91	77	106	253
26	76	81	232	920	222	727	203	133	100	72	38	250
27	69	75	345	694	662	662	206	128	91	69	21	194
28	68	96	448	506	567	506	182	131	94	65	57	133
29	64	87	394	420	-------	394	2,210	125	97	91	83	103
30	64	92	310	319	-------	394	1,170	112	83	144	86	101
31	82	-------	231	378	-------	368	-------	119	-------	86	87	-------

Monthly discharge of Millstone River at Blackwells Mills, N. J., for the year ending Sept. 30, 1923

[Drainage area, 258 square miles]

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October	123	62	88.6	May	567	112	210
November	293	75	116	June	138	65	103
December	448	94	207	July	144	24	70.8
January	2,210	149	616	August	125	21	77.1
February	1,850	91	473	September	314	5	127
March	3,490	318	1,040				
April	2,210	182	457	The year	3,490	5	298

NOTE.—Because of the leakage, seepage, and waste water from the Delaware and Raritan Canal the Discharge per square mile" and the "Run-off" would not represent the natural flow.

GREEN BROOK AT BOUNDBROOK, N. J.

LOCATION.—Near State highway bridge at Boundbrook, Middlesex County, half a mile above mouth.

DRAINAGE AREA.—49 square miles.

RECORDS AVAILABLE.—June 12 to September 30, 1923.

GAGE.—Vertical staff fastened to willow tree on left bank 300 feet below bridge; read by Edward DeNoyes.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel, sand and fine gravel. Control is riffle of gravel 200 feet below gage; not permanent; affected by growth of grass during summer.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period June 12 to September 30, 1.84 feet at 7 a. m. July 5 (discharge, 117 second-feet); minimum stage, 0.80 foot several times in June and July (discharge, about 6 second-feet).

DIVERSIONS AND REGULATION.—Green Brook receives the sewage of Plainfield about 3 miles upstream. A well field of the Elizabethtown Water Co., Consolidated, is situated along stream just above station; a well field of Middlesex Water Co., and a second field of the Elizabethtown Water Co. Consolidated, are also situated in the drainage area above station.

ACCURACY.—Stage-discharge relation not permanent. Base rating curve for indirect determination of discharge not well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying effective mean daily gage height to rating table, corrections for obtaining effective gage heights determined by comparing periodic discharge measurement with base rating. Records fair.

Discharge measurements of Green Brook at Boundbrook, N. J., during the period June 12 to Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
June 15	1.08	31.0	Aug. 16	0.84	*8.0
July 6	1.15	*35.4	Sept. 28	.89	*12.4

* Grass on the control.

Daily discharge, in second-feet, of Green Brook at Boundbrook, N. J., for the period June 12 to Sept. 30, 1923

Day	June	July	Aug.	Sept.	Day	June	July	Aug.	Sept.
1	-------	12	23	13	16	13	42	9	10
2	-------	19	22	11	17	13	18	12	10
3	-------	24	19	10	18	20	18	13	15
4	-------	27	18	16	19	17	17	15	13
5	-------	78	18	15	20	22	15	10	12
6	-------	36	18	18	21	57	9	12	20
7	-------	27	18	12	22	13	9	13	18
8	-------	20	18	18	23	13	26	13	20
9	-------	27	18	14	24	13	17	12	49
10	-------	23	17	13	25	22	24	12	34
11	-------	20	15	12	26	12	16	8	15
12	38	13	16	11	27	15	19	13	15
13	22	19	24	12	28	12	23	18	13
14	20	19	20	14	29	20	22	24	14
15	23	21	16	12	30	17	22	18	16
					31	-------	22	16	-------

Monthly discharge of Green Brook at Boundbrook, N. J., for the period June 12 to Sept. 30, 1923

[Drainage area, 49 square miles]

Month	Discharge in second-feet		
	Maximum	Minimum	Mean
June 12-30	57	12	20.1
July	78	9	22.7
August	24	8	16.1
September	49	10	15.8

NOTE.—No correction made for Plainfield sewage or for water diverted through the various well fields.

LAWRENCE BROOK AT PATRICKS CORNER, N. J.

LOCATION.—Near highway bridge at Patricks Corner, Middlesex County, 3 miles southwest of Milltown, seven-eighths mile above Beaver Brook dam, and 6¼ miles above mouth of Lawrence Brook.

DRAINAGE AREA.—29 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 21, 1922, to September 30, 1923.

GAGE.—Water-stage recorder installed in wooden shelter, on right bank 150 feet above highway bridge. Slope gage at shelter and high-water staff gage attached to shelter; operated by Henry Patrick.

DISCHARGE MEASUREMENTS.—Made by wading near gage for low and medium stages and from highway bridge for high stages.

CHANNEL AND CONTROL.—Banks high and channel fairly straight. Control is sill of old wooden dam.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.67 feet at 5 p. m. January 1 (discharge, 434 second-feet); minimum stage, 1.10 feet at 8 a. m. August 27 (discharge, 0.4 second-foot).

1922-23: Maximum stage recorded, that of January 1, 1923; minimum stage that of August 27, 1923.

REGULATION.—Distribution of flow affected by water power above station.

ACCURACY.—Stage-discharge relation permanent except when affected by grass growing in channel during summer and fall. Rating curve well defined below 300 second-feet. Operation of water-stage recorder satisfactory except for periods noted in footnote to daily-discharge table. Daily discharge ascertained by use of discharge integrator on recorder charts. Records good.

Discharge measurements of Lawrence Brook at Patricks Corner, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 30	Otto Lauterhahn	1.60	14.5	Mar. 14	J. W. Bones	3.39	113
30	do	1.62	15.3	24	Otto Lauterhahn	3.75	140
Jan. 10	do	2.22	[a]45.1	24	do	3.64	136
19	do	1.75	25.8	24	do	3.48	121
Mar. 9	O. W. Hartwell	1.96	41	Apr. 5	do	2.38	57
12	do	4.69	218	5	O. W. Hartwell	2.42	61
12	do	4.50	204	May 9	Otto Lauterhahn	1.57	16.1
12	do	4.41	189	July 1	O. W. Hartwell	1.17	1.22
13	do	3.62	132	1	do	1.17	1.10
13	do	3.57	128	Aug. 30	J. W. Bones	1.35	4.7

[a] May be backwater due to tree 20 feet below bridge.

Daily discharge, in second-feet, of Lawrence Brook at Patricks Corner, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2	8	9	260	30	31	20	28	7	1	7	2
2	9	3	9	157	24	52	21	21	7	5	7	1
3	5	9	4	77	40	66	17	19	4	3	5	1
4	6	10	12	58	47	74	24	19	3	7	6	4
5	2	3	12	49	25	63	68	14	6	10	2	5
6	4	8	13	38	17	50	88	13	8	11	4	1
7	7	8	8	35	23	33	42	10	4	3	2	5
8	4	7	10	32	24	31	41	15	7	2	5	4
9	8	6	9	34	30	33	52	14	6	2	3	2
10	10	7	5	44	22	29	34	11	1	3	4	6
11	10	8	10	39	8	52	30	9	7	6	3	3
12	10	2	11	34	27	169	16	9	5	6	1	5
13	7	8	10	30	58	167	32	11	9	4	8	2
14	6	5	8	30	120	169	33	17	5	4	8	5
15	5	8	10	33	173	78	24	11	4	4	6	7
16	4	8	8	22	50	176	38	15	5	8	8	1
17	5	8	12	25	37	246	23	12	3	8	4	3
18	6	4	33	20	23	104	32	8	6	6	4	3
19	6	2	30	23	10	76	17	8	7	3	1	2
20	7	10	16	19	21	51	13	11	6	6	5	2
21	7	8	11	152	16	51	17	15	3	4	2	8
22	8	8	15	197	16	44	20	20	5	1	5	10
23	9	8	8	75	24	75	12	13	3	6	3	4
24	8	6	6	71	20	130	8	12	2	2	3	10
25	6	10	12	146	9	52	8	12	4	7	8	7
26	7	3	12	83	12	47	10	11	3	5	1	6
27	6	7	14	53	42	37	9	3	4	3	3	4
28	9	10	42	41	50	35	19	5	7	4	1	4
29	2	7	52	32	------	27	116	6	2	2	3	5
30	9	6	43	33	------	28	53	5	4	5	2	1
31	6	------	27	36	------	29	------	6	------	7	6	------

NOTE.—Daily discharge estimated because of no gage-height record by comparison with records for near-by streams Oct. 14–22, Nov. 4, Dec. 19 and 20.

Monthly discharge of Lawrence Brook at Patricks Corner, N. J., for the year ending Sept. 30, 1923

[Drainage area, 29 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	10	2	6.45	0.222	0.26
November	10	2	6.83	.235	.26
December	52	4	15.5	.534	.62
January	260	19	63.8	2.20	2.54
February	173	8	35.6	1.23	1.28
March	246	27	74.3	2.56	2.95
April	116	8	31.2	1.07	1.19
May	28	3	12.3	.424	.49
June	9	2	4.90	.169	.19
July	11	1	4.77	.164	.19
August	8	1	4.19	.144	.17
September	10	1	4.10	.141	.16
The year	260	1	22.0	.759	10.30

NAVESINK RIVER BASIN

SWIMMING RIVER NEAR RED BANK, N. J.

LOCATION.—At dam of Tintern Manor Water Co., 3 miles above mouth of Swimming River at Red Bank, Monmouth County.

DRAINAGE AREA.—48 square miles.

RECORDS AVAILABLE.—July 28, 1922, to September 30, 1923.

GAGE.—Automatic water-stage register on right bank 100 feet above end of dam; operated by J. A. Stewart.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CONTROL.—Dam of stone and concrete, with spillway 148 feet long. In cross section the spillway has a flat top 7 feet wide with downstream edge 1 foot higher than upstream. Two 36-inch "blow-off" sluice gates at dam and one 18-inch "blow-off" sluice gate at pumping station

DIVERSION.—Water diverted from dam to Newman Springs pumping station of Tintern Manor Water Co.

STORAGE.—Flow is slightly affected by storage in reservoir.

DETERMINATION OF DISCHARGE.—Discharge over spillway and through 36-inch and 18-inch sluice gates determined from rating curves based on current meter measurements. Diversion measured by piston displacement method. Storage determined from an approximate capacity curve of reservoir.

EXTREMES OF DISCHARGE.—Maximum stage during period July 28, 1922, to September 30, 1923, 2.57 feet at 7 p. m. January 1, 1923 (discharge, 1,350 second-feet).

ACCURACY.—Stage-discharge relation permanent except for periods when spillway was obstructed by sandbags. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table. Storage correction is so small that possible errors in capacity curve will not affect total results. Records good.

COOPERATION.—Station maintained in cooperation with Tintern Manor Water Co.

Discharge measurements of Swimming River near Red Bank, N. J., during the period July 28, 1922, to Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1922		*Feet*	*Sec.-ft.*	1923		*Feet*	*Sec.-ft.*
July 28	Otto Lauterhahn	1.118	50	Apr. 21	Otto Lauterhahn	[a]—0.89	67
Aug. 7	do	1.104	46.9	May 9	do	[a]—1.36	57
30	O. W. Hartwell	1.094	42.5	July 2	do	[b] 1.92	14.6
Sept. 28	Otto Lauterhahn	1.005	20.2	23	do	[b] 1.81	39.0
Nov. 4	do	1.055	31.5	Aug. 10	do	[b] 1.36	14.9
4	do	1.052	29.1	30	J. W. Bones	[b] 1.44	38.0
1923				Sept. 16	O. W. Hartwell	[b] 1.25	19.2
Apr. 5	do	[a].52	90.3				
17	do	[a].06	75				

[a] Discharge through two sluice gates each full open.

[b] Sandbags on dam.

Discharge measurements of Swimming River (through 18-inch gate) near Red Bank, N. J., during the year ending Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Discharge	Date	Discharge	Date	Discharge
	Sec.-ft.		*Sec.-ft.*		*Sec.-ft.*
Apr. 17	[a] 9.15	Apr. 21	[c] 9.01	Apr. 21	[f] 10.7
17	[a] 12.4	21	[d] 10.5	21	[g] 7.5
21	[b] 5.51	21	[e] 11.9		

[a] Gate openings not recorded.
[b] Gate open 20 turns.
[c] Gate open 40 turns.
[d] Gate open 60 turns.
[e] Gate open 70 turns.
[f] Gate open 50 turns.
[g] Gate open 30 turns.

Daily discharge, in second-feet, of Swimming River near Red Bank, N. J., for the period July 28, 1922, to Sept. 30, 1923

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1922				1922				1922			
1		48	71	11		52	38	21		48	28
2		151	59	12		48	41	22		34	28
3		108	52	13		52	41	23		31	25
4		129	52	14		48	34	24		28	22
5		93	55	15		45	34	25		28	25
6		59	48	16		41	28	26		48	19
7		59	41	17		41	28	27		134	25
8		55	41	18		34	28	28	59	129	19
9		55	41	19		31	28	29	59	80	22
10		55	38	20		75	25	30	45	55	25
								31	45	63	

Day	Oct.	Nov	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922-23												
1	28	25	28	366	72	92	81	90	34	17	28	21
2	36	22	28	342	72	102	79	86	34	14	28	19
3	34	31	25	123	78	92	79	82	34	25	26	18
4	24	34	28	140	79	93	79	78	41	52	24	17
5	20	31	41	108	75	92	86	75	31	140	23	16
6	19	28	38	106	72	88	170	73	25	63	21	16
7	19	31	31	92	69	82	102	71	28	89	20	18
8	34	31	41	90	67	82	92	68	34	41	20	19
9	45	28	45	115	66	80	98	71	31	31	18	35
10	34	25	34	135	65	78	92	75	28	28	15	29
11	34	25	31	92	65	82	89	72	28	108	13	21
12	28	25	34	89	67	115	86	71	28	80	13	19
13	22	25	31	86	76	203	84	71	28	38	20	35
14	25	25	28	80	253	277	86	73	28	28	17	31
15	25	28	34	80	170	124	87	71	25	31	23	24
16	28	38	45	82	91	124	87	67	31	84	24	19
17	28	31	63	76	87	448	85	64	28	25	15	19
18	28	28	89	73	81	161	82	62	25	42	13	19
19	25	28	38	72	75	132	80	62	22	44	11	18
20	25	41	31	73	72	105	77	63	17	43	10	19
21	25	38	41	82	69	100	75	63	17	41	9	41
22	25	28	45	88	67	98	73	36	0	41	12	180
23	28	28	34	88	66	99	71	9	0	41	13	200
24	38	28	34	85	65	153	69	9	7	31	10	140
25	31	25	34	198	66	101	67	40	19	32	9	59
26	25	25	34	105	68	95	66	47	17	31	8	45
27	25	25	34	92	117	92	65	43	19	29	8	38
28	25	28	84	89	198	91	67	43	17	29	9	34
29	25	28	118	85	-------	87	83	39	22	40	26	31
30	25	25	55	80	--- ---	86	98	38	19	32	37	28
31	25	-------	45	74	-------	84	-------	38	-------	29	26	-------

NOTE.—Discharge includes flow over spillway and through all sluice gates. Sluice gates at dam open Jan. 6 to May 22 and at Newmans Springs pumping station Jan. 6 to May 29. Discharge Oct. 1–6, Jan. 17–20, 31, Feb. 1, 2, 5–13, 19–27; Apr. 23–28, and May 16–27, estimated by comparison with record of Lawrence Brook at Patricks Corner. Dam was obstructed by sandbags June 22 to Sept. 21, 1923; during this period a variable correction, based on five discharge measurements, was applied to discharge.

Monthly discharge of Swimming River near Red Bank, N. J., during the period Aug. 1, 1922, to Sept. 30, 1923

[Drainage area, 48 square miles]

Month	Discharge in second-feet					Run-off in inches
	In river			Total yield		
	Maximum	Minimum	Mean	Mean	Per square mile	
1922						
August	151	28	63.1	72.3	1.51	1.74
September	71	19	35.4	43.9	.915	1.02
1922-23						
October	45	19	27.7	34.5	.719	.83
November	41	22	28.6	34.4	.717	.80
December	118	25	42.6	47.6	.992	1.14
January	366	72	112	108	2.25	2.59
February	253	65	88.1	92.6	1.93	2.01
March	448	78	121	119	2.48	2.86
April	170	65	84.5	86.0	1.79	2.00
May	90	9	59.7	60.8	1.27	1.46
June	41	0	23.9	30.6	.637	.71
July	140	14	45.1	53.1	1.11	1.28
August	37	8	17.7	24.8	.517	.60
September	200	16	40.9	46.9	.977	1.09
The period	448	0	57.6	61.4	1.28	17.37

NOTE.—The first three columns of table indicate actual quantity of water flowing in river; the three remaining columns include diversion and storage. Water diverted to Newman Springs pumping station from Oct. 1 to Dec. 30 and during February to September except April.

DELAWARE RIVER BASIN

EAST BRANCH OF DELAWARE RIVER AT FISHS EDDY, N. Y.

LOCATION.—At railroad bridge in Fishs Eddy, Delaware County, 4 miles below mouth of Beaver Kill and 5½ miles above confluence of East and West branches.

DRAINAGE AREA.—785 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 19, 1912, to September 30, 1923.

GAGE.—Staff in two sections on downstream end of left pier of bridge; read by Jay C. Baxter until December 31 and by F. J. McMorris January 1 to September 30, 1923.

DISCHARGE MEASUREMENTS.—Made from highway bridge 200 feet above gage or by wading.

CHANNEL AND CONTROL.—Coarse gravel; occasionally shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.55 feet at 9 a. m. April 6 (discharge, 19,000 second-feet); minimum stage recorded, 1.97 feet at 4 p. m. August 27 (discharge, 117 second-feet).

1912–1923: Maximum stage recorded, 18.0 feet at 8 a. m. March 13, 1920 (stage-discharge relation affected by ice); 17.4 feet during afternoon of March 27, 1913, determined by leveling from flood marks (discharge, about 33,500 second-feet); minimium stage recorded, 1.64 feet at 5 p. m. October 12, 14, and 15, 1914 (discharge, 97 second-feet).

ICE.—Stage-discharge relation seriously affected by ice.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice from December to March. Rating curve fairly well defined between 150 and 20,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except during periods of ice effect, for which they are fair.

Discharge measurements of East Branch of Delaware River at Fishs Eddy, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 6	A. W. Harrington	2.26	198	Apr. 11	J. L. Lamson	6.28	4,660
Jan. 22	B. F. Howe	6.42	4,700	12	do	6.30	4,270
Feb. 9	J. L. Lamson	[a]7.91	1,090	Aug. 13	A. W. Harrington	2.29	222
Mar. 1	B. F. Howe	[a]5.91	546				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of East Branch of Delaware River at Fishs Eddy, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	228	269	305	4,600	750	550	1,760	4,050	548	305	285	325
2	228	261	285	6,500	900	600	1,760	2,890	520	269	234	281
3	210	261	277	4,000	950	750	1,990	2,350	520	261	210	245
4	210	285	285	3,000	1,100	1,500	4,530	2,350	548	265	210	305
5	210	285	395	2,200	800	3,400	10,400	1,760	1,010	261	285	348
6	198	281	217	1,800	750	2,200	18,000	1,540	630	249	231	325
7	204	285	280	1,400	700	1,800	10,600	1,330	820	238	204	285
8	325	285	420	1,200	700	1,500	8,950	1,140	3,030	224	192	370
9	720	305	500	1,100	1,000	1,200	7,350	5,390	1,990	207	159	1,870
10	1,050	305	420	1,100	900	1,200	5,210	4,050	1,650	192	150	890
11	1,050	305	340	800	800	1,300	4,370	2,890	1,180	189	137	660
12	690	281	500	700	800	1,100	4,050	2,890	930	183	137	548
13	520	269	380	550	850	1,300	3,590	3,590	820	174	180	495
14	420	257	340	360	900	1,300	3,170	2,750	720	171	174	420
15	370	265	460	600	700	1,400	2,610	2,350	750	168	177	370
16	285	325	460	800	650	2,000	2,350	2,230	630	180	174	348
17	250	325	440	600	550	5,500	1,990	2,470	575	183	150	305
18	370	305	400	360	500	3,200	1,760	1,990	495	177	142	285
19	325	305	360	550	460	3,600	1,650	1,650	470	165	134	285
20	305	285	340	1,200	420	2,600	1,540	1,430	445	156	137	277
21	285	305	300	6,000	380	2,400	1,990	1,540	420	150	129	660
22	281	305	300	4,370	360	3,600	1,990	1,650	370	145	145	750
23	269	285	340	2,750	340	7,500	1,870	1,330	348	134	145	630
24	420	285	340	1,900	360	11,100	1,540	1,100	325	132	147	1,230
25	420	261	360	2,000	400	7,350	1,230	970	325	162	134	855
26	348	257	360	1,300	440	5,570	1,100	890	348	162	127	720
27	325	228	420	1,200	500	4,370	970	820	602	150	119	630
28	325	285	480	950	550	3,730	1,100	750	420	305	156	602
29	305	285	800	750	-------	2,610	9,350	690	370	470	1,650	630
30	285	285	440	360	-------	2,750	5,570	630	325	281	690	575
31	281	-------	600	600	-------	2,470	--------	602	------	261	445	------

NOTE.—Discharge, Oct. 17, estimated as indicated in above table from hydrograph; gage height doubtful. Discharge Dec. 7 to Jan. 21 and Jan. 24 to Mar. 23 determined from gage heights corrected for ice effect by means of three discharge measurements; study of observer's notes, gage-height graph, and weather records; and comparison with record of Beaver Kill at Cooks Falls.

Monthly discharge of East Branch of Delaware River at Fishs Eddy, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 785 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
Octoher	1,050	198	378	0.482	0.56
November	325	228	284	.362	.40
December	800	217	392	.499	.58
January	6,500	360	1,790	2.28	2.63
February	1,100	340	661	.842	.88
March	11,100	550	2,950	3.76	4.34
April	18,000	970	4,140	5.27	5.88
May	5,390	602	2,000	2.55	2.94
June	3,030	325	738	.940	1.05
July	470	132	212	.270	.31
August	1,650	119	245	.312	.36
September	1,870	245	551	.702	.78
The year	18,000	119	1,200	1.53	20.71

DELAWARE RIVER AT PORT JERVIS, N. Y.

LOCATION.—At steel highway bridge at Port Jervis, Orange County, 1½ miles above mouth of Neversink River and 6 miles below mouth of Mongaup River.

DRAINAGE AREA.—3,070 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 12, 1904, to September 30, 1923.

GAGE.—Chain on downstream side of left span of highway bridge and staff in two sections; the upper section vertical and attached to downstream end of left abutment; the lower section inclined, 30 feet downstream; read by John Bisland.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel; occasionally shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.5 feet at 5 p. m. March 7 (stage-discharge relation affected by ice); 11.8 feet at 8 a. m. March 24 (discharge, 57,900 second-feet); minimum stage recorded, 1.2 feet at 8 a. m. and 5 p. m. July 24 (discharge, 515 second-feet).

1904–1923:[4] Maximum stage recorded, 16.0 feet at 8 a. m. March 28, 1914 (discharge, 92,700 second-feet); minimum stage recorded, 0.60 foot at 8 a. m. September 22 and 23, 1908 (discharge, 175 second-feet).

ICE.—Stage-discharge relation seriously affected by ice.

ACCURACY.—Stage-discharge relation changed presumably at time of breaking of ice jam in March. Rating curve used before change fairly well defined below 2,500 second-feet and well defined between 2,500 and 30,000 second-feet; that used subsequently, fairly well defined between 500 and 15,000 second-feet. Stage-discharge relation affected by ice during most of period, December to March. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good, except during periods of ice effect and estimate, for which they are fair.

[4] During the flood of Oct. 10–11, 1903, a crest stage of 23.3 feet gage height was observed by Mr. Righter, city engineer of Port Jervis. This gage height corresponds to approximately 155,000 second-feet.

Discharge measurements of Delaware River at Port Jervis, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Jan. 24	B. F. Howe	*4.49	6,620
Apr. 13	J. L. Lamson	5.17	11,100
Aug. 12	A. W. Harrington	1.38	633

*Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Delaware River at Port Jervis, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	685	780	880	1,500			8,510	14,500	2,630	1,360	2,210	1,930
2	685	685	780	7,500			7,350	11,100	2,410	1,220	2,120	1,440
3	685	780	780	12,600			7,730	8,510	2,210	1,220	1,760	1,090
4	685	880	780	9,010			10,600	7,730	2,410	1,090	1,510	970
5	600	880	1,390	6,700			24,500	6,290	2,410	1,090	1,590	970
6	600	780	1,110	6,010			48,300	5,630	2,630	1,090	1,360	1,090
7	600	880	990	5,360			39,500	5,010	3,590	970	1,360	1,220
8	685	880	780	4,180			28,100	5,010	5,010	860	1,220	1,220
9	1,550	990	685	3,910			23,800	6,630	6,990	860	1,090	1,440
10	1,800	880	1,180	3,400			19,000	18,400	6,290	760	970	3,330
11	3,040	990	1,110	4,180			14,000	14,000	4,710	760	760	2,740
12	3,040	990	1,110	3,910		12,000	12,000	14,000	3,850	670	670	2,020
13	2,160	880	1,100	3,650			11,100	13,500	3,210	670	670	1,670
14	1,720	880	1,100	2,160			9,330	13,000	2,850	670	670	1,510
15	1,470	880	1,000	1,720	2,600		8,510	10,200	2,630	670	760	1,360
16	1,240	880	950	1,500			7,350	8,910	2,630	670	760	1,220
17	1,110	830	750	1,500			6,290	9,750	2,410	590	760	1,090
18	1,110	780	750	1,900			5,950	9,330	1,930	590	760	1,090
19	1,110	780	750	1,700			5,630	7,730	1,840	670	670	970
20	1,110	880	750	1,800			5,310	6,990	1,670	670	670	970
21	990	880	750	1,900			5,010	6,290	1,510	590	670	1,090
22	880	880	750	6,000			4,710	7,730	1,360	590	670	1,440
23	880	780	750	10,000			4,710	6,290	1,220	590	670	3,590
24	880	780	850	7,000			4,410	5,630	1,220	515	670	6,290
25	1,110	685	1,000	5,500		38,700	4,130	4,410	1,090	590	670	4,410
26	1,110	685	1,100	5,000		28,100	3,850	3,850	1,670	590	590	3,590
27	1,110	685	1,300	5,000		21,700	3,330	3,850	1,670	590	590	2,850
28	990	685	1,400	4,400		17,800	3,210	3,590	1,510	2,850	590	2,630
29	880	685	1,700	3,600	-----	12,000	5,310	3,330	1,670	3,090	2,020	2,410
30	880	780	1,400	3,000	-----	11,600	22,400	3,090	1,510	2,970	3,210	2,410
31	780	-------	1,700	2,200	-------	11,100	---------	2,850	-------	2,740	2,850	-------

NOTE.—Discharge Jan. 30, 31, Feb. 1-28, and Mar. 1-24, estimated by comparison with records of East and West branches of Delaware River and Delaware River at Riegelsville; stage-discharge relation seriously affected by ice jam. Discharge Dec. 13 to Jan. 2 and Jan. 16-29 determined from gage heights corrected for ice effect by means of one discharge measurement, study of observer's notes, gage-height graph, and weather records and by comparison with records in the same drainage area.

Monthly discharge of Delaware River at Port Jervis, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 3,070 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	3,040	600	1,170	0.381	0.44
November	990	685	824	.268	.30
December	1,700	685	1,010	.329	.38
January	12,600	1,500	4,440	1.45	1.67
February			2,600	.847	.88
March	38,700	11,100	13,800	4.50	5.19
April	48,300	3,210	12,100	3.94	4.40
May	18,400	2,850	7,970	2.60	3.00
June	6,990	1,090	2,620	.853	.95
July	3,090	515	1,060	.345	.40
August	3,210	590	1,150	.375	.43
September	6,290	970	2,000	.651	.73
The year	48,300	515	4,250	1.38	18.77

DELAWARE RIVER AT BELVIDERE, N. J.

LOCATION.—At Belvidere, Warren County, just below mouth of Pequest River.

DRAINAGE AREA.—4,540 square miles.

RECORDS AVAILABLE.—October 27, 1922, to September 30, 1923.

GAGE.—Inclined staff gage on left bank bolted to downstream side of storm sewer outlet at foot of Second Street, Belvidere; read by Alexander Rush.

DISCHARGE MEASUREMENTS.—Made by boat 1,000 feet below gage for low water and from highway bridge half a mile upstream during high water. Pequest River measured separately when highway bridge is used.

CHANNEL AND CONTROL.—Channel is heavy gravel and boulders. Control is ledge and boulders about three-quarters mile below gage known as Little Foul Rift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period October 27, 1922, to September 30, 1923, 15.7 feet at 4.30 p. m. March 24 (discharge about 94,000 second-feet); minimum stage recorded, 2.45 feet several times in July and August (discharge, 895 second-feet).

ICE.—Stage-discharge relation affected by ice only during extremely cold periods.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 900 and 24,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Delaware River at Belvidere, N. J., during the period Oct. 27, 1922, to Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 27	3.24	1,800	Feb. 3	5.10	5,900
Jan. 3	7.93	18,200	July 11	2.93	1,330
4	6.79	12,400	Aug. 23	2.57	994
5	6.10	9,400			

Daily discharge, in second-feet, of Delaware River at Belvidere, N. J., for the period Oct. 27, 1922, to Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	-------	1,420	1,100	3,490	5,310	3,490	12,400	19,100	3,960	1,960	3,060	2,660
2	-------	1,420	1,360	12,000	5,020	3,490	11,100	14,400	3,720	1,810	2,660	1,810
3	-------	1,310	1,360	18,000	5,600	4,470	10,600	11,600	3,270	1,670	2,470	1,670
4	-------	1,420	1,360	12,400	6,840	5,900	12,400	9,400	3,720	1,670	2,290	1,310
5	-------	1,540	1,360	9,800	6,200	9,800	22,800	8,220	3,490	1,670	2,120	1,200
6	-------	1,540	1,670	8,220	5,310	14,400	59,500	7,520	3,720	1,810	1,960	1,200
7	-------	1,670	1,420	6,520	4,740	18,000	70,000	6,840	4,470	1,540	1,670	1,200
8	-------	1,420	1,400	5,600	4,470	16,400	41,000	6,200	5,600	1,540	1,670	1,260
9	-------	1,420	1,400	3,960	5,020	13,900	31,600	7,520	7,180	1,420	1,420	1,670
10	-------	1,420	1,420	4,470	5,020	11,600	25,400	15,400	7,180	1,310	1,310	2,120
11	-------	1,420	1,420	4,740	5,020	10,200	19,100	17,400	6,200	1,310	1,200	3,490
12	-------	1,420	1,670	4,740	4,470	11,600	16,400	13,900	5,020	1,260	1,150	2,660
13	-------	1,420	1,670	4,740	4,210	12,000	14,400	14,900	4,470	1,260	1,150	2,290
14	-------	1,420	1,420	4,470	4,210	13,400	12,900	16,900	3,720	1,260	1,100	1,810
15	-------	1,420	1,200	3,960	6,840	12,900	11,600	13,400	3,490	1,150	1,100	1,670
16	-------	1,420	1,260	2,860	5,020	14,400	10,200	12,000	3,270	1,260	1,100	1,540
17	-------	1,540	1,310	3,270	4,210	22,100	9,000	12,400	3,270	1,200	1,060	1,420
18	-------	1,670	1,200	3,490	4,210	47,000	8,220	13,400	3,060	1,100	1,010	1,360
19	-------	1,420	1,150	3,490	3,960	42,000	7,520	11,600	2,660	1,100	1,010	1,260
20	-------	1,420	1,310	3,270	3,720	32,300	7,180	9,800	2,660	1,060	1,010	1,200
21	-------	1,540	1,310	3,490	3,720	25,400	6,840	9,400	2,290	1,010	970	1,310
22	-------	1,960	1,310	5,020	3,490	25,400	6,520	11,100	2,120	1,010	970	1,420
23	-------	1,810	1,540	7,860	3,720	31,600	6,840	10,200	2,120	895	970	1,810
24	-------	1,360	1,540	11,100	3,720	69,000	6,520	8,600	2,120	895	895	3,060
25	-------	1,260	1,540	8,220	3,270	60,000	6,200	7,180	1,960	1,060	895	5,020
26	-------	1,150	1,670	7,520	3,490	42,000	5,600	6,520	1,670	930	895	4,210
27	1,540	1,100	1,670	7,520	3,270	31,600	5,020	6,200	1,810	930	895	3,490
28	1,540	1,100	1,670	7,860	3,270	26,000	4,470	5,600	1,960	970	930	2,660
29	1,540	1,100	2,120	7,180	-------	20,900	7,520	5,020	1,960	2,860	1,010	2,290
30	1,670	1,060	2,120	6,200	-------	17,400	26,000	4,740	1,960	3,960	1,310	2,290
31	1,540	-------	1,960	5,310	-------	15,400	-------	4,470	-------	3,720	3,490	-------

NOTE.—Effect of ice on stage-discharge relation probably negligible. Daily discharge estimated because of no gage-height record Dec. 8 and 9.

Monthly discharge of Delaware River at Belvidere, N. J., for the period Oct. 27, 1922, to Sept. 30, 1923

[Drainage area, 4,540 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
November	1,960	1,060	1,420	0.313	0.35
December	2,120	1,100	1,480	.326	.38
January	18,000	2,860	6,480	1.43	1.65
February	6,840	3,270	4,550	1.00	1.04
March	69,000	3,490	22,100	4.87	5.62
April	70,000	4,470	16,500	3.63	4.05
May	19,100	4,470	10,400	2.29	2.64
June	7,180	1,670	3,470	.764	.85
July	3,960	895	1,500	.330	.38
August	3,490	895	1,440	.317	.37
September	5,020	1,200	2,080	.458	.51

DELAWARE RIVER AT RIEGELSVILLE, N. J.

LOCATION.—At toll suspension bridge between Riegelsville, Warren County, N. J., and Riegelsville, Bucks County, Pa., 600 feet above mouth of Musconetcong River and 9 miles below Lehigh River.

DRAINAGE AREA.—6,190 square miles, revised.

RECORDS AVAILABLE.—July 3, 1906, to September 30, 1923.

GAGE.—Inclined staff installed November 14, 1914, on left bank (New Jersey side) at upstream side of bridge; read by Joseph H. Brotzman. Prior to November 14, 1914, chain gage attached to upstream side of bridge.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Large boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, 17.8 feet at 9 p. m. March 24, determined from high-water marks (discharge, 86,100 second-feet); minimum stage recorded, 1.8 feet at 5 p. m. August 27 (discharge, 1,000 second-feet).

1906–1923: Maximum stage recorded, 25 feet March 28, 1913 (discharge, 144,000 second-feet); minimum stage recorded, 1.55 feet at 8 a. m. September 20, 1908 (discharge, 870 second-feet).

The flood of October 10–11, 1903, reached a stage of 35.9 feet determined by levels from three good flood marks. Maximum discharge during this flood has been estimated 275,000 second-feet at Riegelsville from observations made at Lambertville.

ICE.—Stage-discharge relation affected by ice during severe winters only.

DIVERSIONS.—The Delaware division of the Pennsylvania canal diverts water from Lehigh River near its mouth from about the last of March to the middle of December each year. The canal is so operated that the flow past Riegelsville is constant at 230 second-feet.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Gage read to half-tenths twice a day. Daily discharge ascertained by applying to rating table mean daily gage height. Records good.

Discharge measurements of Delaware River at Riegelsville, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Oct. 17	Otto Lauterhahn	2.70	2,670
July 9	do	2.31	1,760
Aug. 25	O. W. Hartwell	1.99	1,280

Discharge measurements of Pennsylvania canal at Riegelsville, Pa., during the year ending Sept. 30, 1923

Date	Made by—	Discharge
Oct. 17	Otto Lauterhahn	229
July 9	do	222
Aug. 25	O. W. Hartwell	224

Daily discharge, in second-feet, of Delaware River at Riegelsville, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,680	1,860	1,590	5,010	6,500	5,010	18,800	23,500	5,610	2,720	4,710	3,900
2	1,680	1,770	1,770	11,600	7,170	5,920	15,000	18,000	5,310	2,480	4,140	3,000
3	1,590	1,960	1,770	22,600	7,490	7,820	13,500	13,900	5,010	2,260	3,860	2,300
4	1,590	1,860	1,770	17,100	8,150	13,900	15,000	11,600	5,310	2,160	3,330	1,900
5	1,590	1,860	1,770	12,700	7,820	18,800	28,500	10,200	5,310	2,370	3,330	1,590
6	1,590	1,960	1,770	10,900	6,850	21,600	56,000	9,500	5,010	2,260	3,200	1,430
7	1,590	1,960	1,960	8,820	6,540	24,000	71,100	8,820	5,610	2,060	2,480	1,430
8	1,590	1,960	1,590	6,850	6,540	20,000	46,400	8,150	6,850	1,860	2,160	1,510
9	1,960	1,960	1,590	5,920	5,920	18,000	38,100	10,900	8,820	1,860	2,060	1,960
10	3,460	1,960	1,590	6,230	7,170	15,800	31,000	20,700	10,200	1,860	1,770	2,600
11	5,610	1,860	2,060	5,920	9,540	14,200	24,500	23,500	8,150	1,960	1,700	3,860
12	5,610	1,770	1,960	6,230	5,920	15,400	20,700	18,800	6,850	1,770	1,600	3,590
13	5,010	1,960	2,260	5,610	6,540	19,700	18,400	19,700	5,920	1,770	1,500	2,840
14	4,140	1,860	2,160	4,420	6,230	21,100	16,300	22,600	5,010	1,510	1,430	2,260
15	3,330	1,770	1,960	3,860	4,140	18,800	14,600	18,400	5,010	1,280	1,430	1,960
16	3,080	1,960	1,960	3,590	4,420	20,700	13,100	16,300	4,710	1,510	1,360	1,860
17	2,720	1,770	2,060	3,080	5,010	36,900	11,600	17,100	4,420	1,590	1,280	1,590
18	2,600	1,860	2,160	3,080	4,420	43,100	10,500	18,800	4,140	1,430	1,280	1,430
19	2,370	1,770	1,860	4,140	4,140	51,100	10,200	15,800	3,590	1,280	1,210	1,510
20	2,370	1,960	2,000	3,860	3,600	41,800	9,500	14,600	3,330	1,280	1,430	1,430
21	2,370	1,860	2,060	4,140	3,400	34,500	8,820	13,500	3,080	1,140	1,280	2,060
22	2,160	1,770	1,770	6,230	3,600	32,100	8,480	15,400	2,960	1,070	1,280	2,160
23	2,060	1,770	2,060	8,820	4,140	38,100	8,820	13,500	2,600	1,140	1,360	2,960
24	2,160	1,770	2,060	15,000	3,630	64,600	8,150	12,000	2,720	1,140	1,280	4,710
25	1,960	1,770	2,060	11,600	4,140	69,700	8,150	10,500	2,600	1,430	1,210	6,540
26	2,160	1,590	2,370	10,200	4,140	51,100	7,490	9,500	2,600	1,360	1,140	5,920
27	2,160	1,590	2,370	9,840	4,710	40,600	6,850	8,820	2,370	1,280	1,000	5,010
28	2,160	1,590	2,600	10,500	5,010	33,300	6,230	7,820	2,480	1,210	1,280	4,140
29	2,160	1,430	2,480	10,000	-------	27,100	10,200	7,490	2,840	6,540	1,360	3,330
30	1,960	1,430	2,160	9,000	-------	22,100	26,600	6,850	2,720	6,850	1,360	2,960
31	1,960	-------	2,480	6,000	-------	19,700	-------	6,230	-------	5,610	3,600	-------

NOTE.—This table indicates daily discharge of river only. In addition the Pennsylvania canal carried 230 second-feet Oct. 1 to Dec. 13 and Feb. 27 to Sept. 30. Stage-discharge relation affected by ice Feb 20–22. Daily discharge estimated.

Monthly discharge of Delaware River at Riegelsville, N. J., for the year ending Sept. 30, 1923

[Drainage area, 6,190 square miles]

Month	Discharge in second-feet					Run-off in inches
	At gage			Plus diversions		
	Maximum	Minimum	Mean	Mean	Per square mile	
October	5,610	1,590	2,530	2,760	0.446	0.51
November	1,960	1,430	1,810	2,040	.330	.37
December	2,600	1,590	2,000	2,100	.339	.39
January	22,600	3,080	8,160	8,160	1.32	1.52
February	8,150	3,400	5,490	5,510	.890	.93
March	69,700	5,010	28,000	28,200	4.56	5.26
April	71,100	6,230	19,300	19,500	3.15	3.51
May	23,500	6,230	14,000	14,200	2.29	2.64
June	10,200	2,370	4,700	4,930	.796	.89
July	6,850	1,070	2,130	2,360	.381	.44
August	4,710	1,000	1,980	2,210	.357	.41
September	6,540	1,430	2,790	3,020	.488	.54
The year	71,100	1,000	7,750	7,940	1.28	17.41

DELAWARE RIVER AT TRENTON, N. J.

LOCATION.—At Calhoun Street Bridge, Trenton, Mercer County, 1 mile above Pennsylvania Railroad bridge and half a mile above mouth of Assunpink Creek.

DRAINAGE AREA.—6,800 square miles.

RECORDS AVAILABLE.—February 24, 1913, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge 100 feet from left abutment.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Rocky and permanent at rapids a few hundred feet below bridge.

EXTREMES OF DISCHARGE.—Maximum stage during year estimated from hydrograph, 8.2 feet at midnight March 24 (discharge 74,800 second-feet); minimum stage recorded −0.35 feet at 8 a. m. August 27 and 28 (discharge, 1,320 second-feet).

1913–1923: Maximum stage recorded, 13.3 feet during night of March 28, 1914 (discharge, 160,000 second-feet); minimum stage recorded, −0.4 foot, October 22, 31, November 1, 4, 5, 13–15, 1914 (discharge, 1,240 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Delaware division of the Pennsylvania canal diverts 53 second-feet by gaging station from about March 31 to December 15 each year. Delaware and Raritan feeder canal diverts 160 second-feet from March 1 to December 31 each year. Trenton power canal diverts 210 second-feet, around the gage, daily.

ACCURACY.—Stage-discharge relation considered permanent, except during ice-affected periods. Rating curve well defined between 1,700 to 90,000 second-feet. Gage read to tenths once a day. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage readings furnished by United States Weather Bureau.

Discharge measurements of Delaware River at Trenton, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 19	Otto Lauterhahn	0.34	2,640	Apr. 7	Hartwell and Lauterhahn	7.91	70,700
Nov. 20	do	.05	2,000	30	Otto Lauterhahn	2.52	12,000
Dec. 11	do	0	1,910	May 31	J. W. Bones	1.41	6,700
Mar. 13	J. W. Bones	3.87	23,800	Aug. 27	do	−.28	1,400
21	O. W. Hartwell	5.02	34,700				
26	Otto Lauterhahn	6.41	51,000				

***Discharge** measurements of canals that divert water around gaging station on Delaware River at Trenton, N. J., during the year ending Sept. 30, 1923*

Date	Pennsylvania canal	Power canal at Trenton	Delaware and Raritan feeder	Date	Pennsylvania canal	Power canal at Trenton	Delaware and Raritan feeder
Oct. 18	53	189	166	Apr. 30	54	318	132
Nov. 21	49.5	89	175	June 9	77	219	167
Jan. 23	1.3	190	[a]0	July 2	49.1	214	153
Mar. 2	[a]0	209	[a]3	Aug. 1	55	225	143
Apr. 4	61	324	158	Sept. 24	51	171	147
Apr. 7		280					

[a] Estimated.

Daily discharge, in second-feet, of Delaware River at Trenton, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.
1	2,080	1,900	1,400	3,800	6,000	7,000	19,600	27,400	6,000	2,840	5,600	4,140
2	1,900	2,080	1,400	11,100	6,400	7,500	16,400	20,400	6,000	3,000	4,140	3,000
3	1,900	1,900	1,560	17,200	7,200	7,500	14,800	16,400	5,600	2,700	4,140	2,430
4	1,900	2,080	1,720	20,400	8,650	14,800	14,800	13,200	5,600	2,560	3,470	1,990
5	1,900	1,900	1,720	14,800	8,650	21,200	18,000	11,100	5,600	2,560	3,800	1,810
6	1,720	2,080	1,560	11,800	8,150	21,200	38,700	9,800	5,220	2,840	3,150	1,810
7	1,560	2,300	1,560	9,200	7,500	23,800	73,400	9,200	5,220	2,700	2,840	1,720
8	1,560	1,900	1,560	8,150	7,000	24,700	53,200	8,650	6,400	2,430	2,430	1,640
9	1,560	1,900	1,560	6,000	6,500	19,600	38,700	7,650	7,200	2,300	2,190	1,990
10	2,080	2,080	1,560	5,600	6,500	18,000	32,400	13,200	9,200	2,080	2,300	1,990
11	4,140	2,080	1,560	6,800	7,000	15,600	26,500	26,500	9,200	2,080	1,900	2,190
12	5,220	2,080	2,080	6,400	6,500	15,600	22,000	21,200	7,650	2,080	1,720	4,140
13	5,220	2,080	1,900	6,400	6,000	23,800	19,600	18,800	6,800	2,080	1,720	3,470
14	5,600	1,900	2,080	6,400	6,500	24,700	18,000	22,000	6,000	2,080	1,810	2,840
15	4,140	1,900	2,300	4,670	6,500	21,200	16,400	21,200	4,850	1,810	1,640	2,190
16	3,150	1,900	2,080	4,600	4,400	20,400	14,200	17,200	5,220	1,640	1,720	2,190
17	2,840	1,720	2,080	4,400	4,600	40,900	11,800	16,400	4,850	1,640	1,560	1,900
18	2,840	1,720	2,300	4,400	5,500	37,600	11,800	19,600	4,490	1,720	1,560	1,810
19	2,560	1,720	2,300	4,600	5,000	44,500	10,400	18,000	4,140	1,640	1,480	1,640
20	2,560	1,900	2,300	4,600	4,600	43,300	9,800	17,200	4,140	1,480	1,640	1,640
21	2,300	1,900	1,900	5,000	4,400	36,500	9,200	13,200	3,800	1,400	1,480	2,190
22	2,300	1,720	1,900	6,800	4,400	30,400	8,650	14,800	3,470	1,400	1,480	2,560
23	2,300	1,720	1,900	10,400	4,400	36,400	8,150	15,600	3,470	1,640	1,480	2,560
24	2,080	1,720	2,840	11,800	4,200	44,500	8,650	13,200	3,000	1,400	1,480	2,560
25	2,080	1,720	2,840	14,000	4,600	69,200	8,150	11,800	3,000	1,480	1,480	4,850
26	2,080	1,720	2,080	9,800	4,800	53,200	7,650	10,400	2,840	1,560	1,400	6,400
27	1,900	1,720	2,300	9,800	5,500	42,100	7,200	9,200	2,840	1,640	1,320	5,600
28	2,080	1,900	2,560	9,800	7,000	33,400	6,800	8,150	2,700	1,560	1,320	4,490
29	2,300	1,720	2,840	9,200	-------	29,400	17,200	7,650	2,700	1,640	1,480	3,800
30	2,300	1,720	2,840	9,800	-------	22,900	12,500	7,200	3,150	7,200	1,480	3,150
31	2,080	-------	2,560	8,150	-------	20,400	--------	6,400	-------	6,400	1,640	------

NOTE.—This table indicates flow in river only. Diversion by canal included in monthly table. Stage-discharge relation affected by ice Jan. 16–21, Feb. 7 to Mar. 3. Daily discharge determined by study of eather records and comparison with records for other stations on Delaware River.

Monthly discharge of Delaware River at Trenton, N. J., for the year ending Sept. 30, 1923

[Drainage area, 6,800 square miles]

Month	Discharge in second-feet					Run-off in inches
	At gage			Plus diversions		
	Maximum	Minimum	Mean	Mean	Per square mile	
October	5,600	1,560	2,590	2,990	0.440	0.51
November	2,300	1,720	1,890	2,290	.337	.38
December	2,840	1,400	2,040	2,410	.354	.41
January	20,400	3,800	8,580	8,780	1.29	1.49
February	8,650	4,200	6,020	6,220	.915	.95
March	69,200	7,000	28,000	28,400	4.18	4.82
April	73,400	7,200	19,200	19,600	2.88	3.21
May	27,400	6,400	14,600	15,000	2.21	2.55
June	9,200	2,700	5,010	5,410	.796	.89
July	7,200	1,400	2,310	2,710	.399	.46
August	5,600	1,320	2,160	2,560	.376	.43
September	6,400	1,640	2,820	3,220	.474	.53
The year	73,400	1,320	7,960	8,290	1.22	16.63

BEAVER KILL AT COOKS FALLS, N. Y.

LOCATION.—At covered highway bridge in Cooks Falls, Delaware County, 5½ miles below mouth of Willowemoc Creek and 10 miles above mouth.

DRAINAGE AREA.—241 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 25, 1913, to September 30, 1923.

GAGE.—Vertical staff, in three sections, bolted to rock on left bank under bridge read by H. B. Couch.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Coarse gravel, boulders, and solid ledge; shifts occasionally.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.8 feet at 7 a. m. April 6 (discharge, 7,480 second-feet); minimum stage recorded, 0.62 foot from 7 a. m. August 27 to 3 p. m. August 28 (discharge, 54 second-feet).

1913–1923: Maximum stage recorded, 12.4 feet at 5 p. m. October 30, 1917 (discharge, about 9,700 second-feet); minimum discharge, 30 second-feet from 7 a. m. October 12 to 7 a. m. October 13, 1916.

ICE.—Stage-discharge relation somewhat affected by ice.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice from December to March. Rating curve fairly well defined between 80 and 3,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except during period of ice effect, for which they are fair.

Discharge measurements of Beaver Kill at Cooks Falls, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage Height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 6	A. W. Harrington	1.10	83.0	Mar. 1	B. F. Howe	*2.37	228
6	do	1.09	81.7	Apr. 12	J. L. Lamson	4.98	1,700
Jan. 23	B. F. Howe	*3.27	672	Aug. 13	A. W. Harrington	1.40	122
Feb. 10	J. L. Lamson	2.27	307				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Beaver Kill at Cooks Falls, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	92	118	104	1,700	360	240	980	1,870	222	126	126	118
2	87	118	92	1,600	380	260	880	1,330	188	118	118	98
3	82	111	92	1,100	400	320	1,150	780	178	118	104	87
4	82	111	104	850	320	950	2,240	730	168	111	92	118
5	82	104	111	700	260	1,210	3,760	680	635	111	87	104
6	69	104	82	550	220	635	6,720	590	338	104	82	98
7	66	118	69	400	200	525	4,050	505	390	104	69	98
8	168	118	142	360	220	465	3,580	485	1,730	98	69	118
9	247	126	234	360	360	425	2,960	880	1,330	92	63	680
10	680	118	150	340	320	465	2,160	1,210	730	87	63	320
11	425	111	82	260	275	425	1,660	830	590	82	63	210
12	223	104	234	220	247	425	1,870	680	505	82	60	168
13	168	104	168	190	260	465	1,660	1,210	425	69	111	159
14	142	98	142	200	280	445	1,330	880	390	74	82	134
15	134	104	168	240	240	445	1,090	780	338	82	69	126
16	126	118	140	200	220	568	980	880	290	92	63	126
17	134	118	130	180	190	1,460	930	980	275	87	60	118
18	126	118	130	190	160	1,590	880	780	247	82	58	118
19	118	111	100	300	160	1,150	780	680	234	63	58	104
20	118	111	100	1,100	150	930	780	680	188	63	58	104
21	118	111	95	1,700	140	830	1,040	830	168	63	58	372
22	111	104	90	1,400	140	1,210	1,150	730	150	60	58	305
23	111	104	95	700	140	2,880	780	590	142	60	58	465
24	150	104	100	650	150	2,480	680	545	134	60	58	525
25	134	98	110	500	150	2,320	635	465	118	82	56	355
26	118	87	140	420	180	1,940	568	445	168	82	56	305
27	118	92	150	380	220	1,590	505	425	150	69	54	234
28	118	126	360	320	240	1,390	445	408	142	178	54	210
29	118	118	260	240	-------	1,270	2,960	355	134	159	730	247
30	118	111	140	180	-------	1,150	2,960	320	126	118	210	210
31	118	-------	240	240	-------	780	-------	247	-------	118	142	-------

NOTE.—Discharge Dec. 17, Jan. 19, 20, 24, 25, 26, 27, Feb. 19, and 20, estimated as indicated in above table; no gage-height record. Discharge Dec. 16 to Feb. 9 and Feb. 14 to Mar. 4 determined from gage heights corrected for ice effect by means of three discharge measurements, study of observer's notes, gage-height graph, and weather records and by comparison with records of East Branch of Delaware River at Fishs Eddy, N. Y.

Monthly discharge of Beaver Kill at Cooks Falls, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 241 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	680	66	152	0.631	0.73
November	126	87	110	.456	.51
December	360	69	140	.581	.67
January	1,700	180	573	2.38	2.74
February	400	140	236	.979	1.02
March	2,880	240	1,010	4.19	4.83
April	6,720	445	1,740	7.22	3.06
May	1,870	247	735	3.05	3.52
June	1,730	118	361	1.50	1.67
July	178	60	93.4	.388	.45
August	730	54	99.6	.413	.48
September	680	87	214	.888	.90
The year	6,720	54	455	1.89	25.67

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WEST BRANCH OF DELAWARE RIVER AT HALE EDDY, N. Y.

LOCATION.—At highway bridge in Hale Eddy, Delaware County, 8 miles below power dam of Deposit Electric Co. and 8½ miles above junction with East Branch of Delaware River.

DRAINAGE AREA.—603 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 15, 1912, to September 30, 1923.

GAGE.—Vertical staff in four sections, attached to rocks near right abutment of bridge and to abutment; read by W. J. Shanly.

DISCHARGE MEASUREMENTS.—Made from cable 400 feet below gage or by wading.

CHANNEL AND CONTROL.—Coarse gravel and boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.0 feet at noon March 17 (stage-discharge relation affected by ice); maximum open-water stage, 10.6 feet at 4 p. m. March 17 (discharge, 11,400 second-feet); minimum stage recorded, 1.4 feet several times during July and August (discharge, 53 second-feet).

1912–1923:[5] Maximum stage recorded, 15.3 feet at 5 p. m. March 27, 1913 (discharge, 25,000 second-feet); minimum stage recorded, 1.0 foot at 6 p. m. September 21, 1913 (discharge, 34 second-feet).

ICE.—Stage-discharge relation seriously affected by ice.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice from December to March. Previous rating was revised below 750 second-feet to agree more closely with current discharge measurements, and new rating used throughout year. Rating curve fairly well defined between 50 and 24,000 second-feet. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table Records fair, except during period of ice effect for which they are approximate only.

Discharge measurements of West Branch of Delaware River at Hale Eddy, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 6	A. W. Harrington	1.74	112	Mar. 2	B. F. Howe	[a] 5.55	341
Jan. 21	B. F. Howe	[a] 8.08	649	Apr. 11	J. L. Lamson	5.30	2,320
Feb. 8	J. L. Lamson	[a] 6.90	714	Aug. 14	A. W. Harrington	1.57	73.1

[a] Stage-discharge relation affected by ice.

[5] The flood of October 10, 1903, reached a stage of 20.3 feet, corresponding to a discharge of approximately 46,000 second-feet.

Daily discharge, in second-feet, of West Branch of Delaware River at Hale Eddy, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	146	146	290	3,200	320	340	1,360	2,470	330	175	166	146
2	146	160	330	3,400	550	340	1,360	2,070	310	146	160	108
3	133	146	290	2,400	800	500	1,210	1,790	310	133	175	86
4	120	133	310	1,700	650	700	1,880	1,520	310	133	350	77
5	113	160	310	1,300	550	2,000	3,820	1,210	310	128	350	108
6	113	175	300	900	500	1,500	9,100	1,070	330	108	290	310
7	120	175	240	700	500	1,300	5,580	1,000	390	113	238	255
8	205	160	380	650	700	1,200	3,820	930	675	113	220	290
9	455	146	380	600	700	1,300	2,980	3,320	650	108	190	625
10	575	175	300	650	600	1,100	2,470	3,320	575	104	175	625
11	650	146	320	600	550	1,000	2,270	2,470	500	90	133	575
12	478	175	340	500	550	1,100	1,880	2,370	390	90	108	455
13	370	175	320	460	550	1,000	1,520	2,270	350	86	108	390
14	238	160	300	360	550	900	1,360	2,070	350	82	82	390
15	205	205	280		500	950	1,360	1,790	290	72	108	272
16	175	272	220		460	1,700	1,210	1,520	272	82	97	238
17	160	205	240	500	420	6,500	1,070	1,700	238	68	77	205
18	175	175	260		380	5,920	930	1,520	205	72	77	190
19	175	146	220		340	4,490	930	1,360	255	72	68	160
20	146	175	200		320	3,320	870	1,210	255	68	53	290
21	146	205	220	600	320	2,980	810	1,210	238	65	56	1,140
22	146	205	180	600	340	4,640	675	1,000	220	56	97	750
23	175	220	200	600	340	6,270	675	840	205	56	77	478
24	238	205	200	600	320	8,020	675	700	205	53	77	410
25	220	238	220	600	300	5,920	675	625	175	56	65	350
26	205	205	280	650	360	3,820	625	575	175	56	53	290
27	175	205	320	600	420	2,770	600	550	205	77	68	238
28	175	238	400	600	480	2,270	650	478	205	108	86	310
29	160	255	480	440	-------	2,070	6,270	432	160	120	600	350
30	146	310	400	340	-------	1,790	3,820	370	175	146	432	310
31	160	-------	360	280	-------	1,440	-------	310	------	190	220	-------

NOTE.—Discharge Jan. 15–20 estimated from hydrograph and comparison with records in near-by drainage areas. Discharge Dec. 6 to Mar. 17 determined from gage heights corrected for ice effects by means of three discharge measurements, study of observer's notes, gage-height graph, and weather records and by comparison with records in near-by drainage areas.

Monthly discharge of West Branch of Delaware River at Hale Eddy, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 603 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	650	113	221	0.367	0.42
November	310	133	190	.315	.35
December	480	180	293	.486	.56
January	3,400	280	849	1.41	1.63
February	800	300	478	.793	.83
March	8,020	340	2,550	4.23	4.88
April	9,100	600	2,080	3.45	3.85
May	3,320	310	1,420	2.35	2.71
June	675	160	309	.512	.57
July	190	53	97.6	.162	.19
August	600	53	163	.270	.31
September	1,140	77	347	.575	.64
The year	9,100	53	753	1.25	16.94

FLAT BROOK NEAR FLATBROOKVILLE, N. J.

LOCATION.—At farm of E. S. Aker, 1 mile above Flatbrookville, Sussex County, and 1½ miles above mouth.

DRAINAGE AREA.—65 square miles.

RECORDS AVAILABLE.—July 8 to September 30, 1923.

GAGE.—Inclined staff gage on right bank; read by E. S. Aker.

DISCHARGE MEASUREMENTS.—Made from footbridge or by wading.

CHANNEL AND CONTROL.—Channel, fine to coarse gravel. Control is bar of heavy gravel 50 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 2.09 feet at 7.30 a. m. September 9 (discharge, 83 second-feet); minimum stage recorded 1.35 feet at 7 a. m. September 6 and 7 (discharge, 4 second-feet).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 6 and 250 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Flat Brook near Flatbrookville, N. J., during the period July 8 to Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Gage height	Discharge
	Feet	*Sec.-ft.*
July 8	1.64	22.9
Aug. 24	1.42	6.4

Daily discharge, in second-feet, of Flat Brook near Flatbrookville, N. J., for the period July 8 to Sept. 30, 1923

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1		35	5	11	18	16	16	21	19	11	15
2		16	5	12	20	14	13	22	15	17	23
3		18	7	13	17	12	12	23	13	18	22
4		42	14	14	17	12	18	24	11	17	21
5		31	11	15	21	12	26	25	18	8	13
6		18	9	16	21	11	10	26	18	9	14
7		16	5	17	21	12	7	27	12	9	19
8	21	15	11	18	21	11	8	28	16	13	10
9	19	13	70	19	20	10	9	29	30	21	12
10	19	13	34	20	15	9	12	30	23	9	11
								31	25	11	

Monthly discharge of Flat Brook near Flatbrookville, N. J., for the period July 8 to Sept. 30, 1923

[Drainage area, 65 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
July 8–31	30	11	18.8	0.289	0.26
August	42	8	15.5	.238	.27
September	70	5	15.4	.237	.26

PAULINS KILL AT BLAIRSTOWN, N. J.

LOCATION.—At highway bridge in Blairstown, Warren County, 200 feet above mouth of Blairs Creek and 9 miles above mouth of Paulins Kill.

DRAINAGE AREA.—128 square miles (measured on topographic map).

RECORDS AVAILABLE.—October 20, 1921, to September 30, 1923.

GAGE.—Water-stage recorder in wooden shelter on right bank just above highway bridge. Auxiliary chain gage on upstream side of highway bridge. Recorder operated by Mrs. G. W. Croupe.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel sand and gravel. Control riffle of small boulders at downstream side of bridge.

EXTREMES OF DISCHARGE.—Maximum stage during year from water stage recorder, 6.93 feet at 7 a. m. March 17 (discharge, 1,750 second-feet); minimum stage recorded, 1.34 feet at 3 p. m. November 1 (discharge, about 2.8 second-feet).

1921–1923: Maximum stage recorded during period, 7.0 feet at 4 p. m. March 8, 1922 (discharge, 1,800 second-feet); minimum stage recorded, 1.34 feet at 3 p. m. November 1, 1922 (discharge, about 2.8 second-feet).

ICE.—Stage-discharge relation affected by ice during winter.

REGULATION.—Distribution of flow affected by storage in Swartswood Lake and by water power above station.

ACCURACY.—Stage-discharge relation permanent, except as affected by ice. Rating curve well defined to 1,500 second-feet. Operation of recorder satisfactory. Daily discharge ascertained by use of discharge integrator. Records very good.

Discharge measurements of Paulins Kill at Blairstown, N. J., during the year ending Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 18	1.46	8.8	Mar. 5	4.94	*814
18	1.46	8.2	19	5.91	1,240
Feb. 2	2.42	145	Aug. 22	1.47	10.4
2	2.46	150			

*Meter was lost; part of discharge was estimated.

Daily discharge, in second-feet, of Paulins Kill at Blairstown, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	56	36	33	291	144	102	227	188	78	53	39	30
2	56	43	32	550	141	118	225	152	77	47	31	25
3	61	43	39	415	153	162	217	132	75	47	45	25
4	50	47	36	259	156	445	239	116	84	42	31	25
5	61	60	39	190	130	755	335	106	86	44	44	41
6	55	55	28	164	110	614	544	104	83	35	41	34
7	57	51	24	114	120	458	436	95	96	45	31	32
8	63	55	24	101	130	424	342	92	177	35	26	37
9	82	48	36	147	133	374	292	169	154	32	35	60
10	82	53	43	146	122	318	258	186	104	38	23	64
11	94	47	44	141	116	284	231	145	92	38	31	41
12	102	51	46	119	100	395	210		77	35	24	40
13	95	28		120	113	555	196		72	33	35	48
14	78	59		90	127	613	184		67	40	25	50
15	69	54	38	122		571	169		69	34	27	41
16	56	47		129		888	165		78	34	24	30
17	62	37		144		1,600	155	150	66	36	27	34
18	57	44	44	125		1,400	147		65	32	23	28
19	62	43	39	119		1,210	142		65	33	22	29
20	51	45	33	110	90	784	139		55	30	32	40
21	43	52	33	116		686	129		45	31	33	50
22	43	45	33	291		635	122		34	30	33	60
23	51	33	36	295		662	117	205	62	25	38	63
24	45	36	29	255		740	104	166	50	29	37	69
25	48	41	33	254		583	102	140	50	40	35	52
26	51	34	49	219	93	473	93	123	56	45	35	52
27	49	39	29	216	98	406	92	113	52	48	35	47
28	43	35	36	168	106	362	96	103	53	42	27	45
29	36	26	71	161	------	281	295	83	53	32	35	43
30	32	20	102	154	------	291	267	88	57	45	28	40
31	39	------	72	120	------	272	------	85	------	34	32	------

NOTE.—Stage-discharge relation affected by ice Jan. 13, 14, 31, Feb. 5–8, 12, and 15–25; discharge estimated. Mean discharge for Dec. 13–17, Feb. 15–25, and May 12–22 estimated by comparison with records of near-by stream.

Monthly discharge of Paulins Kill at Blairstown, N. J., for the year ending Sept. 30, 1923

[Drainage area, 128 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	102	32	59.0	0.461	0.53
November	60	20	43.6	.341	.38
December	102	24	40.5	.316	.36
January	550	90	189	1.48	1.71
February	156	------	110	.859	.89
March	1,600	102	563	4.40	5.07
April	544	92	209	1.63	1.82
May	------	83	137	1.07	1.23
June	177	34	74.4	.581	.65
July	53	25	37.5	.293	.34
August	45	22	31.7	.248	.29
September	69	25	42.5	.332	.37
The year	1,600	20	129	1.01	13.64

PEQUEST RIVER AT PEQUEST, N. J.

LOCATION.—At Pequest station, Warren County, on Lehigh & Hudson River Railroad, 100 feet above railroad bridge, 300 feet below mouth of Furnace Brook, and 6¾ miles above mouth of Pequest River.

DRAINAGE AREA.—108 square miles (measured on topographic map).

RECORDS AVAILABLE.—November 7, 1921, to September 30, 1923.

GAGE.—Vertical staff gage attached to face of former bridge abutment on right bank 100 feet above railroad bridge; read by Marcus Beers.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 15 feet above gage.

CHANNEL AND CONTROL.—Channel fine gravel; control riffle of large stones probably remains of old diversion dam 50 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year 2.91 feet at 5 p. m. March 19 (discharge, 694 second-feet); minimum stage recorded, 0.36 foot at 7.30 a. m. September 6 (discharge, 20 second-feet).

1921–1923: Maximum stage recorded, that of March 19, 1923; minimum stage recorded, that of September 6, 1923.

ICE.—Stage-discharge relation not seriously affected by ice.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 20 and 800 second-feet. Gage read to even hundredths twice a day. Daily discharge ascertained by applying to rating table mean daily gage height. Records good.

Discharge measurements of Pequest River at Pequest, N. J., during the year ending Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 4	0.64	39.2	Feb. 1	1.34	158	Mar. 19	2.92	700
4	.64	38.4	Mar. 15	2.19	413	Aug. 22	.42	22.6
Feb. 1	1.28	147						

Daily discharge, in second-feet, of Pequest River at Pequest, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	72	49	44	277	134	105	206	193	77	45	36	24
2	70	51	45	343	145	134	193	156	75	34	33	23
3	64	60	45	343	145	180	193	134	77	42	30	28
4	66	66	43	293	156	414	206	124	88	66	30	24
5	66	66	57	206	105	414	293	114	88	62	28	22
6	66	62	60	180	86	378	378	114	78	52	30	21
7	63	72	40	134	96	248	378	114	105	44	29	21
8	78	66	49	88	114	220	326	105	124	41	30	24
9	88	56	52	134	114	248	277	156	124	41	24	25
10	105	55	57	145	114	234	234	193	96	37	25	27
11	124	51	49	96	96	220	206	145	82	36	24	26
12	124	55	62	124	88	326	193	134	74	34	32	24
13	105	57	45	105	114	451	193	206	68	34	34	24
14	86	52	36	62	124	414	180	168	66	33	30	25
15	80	49	50	83	74	414	168	134	69	32	28	25
16	77	51	44	124	65	489	168	134	63	55	27	27
17	75	60	56	88	65	565	156	156	57	40	25	24
18	78	55	52	88	70	605	145	134	57	34	24	23
19	72	52	47	105	88	690	145	114	52	34	24	28
20	70	47	50	82	72	605	134	114	63	30	24	25
21	75	55	43	145	80	645	134	206	52	29	22	38
22	63	52	50	293	85	605	124	206	53	30	25	36
23	68	50	42	248	72	527	124	156	63	31	28	38
24	69	50	39	180	72	527	124	134	62	34	28	37
25	75	49	43	193	75	489	114	114	50	60	26	37
26	63	42	47	180	78	451	114	105	46	41	25	31
27	60	44	52	180	88	414	105	96	42	34	23	30
28	56	42	105	156	105	414	105	96	47	34	22	31
29	52	46	96	134	-------	293	277	96	45	37	30	30
30	51	42	83	134	-------	293	262	82	45	35	27	24
31	50	-------	82	96	-------	234	-------	80	-------	34	25	-------

NOTE.—Stage-discharge relation affected by ice Feb. 16–18; discharge estimated.

Monthly discharge of Pequest River at Pequest, N. J., for the year ending Sept. 30, 1923

[Drainage area, 108 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	124	50	74.5	0.690	0.80
November	72	42	53.5	.495	.55
December	105	36	53.7	.497	.57
January	343	62	163	1.51	1.74
February	156	65	97.1	.899	.94
March	690	105	395	3.66	4.22
April	378	105	195	1.81	2.02
May	206	80	136	1.26	1.45
June	124	42	69.6	.644	.72
July	66	29	39.5	.366	.42
August	36	22	27.4	.254	.29
September	38	21	27.2	.252	.28
The year	690	21	111	1.03	14.00

BEAVER BROOK NEAR BELVIDERE, N. J.

LOCATION.—500 feet above mouth of brook and 2 miles east of Belvidere, Warren County.

DRAINAGE AREA.—36 square miles (measured on topographic map).

RECORDS AVAILABLE.—May 24, 1922, to September 30, 1923.

GAGE.—Water-stage recorder on right bank 500 feet above mouth of brook; operated by M. F. Hildebrant.

DISCHARGE MEASUREMENTS.—Made by wading at various points or from highway bridge one-fourth mile above gage.

CHANNEL AND CONTROL.—Gravel and ledge. Control is solid rock outcrop 25 feet below gage, improved by having rough cavities filled with concrete; permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.83 feet at 11 a. m. March 17 (discharge, 760 second-feet); minimum stage from recorder, 1.21 feet on September 4 and 5 (discharge, about 3.1 second-feet).

1922–1923: Maximum and minimum stages occurred in 1923.

REGULATION.—Daily distribution of flow often irregular because of operation of small grist mills some distance upstream.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height and by use of discharge integrator. Records very good.

Discharge measurements of Beaver Brook near Belvidere, N. J., during the year ending Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 28	1.42	8.2	Jan. 4	2.13	59	Mar. 14	2.82	213
28	1.42	8.4	4	2.12	58	15	2.78	196
Dec. 2	1.44	7.5	5	2.05	51	18	3.34	445
2	1.43	7.1	5	2.05	49.5	18	3.31	427
4	1.34	5.1	Feb. 5	*2.20	57	July 11	1.37	5.3
4	1.34	5.2	Mar. 14	2.81	208	12	1.38	6.0
4	1.34	5.0						

*Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Beaver Brook near Belvidere, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9.5	7.9	5.5	64	40	31	65	52	24	12	6.2	3.8
2	10	9.2	7.5	132	55	42	115	44	23	8.2	6.2	3.6
3	9.5	9.2	6.7	81	70	80	64	39	20	9.4	5.2	3.3
4	9.5	11	5.2	60	65	150	72	37	23	12	5.6	3.1
5	9.5	10	7.8	52	55	123	108	33	20	11	5.7	3.5
6	10	10	9.7	47	55	78	132	34	20	9.4	5.2	3.2
7	9.2	11	7.8	56	55	82	104	33	27	8.2	5.1	4.4
8	16	11	8.6	102	50	89	95	31	54	7.0	4.5	5.5
9	22	9.5	10	104	30	76	88	34	39	7.0	4.5	5.8
10	21	8.5	14	49	28	95	78	59	31	6.7	4.8	6.0
11	26	8.5	9	38	22	95	72	44	25	6.0	3.8	6.0
12	17	9.2	15	28	16	134	66	39	22	6.0	4.8	4.5
13	14	8.8	13	20	24	189	62	50	20	5.8	5.6	5.5
14	14	9.2	8	60	34	207	59	55	18	5.6	4.9	6.2
15	12	8.8	10	74	24	201	55	44	19	5.4	4.1	4.7
16	12	8.5	12	46	18	250	57	41	18	17	3.9	4.7
17	11	9.2	20	31	18	636	48	47	16	8.2	4.5	4.0
18	10	7.9	18	28	18	452	47	46	14	6.4	4.1	3.7
19	10	8.5	16	24	14	368	45	39	13	6.0	3.8	4.6
20	10	8.8	14	19	14	250	43	36	12	5.6	3.5	3.8
21	9.8	8.8	14	16	14	221	41	56	10	5.8	3.9	7.4
22	8.5	7.9	11	34	16	189	38	59	10	4.6	5.7	9.1
23	9.8	8.2	8.6	50	15	177	37	46	14	5.6	5.5	9.4
24	8.5	7.3	8	50	20	180	35	41	30	6.7	4.8	9.6
25	8.5	7.6	11	70	18	154	33	38	32	10	4.4	7.8
26	9.5	7.8	13	65	16	134	30	35	18	7.0	4.0	6.0
27	9.8	5.5	18	60	18	117	29	34	15	5.8	3.7	6.3
28	8.8	6.7	30	50	20	102	30	33	13	6.4	4.2	5.3
29	8.8	6.6	24	40	-------	84	88	30	12	6.7	4.4	5.0
30	7.9	6.3	17	30	-------	84	65	29	11	7.0	4.4	5.0
31	8.5	-------	12	22	-------	76	-------	25	-------	5.8	4.1	-------

NOTE.—Stage-discharge relation affected by ice Feb. 6-10 and 18-28; discharge determined by comparison with records for near-by streams.

Monthly discharge of Beaver Brook near Belvidere, N. J., for the year ending Sept. 30, 1923

[Drainage area, 36 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	26	7.9	11.6	0.322	0.37
November	11	5.5	8.58	.238	.27
December	30	5.2	12.4	.344	.40
January	132	16	51.7	1.44	1.66
February	70	14	30.1	.836	.87
March	636	31	166	4.61	5.32
April	132	29	63.4	1.76	1.96
May	59	25	40.7	1.13	1.30
June	54	10	20.8	.578	.64
July	17	4.6	7.56	.210	.24
August	6.2	3.5	4.68	.130	.15
September	9.6	3.1	5.36	.149	.17
The year	636	3.1	35.4	.983	13.35

MUSCONETCONG RIVER NEAR HACKETTSTOWN, N. J.

LOCATION.—500 feet above Delaware, Lackawanna & Western Railroad bridge, half a mile below Saxton Falls dam of Morris Canal, and 3 miles above Hackettstown, Warren County.

DRAINAGE AREA.—70 square miles (measured on topographic map).

RECORDS AVAILABLE.—September 24, 1921, to September 30, 1923.

GAGE.—Automatic water-stage recorder installed on left bank 500 feet above Delaware, Lackawanna & Western Railroad bridge August 21, 1923. Prior to this date an inclined staff gage was used at the same location. Gage read and recorder operated by Mary C. Luyster Hulse and Clifford Strand

DISCHARGE MEASUREMENTS.—Made from railroad bridge or by wading.

CHANNEL AND CONTROL.—Coarse gravel, probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.75 feet at 8.30 a. m. March 17 (discharge, 518 second-feet); minimum stage recorded, 1.28 feet at 5.30 p. m. May 26 (discharge, 11 second-feet).

1922–1923: Maximum stage estimated from graph, 4.2 feet at 3 a. m. September 5, 1922 (discharge, 720 second-feet); minimum stage recorded, 1.05 feet at 5.30 p. m. May 1, 1922 (discharge, 3 second-feet).

ICE.—Stage-discharge relation affected by ice during winter.

DIVERSIONS.—Lake Hopatcong, about 9 miles above this station, is the source of supply for the Morris Canal. There is a complex interchange of water between the canal and the river from the lake down to the Saxton Falls dam, where the canal finally leaves the river and extends westward to Delaware River at Phillipsburg. The canal also extends eastward to Wharton and thence down the Passaic Valley to Newark. The record at this station represents the amount of water left in Musconetcong River by the Morris Canal.

REGULATION.—Distribution of flow is affected by operation of Morris Canal. See "Diversions."

ACCURACY.—Stage-discharge relation permanent, except as affected by ice. Rating curve well defined between 10 and 450 second-feet. Daily discharge ascertained by applying to rating table mean daily gage height. Records good.

Discharge measurements of Musconetcong River near Hackettstown, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 1	Otto Lauterhahn	*2.36	61	May 23	Otto Lauterhahn	2.37	136
May 22	do	2.60	181	Aug. 21	O. W. Hartwell	1.54	29.6

*Stage-discharge relation affected by ice.

Discharge measurements of Morris canal near Hackettstown, N. J., during the year ending Sept. 30, 1923

Date	Made by—	Discharge	Date	Made by—	Discharge
		Sec.-ft.			*Sec.-ft.*
Feb. 1	Otto Lauterhahn	11.2	July 26	Otto Lauterhahn	13.0
May 3	O. W. Hartwell	0	Aug. 21	O. W. Hartwell	9.6
22	Otto Lauterhahn	0			

Daily discharge, in second-feet, of Musconetcong River near Hackettstown, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	40	45	36	160		55	123	160	37	26	33	25
2	37	45	30	276		57	123	107	28	24	31	26
3	28	62	24	180		64	107	78	23	22	32	26
4	27	55	24	160		107	107	78	20	35	30	26
5	23	49	36	107	55	170	132	78	49	37	31	26
6	37	49	37			160	170	64	46	35	30	28
7	43	51	36			160	150	43	59	33	30	44
8	46	46	33			160	123	56	100	28	31	27
9	56	47	35	120		160	115	100	141	28	31	31
10	64	45	36			141	107	107	107	31	30	30
11	107	45	30			107	92	107	64	29	31	26
12	80	45	28			132	107	107	36	29	31	32
13	68	40	28			202	92	150	18	26	36	36
14	56	40	33			191	78	160	19	31	30	30
15	46	43	37			150	76	123	27	37	30	29
16	43	45	26	55		202	64	115	19	35	29	29
17	46	41	31			499	62	141	19	33	30	29
18	44	30	28			403	62	141	18	29	28	29
19	41	33	28			428	57	150	19	26	29	29
20	39	43	20		50	333	57	132	18	24	31	29
21	36	55	22			263	56	160	19	22	26	50
22	39	46	24			64	47	170	18	24	36	44
23	36	49	24			66	68	132	22	26	30	41
24	34	49	22			304	68	141	24	35	26	45
25	35	40	22			132	43	33	26	32	24	36
26	44	50	22	100		55	46	23	39	30	24	34
27	44	49	22			43	46	15	35	24	24	28
28	41	49	46			160	76	46	24	24	25	28
29	40	43	67		-------	150	123	40	30	23	29	30
30	41	37	68		-------	123	141	46	28	32	27	30
31	47	-------	36		-------	123	--	41	-------	33	27	-------

NOTE.—This table does not include water diverted by Morris Canal. Stage-discharge relation affected by ice Jan. 6 to Mar. 1. Mean discharge estimated from study of one discharge measurement and weather records and by comparison with records for near-by stations. Daily discharge estimated because of no gage-height record Mar. 7, 31, July 11–25, and Sept. 15–22.

Monthly discharge of Musconetcong River near Hackettstown, N. J., for the year ending Sept. 30, 1923

[Drainage area, 70 square miles]

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October	107	23	45.5	May	170	15	98.2
November	62	30	45.5	June	141	18	37.7
December	68	20	32.0	July	37	22	29.1
January	-------	-------	103	August	36	24	29.4
February	-------	-------	51.8	September	-------	25	31.8
March	499	43	175				
April	170	43	90.6	The year	499	15	64.4

NOTE.—This table does not include water diverted from Musconetcong River by Morris Canal.

MUSCONETCONG RIVER NEAR BLOOMSBURY, N. J.

LOCATION.—At highway bridge 1½ miles above Bloomsbury, Hunterdon County, and 9 miles above mouth of river.

DRAINAGE AREA.—143 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 4, 1903, to March 31, 1907; and from July 26, 1921, to September 30, 1923.

GAGE.—Gurley seven-day water-stage recorder in concrete shelter on right bank just below bridge; operated by Howard Person. Auxiliary vertical staff gage in downstream side of right bridge abutment. Not at datum used 1903 to 1907. Comparison between ratings for the two periods indicates that datum of present gage is about 0.03 foot lower than datum used from 1903 to 1907.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Channel gravel. Control gravel riffle 150 feet below gage. Banks are overflowed at high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.75 feet at 11 p. m. March 16 (discharge, 1,040 second-feet); minimum stage, 0.68 foot at 10 a. m. August 31 (discharge, 26 second-feet).

1903–1907, 1921–1923: Maximum stage recorded, 8.0 feet (1903–1907 datum) on October 10 or 11, 1903 (discharge not determined); minimum stage, 0.73 foot November 19, 1921 (discharge, 21 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—Lake Hopatcong at head of Musconetcong River is source of supply for Morris canal. Through this canal water passes westward to Delaware River at Phillipsburg and eastward down the Passaic Valley to Newark. Water left in the Musconetcong by canal is measured by gaging station near Hackettstown.

REGULATION.—Distribution of flow affected by several small water powers above the station.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined between 75 and 350 second-feet. Operation of water-stage recorder satisfactory during the year. Daily discharge determined by integrator except for periods of ice effect. Records good.

COOPERATION.—Station established in cooperation with the Warren Manufacturing Co.

Discharge measurements of Musconetcong River near Bloomsbury, N. J., during the year ending Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Feb. 6	[a]1.06	49.6	Mar. 17	3.26	827	July 12	0.917	49.0
Mar. 13	2.26	448	17	3.15	772	12	.92	52.

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Musconetcong River near Bloomsbury, N. J., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	97	100	91	466	134	141	250	242	119	80	86	68
2	106	103	99	412	138	175	246	2.5	101	98	83	45
3	101	109	63	298	140	341	244	189	141	85	78	71
4	103	125	88	250	133	459	236	184	147	92	78	68
5	93	95	90	205	105	428	328	174	103	151	69	64
6	102	116	87	175	90	310	412	160	124	103	72	65
7	103	111	97	142	85	284	301	151	144	96	72	66
8	109	110	82	126	85	290	282	139	228	80	73	76
9	132	111	95	154	100	257	257	250	251	93	71	74
10	137	98	81	151	116	238	230	205	205	84	65	77
11	194	99	85	128	95	235	227	201	171	94	77	70
12	163	92	83	118	75	364	220	201	133	83	71	61
13	136	111	78	113	100	450	214	249	114	78	100	66
14	121	93	67	93	129	474	202	238	107	74	76	72
15	108	91	76	122	100	366	188	224	102	72	73	64
16	110	101	78	116	80	640	192	217	87	116	70	51
17	116	107	68	119	80	834	172	260	83	103	79	69
18	116	93	94	125	80	703	179	230	99	92	70	71
19	109	76	79	118	80	678	164	214	86	77	55	60
20	110	94	84	122	80	520	158	215	89	80	78	48
21	83	98	74	154	80	497	166	290	85	70	70	114
22	90	111	77	309	85	450	156	279	87	67	70	90
23	111	106	74	223	90	447	160	253	99	74	73	82
24	101	101	62	205	85	493	155	219	100	72	72	108
25	101	93	71	224	79	421	143	177	96	109	60	84
26	103	99	81	190	96	365	138	147	87	103	54	74
27	99	111	82	176	102	353	138	113	98	83	71	73
28	93	95	146	154	140	326	139	123	94	66	76	63
29	91	105	126	158	-------	268	412	134	96	75	88	78
30	96	85	102	136	-------	276	266	121	92	84	75	59
31	98	-------	92	122	-------	263	-------	129	-------	80	72	-------

NOTE.—This table does not include water diverted by the Morris Canal. Stage-discharge relation affected by ice Feb. 5–9, 11–13, and 15–24. Discharge determined by comparison with records for near-by streams.

Monthly discharge of Musconetcong River near Bloomsbury, N. J., for the year ending Sept. 30, 1923

[Drainage area, 143 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	194	83	111	0.776	0.89
November	116	76	101	.706	.79
December	146	62	85.6	.598	.69
January	466	93	181	1.27	1.46
February	140	75	99.4	.695	.73
March	834	141	398	2.78	3.20
April	412	138	219	1.53	1.71
May	290	113	198	1.38	1.59
June	251	83	119	.832	.93
July	151	66	87.5	.612	.71
August	100	54	73.5	.514	.59
September	114	45	71.0	.497	.55
The year	834	45	146	1.02	13.84

NOTE.—This table does not include water diverted from Musconetcong River by the Morris Canal.

ASSUNPINK CREEK AT TRENTON, N. J.

LOCATION.—At Chambers Street Bridge in Trenton, Mercer County, 1½ miles above mouth.

DRAINAGE AREA.—89 square miles.

RECORDS AVAILABLE.—July 20 to September 30, 1923.

GAGE.—Automatic recorder on left bank about 50 feet above Chambers Street Bridge, inspected by engineers of United States Geological Survey.

DISCHARGE MEASUREMENTS.—Made by wading or from Monmouth Street Bridge 400 feet below gage.

CHANNEL AND CONTROL.—Channel, sand and gravel. Control is bar of gravel and large stone placed 40 feet below gage.

REGULATION.—Large fluctuations in flow at low stages due to water powers upstream.

ICE.—Stage-discharge relation not affected by ice because of use of water for condensing at steam-power plant just above gage.

EXTREMES OF DISCHARGE.—Maximum stage during period July 20 to September 30 from water-stage recorder, 3.42 feet at 9 p. m. August 19 (discharge, 397 second-feet; minimum stage from water-stage recorder 1.62 feet at 12.30 a. m. July 22 (discharge, about 10 second-feet).

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 10 and 2,200 second-feet. Daily discharge ascertained by use of discharge integrator. Records very good.

The following discharge measurement was made by Otto Lauterhahn:
July 27, 1923: Gage height, 1.78 feet; discharge, 15.6 second-feet.

Daily discharge, in second-feet, of Assunpink Creek at Trenton, N. J., for the period July 20 to Sept. 30, 1923

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1		24	22	11		20	20	21	11	24	54
2		23	21	12		20	23	22	11	27	52
3		22	20	13		20	39	23	11	26	58
4		23	18	14		19	25	24	12	24	70
5		23	18	15		22	23	25	22	23	66
6		23	18	16		18	24	26	18	22	88
7		21	18	17		18	24	27	18	20	70
8		20	21	18		17	22	28	20	20	47
9		18	22	19		23	23	29	20	23	34
10		18	20	20	16	33	21	30	27	22	29
								31	23	22	

Monthly discharge of Assunpink Creek at Trenton, N. J., for the period Aug. 1 to Sept. 30, 1923

[Drainage area, 89 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
August	33	17	21.9	0.246	0.28
September	88	18	33.7	.379	.42

NORTH BRANCH OF RANCOCAS CREEK AT PEMBERTON, N. J.

LOCATION.—Near highway bridge at Pemberton, Burlington County, 11 miles above confluence with South Branch.

DRAINAGE AREA.—111 square miles (measured on topographic map).

RECORDS AVAILABLE.—September 15, 1921, to September 30, 1923.

GAGE.—Vertical staff gage on left bank installed September 15, 1921, 800 feet downstream from highway bridge at Pemberton. Automatic water-stage recorder installed at staff gage June 9, 1923. Gage read and recorder operated by William Jones.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Sand shifting. Banks are overflowed at high stages. This station has a channel control.

REGULATION.—Distribution of flow greatly affected by operation of grist mill at Pemberton and regulation of its pond.

ACCURACY.—Stage-discharge relation not permanent. An arbitrary curve assumed for base rating. Discharge determined by applying sliding correction based on periodic discharge measurements, to mean daily gage height and then applying corrected gage height to base rating. Records fair.

Discharge measurements of North Branch of Rancocas Creek at Pemberton, N. J., during the year ending Sept. 30, 1923

[Made by Otto Lauterhahn]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Apr. 9	3.41	273	June 8	1.36	77	July 30	1.41	92
May 11	2.44	150	July 3	1.44	90	30	1.29	79
						Sept. 26	1.84	92

Monthly discharge of North Branch of Rancocas Creek at Pemberton, N. J., for the years ending Sept. 30, 1922 and 1923

[Drainage area, 111 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1921–22					
October	74	34	52.1	0.469	0.54
November	105	38	75.5	.68	.76
December	94	61	80.6	.726	.84
January	128	58	78.6	.708	.82
February	241	77	133	1.20	1.25
March	259	74	165	1.49	1.72
April	178	46	96.8	.872	.97
May	169	32	85.1	.767	.88
June	112	26	55.4	.499	.56
July	250	70	130	1.17	1.35
August	295	56	126	1.14	1.31
September	105	36	66.8	.602	.67
The year	295	26	95.3	.859	11.67
1922–23					
October	80	18	38.7	.349	.40
November	77	30	45.7	.412	.46
December	152	34	69.2	.623	.72
January	405	120	230	2.07	2.39
February	315	112	168	1.51	1.57
March	525	120	271	2.44	2.81
April	335	152	256	2.31	2.58
May	241	88	156	1.41	1.63
June	91	58	76.0	.685	.76
July	102	38	63.6	.573	.66
August	74	22	48.7	.439	.51
September	136	40	66.3	.597	.67
The year	525	18	124	1.12	15.16

SUSQUEHANNA RIVER BASIN

SUSQUEHANNA RIVER AT CONKLIN, N. Y.

LOCATION.—At steel highway bridge just below Conklin, Broome County, 5 miles below Big Snake Creek and 9 miles above mouth of Chenango River at Binghamton.

DRAINAGE AREA.—2,350 square miles.

RECORDS AVAILABLE.—November 13, 1912, to September 30, 1923.

GAGE.—Stevens continuous water-stage recorder on left bank just below bridge; inspected by George W. Marvin.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Coarse gravel and boulders; shifting occasionally.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 13.23 feet at 10.30 a. m. March 24 (discharge, 27,300 second-feet); minimum stage from water-stage recorder, 1.76 feet at 2.30 p. m. August 20 (discharge, 164 second-feet).

1912-1923: Maximum stage recorded, 18.3 feet on the morning of March 28, 1913 (discharge, 52,000 second-feet); minimum stage recorded, 1.32 feet at 8.20 a. m. and 4 p. m. September 16, 1913 (discharge, 106 second-feet).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation changed presumably at time of high water March 24. Rating curve used before that time fairly well defined between 400 and 40,000 second-feet; that used after the change well defined between 250 and 55,000 second-feet. Stage-discharge relation affected by ice from December to March. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of recorder graph, or for days of considerable fluctuation, by averaging discharge for intervals of the day. Records good, except during periods of ice effect and estimate, for which they are fair.

Discharge measurements of Susquehanna River at Conklin, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 7	A. W. Harrington	2.44	430	Apr. 10	J. L. Lamson	8.15	10,400
Jan. 20	B. F. Howe	[a]4.63	1,670	Aug. 14	A. W. Harrington	2.15	379
Feb. 7	J. L. Lamson	[a]5.02	2,730				

[a] Stage-discharge relation affected by ice

Daily discharge, in second-feet, of Susquehanna River at Conklin, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	453	551	752	3,800	2,000	2,000	4,430	6,400	1,350	642	558	677
2	447	525	738	10,000	2,400	2,400	4,640	5,060	1,280	656	740	527
3	501	532	1,050	10,000	3,800	2,600	5,940	3,950	1,130	768	712	434
4	441	544	1,620	7,500	5,000	8,000	12,500	3,240	1,120	796	593	480
5	441	597	1,290	6,000	4,800	18,000	21,500	2,830	1,220	954	635	461
6	435	646	1,140	4,800	3,600	16,000	22,600	2,440	1,400	796	649	834
7	429	625	1,450	4,200	3,000	12,000	18,700	2,140	1,800	677	600	754
8	417	590	1,130	3,000	3,000	9,000	16,100	2,000	2,500	558	558	712
9	477	688	1,210	2,800	2,400	8,500	12,600	5,960	4,230	530	518	747
10	800	760	1,460	2,800	2,400	8,100	10,800	9,500		506	440	1,280
11	962	782	1,750	2,600	2,400	7,500	8,760	7,560	2,700	458	350	1,100
12	928	790	1,400	2,200	2,200	6,500	8,040	6,630		416	310	898
13	936	709	1,200	1,900	1,800	7,000	7,100	8,520		380	295	775
14	787	660	1,050	1,700	2,000	7,000	6,170	7,330	1,880	305	340	705
15	653	660	825	1,200	2,000	6,500	5,280	5,720		330	260	712
16	577	702	1,000	1,200	2,400	8,000	4,640	5,170	1,300	345	274	649
17	532	738	850	1,300	2,400	15,000	4,330	6,170		330	300	558
18	513	845	850	1,500	2,600	20,000	3,860	5,940		295	305	488
19	507	861	700	1,400	2,800	19,000	3,590	4,740		256	252	464
20	495	829	750	1,500	2,600	15,000	3,330	3,860	858	260	188	482
21	471	760	750	1,500	2,200	11,000	2,990	3,680	842	300	220	832
22	465	702	750	3,800	1,800	13,000	2,830	3,860	768	300	252	1,470
23	471	775	750	7,000	1,800	20,000	2,510	3,590	712	265	256	2,360
24	495	782	700	7,000	1,600	27,200	2,360	3,080	677	256	285	2,510
25	653	760	700	6,000	1,500	25,200	2,070	2,670	628	270	265	2,360
26	730	716	650	5,500	1,500	17,400	1,750	2,360	642	260	275	1,940
27	738	730	700	4,200	1,600	12,300	1,570	2,070	656	260	260	1,330
28	738	730	900	3,800	1,800	9,740	1,570	1,880	747	300	322	1,190
29	695	667	1,200	3,400	-------	7,100	4,100	1,630	712	345	667	1,350
30	625	688	1,200	3,000	-------	6,000	8,290	1,570	698	345	642	1,190
31	646	-------	1,100	2,400	-------	4,500	--------	1,460	-------	380	810	-------

NOTE.—Discharge for the following periods estimated from automatic record and comparison with records in near-by drainage areas, June 10–13, 15–19, Oct. 18, 19, 20, Nov. 2, Dec. 30, Mar. 6, 7, 8, 9, 29, 30, 31, Apr. 1, 2, June 7, 8, 9, July 26 and 27. Discharge June 20 to July 13 based on two chain-gage readings a day; water-stage recorder not operating. Discharge Dec. 16 to Mar. 23 determined from gage heights corrected for ice effect by means of two discharge measurements, study of gage-height graph and weather records, and by comparison with records in near-by drainage areas.

Monthly discharge of Susquehanna River at Conklin, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 2,350 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	962	417	595	0.253	0.29
November	861	525	698	.297	.33
December	1,750	650	1,020	.434	.50
January	10,000	1,200	3,840	1.63	1.88
February	5,000	1,500	2,480	1.06	1.10
March	27,200	2,000	11,300	4.81	5.54
April	22,600	1,570	7,150	3.04	3.39
May	9,500	1,460	4,290	1.83	2.11
June	4,230	628	1,440	.613	.68
July	954	256	437	.186	.21
August	810	188	424	.180	.21
September	2,510	434	1,010	.430	.48
The year	27,200	188	2,900	1.23	16.72

CHENANGO RIVER NEAR CHENANGO FORKS, N. Y.

LOCATION.—1½ miles below mouth of Tioughnioga River, 2 miles by road below Chenango Forks, Broome County, and 11½ miles above Binghamton and mouth of river.

DRAINAGE AREA.—1,420 square miles. See "Diversions."

RECORDS AVAILABLE.—November 11, 1912, to September 30, 1923.

GAGE.—Stevens water-stage recorder on the left bank; inspected by Erastus Ingraham.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet above gage or by wading.

CHANNEL AND CONTROL.—Sand, gravel, and small cobblestones; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 11.47 feet at 8.30 a. m. April 6 (discharge, 25,200 second-feet); minimum stage from water-stage recorder, 2.34 feet from 8 p. m. August 27 to 2 a. m. August 28 (discharge, 138 second-feet).

1912–1923: Maximum stage recorded, 13.7 feet on afternoon of March 27, 1913 (discharge, 35,500 second-feet); minimum stage, 2.20 feet several times in August and September, 1913 (discharge, 92 second-feet).

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—The run-off from 87.3 square miles at head of Chenango River and from 15.7 square miles at head of Tioughnioga River is stored in reservoirs and, except for discharge over the spillways, is diverted out of the drainage area to the Erie Canal. The above-mentioned drainage area for Chenango River does not include these two areas.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice from December to March. Previous rating was revised below 300 second-feet to agree more closely with current discharge measurements, and new rating used throughout the year. Rating curve well defined between 150 and 15,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage heights, determined by inspection of gage-height graph, or for days of considerable fluctuation, by averaging discharge for intervals of the day. Records good except during periods of ice effect and estimate, for which they are fair.

Discharge measurements of Chenango River near Chenango Forks, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 7	A. W. Harrington	2.69	282	Feb. 6	J. L. Lamson	*5.86	2,270
8	do	2.75	358	Apr. 9	do	7.34	9,800
Nov. 12	do	2.97	563	Aug. 14	A. W. Harrington	2.46	185
Jan. 19	B. F. Howe	*6.76	1,210				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Chenango River near Chenango Forks, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	393	393	654	2,800	1,700	1,400	3,000	2,260	758	432	432	215
2	400	386	2,020	6,500	2,600	1,500	2,900	1,900	714	386	358	195
3	408	400	1,600	7,000	4,400	1,700	3,300	1,580	681	372	300	184
4	393	432	1,240	5,000	3,600	5,500	6,180	1,420	780	372	264	259
5	379	440	1,170	4,000	2,400	12,000	16,000	1,290	1,000	358	254	259
6	351	424	1,230	3,200	2,200	9,500	24,100	1,170	952	358	232	248
7	388	440	952	2,400	2,000	6,000	17,700	1,100	864	344	232	215
8	393	464	1,190	2,200	1,600	5,000	12,800	1,030	2,110	324	226	232
9	456	534	2,670	2,400	1,600	4,600	10,500	4,030	2,180	306	215	264
10	590	630	2,000	1,800	1,500	4,200	7,870	4,840	2,620	300	237	288
11	804	600		1,600	1,300	3,600	6,090	3,200	1,780	276	210	300
12	650	543		1,400	1,400	3,400	5,320	3,220	1,320	259	200	259
13	543	516		1,100	1,300	4,600	4,600	4,150	1,110	248	200	248
14	489	489	900	950	1,200	4,400	3,930	2,900	965	248	205	248
15	448	507		750		3,800	3,400	2,350	876	242		254
16	424	804		900	1,400	6,500	3,000	4,150	780	264		232
17	424	804	500	700		15,000	2,720	7,870	692	294		210
18	472	692	550	750	1,300	14,000	2,440	5,200	640	264		205
19	440	630	420	800	1,200	14,000	2,350	3,720	600	242		205
20	416	620	480	750		10,000	2,260	3,000	561	232		200
21	377	640	480	900	1,100	10,000	2,090	3,100	525	215	160	215
22	368	640	480	3,200		11,000	2,000	2,810	498	210		288
23	365	600	460	5,000	1,100	16,000	2,090	2,560	456	190		470
24	561	590	400	3,800	1,000	22,500	2,000	1,860	432	195		498
25	650	590	380	3,200	950	15,200	1,700	1,630	416	232		408
26	620	543	360		950	11,200	1,510	1,440	424	210		358
27	552	561	400	2,400	1,100	8,160	1,340	1,270	400	200	152	318
28	489	570	550		1,200	5,450	1,300	1,130	386	259	184	294
29	440	561	750		-------	3,930	2,520	1,030	408	294	270	288
30	424	552	700	1,700	-------	4,380	2,530	926	440	318	276	264
31	416	-------	650	1,300	-------	3,820	--------	840	-----	358	242	------

NOTE.—Recorder not operating Oct. 14, 19, 20–22, Dec. 11–16, Mar. 27 and 29; discharge estimated from gage-height graph and by comparison with records of Susquehanna River at Conklin, N. Y. Discharge Dec. 17 to Mar. 23 determined from gage heights corrected for ice effect by means of two discharge measurements and study of gage-height graph and weather records and by comparison with records of Susquehanna River.

Monthly discharge of Chenango River near Chenango Forks, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 1,420 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	804	351	468	0.330	0.38
November	804	386	553	.389	.43
December	2,670	360	893	.629	.73
January	7,000	700	2,440	1.72	1.98
February	4,400	950	1,610	1.13	1.18
March	22,500	1,400	7,820	5.51	6.35
April	24,100	1,300	5,320	3.75	4.18
May	7,870	840	2,540	1.79	2.06
June	2,620	386	879	.619	.69
July	432	190	284	.200	.23
August	432	152	213	.150	.17
September	498	184	271	.191	.21
The year	24,100	152	1,950	1.37	18.59

TIOGA RIVER NEAR ERWINS, N. Y.

LOCATION.—At highway bridge one-quarter mile below mouth of Canisteo River near Erwins, Steuben County, and 3 miles above confluence of Tioga and Cohocton rivers, which form Chemung River at Painted Post.

DRAINAGE AREA.—1,320 square miles (furnished by Robert O. Hayt).

RECORDS AVAILABLE.—July 12, 1918, to September 30, 1923.

GAGE.—Chain on downstream side of bridge near left abutment; read by Miss Jane Sexton.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of well-compacted gravel; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.2 feet at 9.15 a. m. March 5 (discharge, 17,900 second-feet); minimum stage recorded, 0.62 foot at 5.40 p. m. August 22 (discharge, 31 second-feet).

1918–1923: Maximum stage recorded, 16.4 feet at 4 p. m. May 22, 1919 (beyond the limits of present rating curve); minimum discharge, 30 second-feet several times August 24 to September 2, 1921.

ICE.—Stage-discharge relation affected by ice.

REGULATION—Storage not sufficient to affect seasonal flow.

ACCURACY.—Stage-discharge relation permanent except as affected by ice from December to March. Rating curve fairly well defined between 50 and 15,000 second-feet; extended beyond these limits. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records good, except during low-water season, when daily discharge determined from mean of two gage readings daily may be considerably in error owing to fluctuations in stage caused by power operations upstream. Records for period of ice effect and when gage was not read, fair.

Discharge measurements of Tioga River near Erwins, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 9	A. W. Harrington	1.15	132	Apr. 5	E. B. Shupe	8.94	13,600
Jan. 17	B. F. Howe	*1.65	190	Aug. 15	A. W. Harrington	.86	66.7
Feb. 8	do	*2.50	457				

*Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Tioga River near Erwins, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	136	165	157	850	550	750	700	1,020	450	180	108	55
2	128	157	139	3,800	600	850	860	940	414	136	111	50
3	119	172	330	1,300	1,200	8,500	900	780	378	150	122	51
4	86	165	270	900	2,200	15,000	980	700	366	513	216	57
5	82	161	235	850	1,400	13,800	9,110	660	414	478	176	61
6	75	180	220	700	900	4,450	10,100	590	366	297	139	57
7	73	216	302	650	650	2,920	4,630	562	402	235	108	71
8	86	180	220	460	500	2,080	2,920	506	1,200	189	104	66
9	142	176	172	480	500	1,520	3,240	625	940	172	73	70
10	176	184	202	380	420	1,620	1,840	980	740	150	69	84
11	336	198	250	420	400	1,620	1,730	900	562	146	69	80
12	402	180	198	280	360	3,580	1,520	980	485	130	66	69
13	270	180	170	240	380	7,010	1,380	4,270	390	139	69	68
14	184	165	190	360	550	3,410	1,240	2,340	354	125	66	61
15	161	180	170	400	600	1,840	1,060	1,730	354	113	68	57
16	176	172	180	280	550	6,790	1,020	1,960	286	130	61	47
17	202	184	150	220	500	7,230	980	3,920	302	172	61	57
18	184	184	160	260	480	4,980	860	1,960	270	165	55	47
19	184	180	160	220	480	4,630	820	1,730	250	136	51	41
20	184	176	120	300	400	2,080	780	1,420	225	119	55	52
21	172	165	120	280	340	2,080	740	2,340	207	104	54	66
22	150	165	150	1,200	300	2,480	590	2,210	184	99	40	60
23	157	161	150	1,400	300	5,960	660	1,620	172	99	35	57
24	189	157	160	1,100	220	5,760	700	1,330	155	95	40	71
25	275	157	160	950	180	3,580	625	1,150	142	86	45	63
26	265	113	240	800	240	2,480	548	980	157	99	40	66
27	230	150	280	600	340	1,960	520	820	150	95	47	68
28	176	102	480	600	600	1,840	485	740	180	90	48	57
29	189	157	600	500	-------	1,200	1,330	660	198	71	52	90
30	189	172	700	500	-------	1,280	1,100	576	180	90	61	133
31	165	-------	700	500	-------	1,020	-------	492	-------	88	57	-------

NOTE.—No gage-height record, Jan. 31, Feb. 11, 14, 15, June 12, 13, 24, Sept. 2 and 9; discharge estimated as indicated in above table from comparison with records of Chemung River at Chemung and Cohocton River near Campbell. Discharge Dec. 13 to Mar. 3 determined from gage heights corrected for ice effect by means of two discharge measurements, study of observer's notes, gage-height graph, and weather records, and by comparison with records of Chemung and Cohocton rivers.

Monthly discharge of Tioga River near Erwins, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 1,320 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	402	73	179	0.136	0.16
November	216	102	168	.127	.14
December	700	120	250	.189	.22
January	3,800	220	703	.533	.61
February	2,200	180	576	.436	.45
March	15,000	750	4,010	3.04	3.50
April	10,100	485	1,800	1.36	1.52
May	4,270	492	1,340	1.02	1.18
June	1,200	142	362	.274	.31
July	513	71	158	.120	.14
August	216	35	76.3	.058	.07
September	133	41	64.4	.049	.05
The year	15,000	35	811	.614	8.35

CHEMUNG RIVER AT CHEMUNG, N. Y.

LOCATION.—At new steel highway bridge midway between Chemung, Chemung County, N. Y., and Willawana, Pa., half a mile upstream from State line and 10 miles above mouth.

DRAINAGE AREA.—2,440 square miles.

RECORDS AVAILABLE.—September 7, 1903, to September 30, 1923.

GAGE.—Tape gage at upstream side of right span of bridge; read by R. C. Farrow from October 1 to March 31 and by D. L. Orcutt from April 1 to September 30.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Sand and gravel; occasionally shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.65 feet at 7.30 a. m. March 5 (discharge, 37,900 second-feet); minimum stage recorded, 1.44 feet at 5 p. m. August 26 (discharge, 87 second-feet).

1903–1923: Maximum stage recorded, 17.96 feet at 7 a. m. March 15, 1918 (discharge, about 67,000 second-feet); minimum discharge of 49 second-feet at 7 a. m. August 14, 1911.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice from December to March. The previous rating was revised below 1,000 second-feet to agree more closely with current discharge measurements, and new rating used throughout year. Rating curve fairly well defined between 100 and 45,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except during period of ice effect, for which they are fair.

Discharge measurements of Chemung River at Chemung, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 8	A. W. Harrington	1.98	287	Feb. 8	B. F. Howe	[a]4.34	1,140
9	do	1.99	287	Apr. 6	E. B. Shupe	10.30	20,700
Nov. 12	do	2.04	313	Aug. 15	A. W. Harrington	1.65	145
Jan. 18	B. F. Howe	[a]2.86	341				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Chemung River at Chemung, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	322	295	245	1,600	900	1,000	1,730	1,600	730	295	219	123
2	295	285	260	2,600	1,000	1,500	1,480	1,540	690	275	194	112
3	295	285	322	2,600	1,300	4,800	1,420	1,300	615	265	228	112
4	295	285	416	2,000	3,000	28,000	1,480	1,150	615	350	236	151
5	295	285	380	1,400	3,800	34,800	7,850	1,050	615	580	295	126
6	280	275	350	1,100	2,400	13,100	20,800	1,000	652	580	265	151
7	265	295	275	1,000	1,500	6,490	10,000	860	615	410	241	136
8	285	285	380	1,000	1,200	4,860	6,750	815	1,000	350	202	139
9	295	295	410	900	1,000	3,840	5,300	950	1,730	295	179	143
10	410	285	442	850	900	3,280	4,040	1,360	1,200	275	163	136
11	545	322	380	650	700	3,280	3,280	1,540	950	275	151	132
12	770	322	380	600	700	5,760	2,930	1,540	770	280	153	143
13	615	295	380	550	750	14,900	2,600	4,860	652	211	139	143
14	510	295	380	480	750	8,440	2,290	4,240	580	219	129	139
15	442	295	320	420	950	4,860	2,000	2,760	545	211	139	129
16	410	295	360	600	1,000	5,530	1,730	2,760	510	202	129	117
17	380	280	340	550	1,000	19,200	1,600	6,240	510	224	126	123
18	350	285	320	500	1,000	10,400	1,540	4,440	442	350	129	117
19	350	295	300	460	850	8,750	1,420	3,100	410	295	126	126
20	295	285	220	500	800	5,760	1,420	2,440	380	245	117	117
21	295	280	240	550	700	4,440	1,420	2,930	350	228	112	129
22	275	260	240	1,100	650	4,440	1,300	4,040	322	194	114	123
23	295	265	260	2,200	600	7,010	1,200	2,760	295	182	106	123
24	322	250	280	2,200	550	13,100	1,200	2,140	285	171	106	129
25	350	255	300	2,000	500	6,490	1,150	1,860	255	167	98	132
26	410	219	320	1,800	500	4,650	1,000	1,540	255	171	91	139
27	380	245	460	1,400	600	4,040	950	1,300	236	160	96	129
28	380	265	480	1,100	650	3,280	860	1,150	228	198	123	136
29	322	250	800	1,000	-------	2,290	1,420	1,050	275	215	123	615
30	322	250	850	900	-------	2,290	2,140	905	275	194	112	228
31	322	-------	1,100	900	-------	2,000	-------	815	-------	211	109	-------

NOTE.—Discharge Dec. 14 to Mar. 4 determined from gage heights corrected for ice effect by means of two discharge measurements; study of observer's notes, gage-height graph, and weather records; and comparison with records of Tioga River near Erwins and Cohocton River near Campbell. Discharge Mar. 31 estimated as indicated in above table by comparison with records of Tioga and Cohocton rivers; no gage-height record.

Monthly discharge of Chemung River at Chemung, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 2,440 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	770	265	367	0.150	0.17
November	322	219	279	.114	.13
December	1,100	220	393	.161	.19
January	2,600	420	1,150	.471	.54
February	3,800	500	1,080	.443	.46
March	34,800	1,000	7,830	3.21	3.70
April	20,800	860	3,140	1.29	1.44
May	6,240	815	2,130	.873	1.01
June	1,730	228	566	.232	.26
July	580	160	267	.109	.13
August	295	91	153	.063	.07
September	615	112	150	.061	.07
The year	34,800	91	1,470	.602	8.17

COHOCTON RIVER NEAR CAMPBELL, N. Y.

LOCATION.—At steel highway bridge 2 miles upstream from Campbell, Steuben County, and 11 miles above confluence of Cohocton and Tioga rivers, which unite at Painted Post to form Chemung River.

DRAINAGE AREA.—480 square miles (furnished by Robert O. Hayt).

RECORDS AVAILABLE.—July 11, 1918, to September 30, 1923.

GAGE.—Chain gage on downstream side of bridge near left abutment; read by Miss Dora Wood.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of well-compacted gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.20 feet at noon March 4 (stage-discharge relation affected by ice); maximum discharge, 7,300 second-feet at 8 a. m. March 5; minimum discharge, 33 second-feet, morning and afternoon of September 3.

1918–1923: Maximum discharge recorded, 11,300 second-feet at noon March 12, 1920; minimum stage recorded, 0.68 foot at 5 p. m. October 7, 1921 (backwater correction of 0.33 foot due to aquatic growth; discharge about 13 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Seasonal distribution of flow is probably not affected by small reservoirs above.

ACCURACY.—Stage-discharge relation probably permanent, except as affected by aquatic growth from October to December, and from June to September, and by ice from December to March. Rating curve fairly well defined between 200 and 4,000 second-feet. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying to rating table mean daily gage height corrected for weed or ice effect from discharge measurements, when necessary. Records good during period when stage-discharge relation was not affected by weeds or ice; for other periods, fair.

Discharge measurements of Cohocton River near Campbell, N. Y., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 10	A. W. Harrington	[a] 1.22	183	Feb. 7	B. F. Howe	[b] 2.06	389
Nov. 11	do	[a] .97	127	Apr. 5	E. B. Shupe	4.4	3,300
Jan. 16	B. F. Howe	[b] 1.44	140	Aug. 16	A. W. Harrington	[a] 1.12	49

[a] Stage-discharge relation affected by aquatic growth.
[b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Cohocton River near Campbell, N. Y., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	85	110	85	320	280	380	450	317	175	85	65	34
2	90	110	140	460	320	500	422	307	168	60	65	36
3	95	170	120	380	550	1,200	395	250	168	65	65	34
4	90	150	100	340	600	6,000	682	234	168	190	60	42
5	90	120	120	320	500	5,880	2,760	221	179	110	65	48
6	110	110	100	320	460	2,760	3,030	209	170	95	60	48
7	110	110	140	260	420	1,690	2,010	205	190	85	55	38
8	120	110	150	240	380	1,300	1,500	198	280	70	50	48
9	180	100	160	220	360	1,120	1,220	317	260	60	48	65
10	190	130	110	190	340	1,040	955	340	240	60	46	46
11	300	120	120	160	340	915	915	298	200	60	42	44
12	240	130	130	150	280	1,590	758	345	190	50	42	44
13	180	100	95	130	240	2,630	720	450	160	50	44	42
14	160	110	80	110	220	1,590	575	340	150	46	42	42
15	140	120	90	110	220	1,220	510	336	160	65	55	42
16	130	110	90	110	220	1,590	450	510	140	55	42	42
17	130	110	90	130	220	3,600	450	645	120	60	38	34
18	120	100	70	140	200	2,500	422	510	100	85	44	36
19	100	100	65	170	170	2,370	450	395	90	65	42	38
20	110	100	60	190	150	1,220	450	395	90	65	42	34
21	110	120	60	240	140	1,120	422	422	85	75	38	48
22	100	120	65	340	140	1,220	395	395	75	46	42	46
23	110	120	70	380	130	2,130	450	340	85		42	60
24	170	110	80	360	110	2,010	395	298	90			60
25	140	110	100	340	95	1,400	370	263	85	80		55
26	130	100	110	300	130	1,120	336	250	80		38	65
27	110	90	140	280	200	955	345	229	100	90		55
28	130	90	160	280	260	758	326	205	110	85		50
29	110	95	190	280	-------	682	450	194	130	85		50
30	120	90	190	260	-------	645	345	183	100	65		46
31	110	-------	220	260	-------	450	-------	175	-------	65	34	-------

NOTE.—Discharge July 23–26, Aug. 24–30, and Jan. 19 estimated as indicated in above table, by comparison with records of Chemung River at Chemung and Tioga rivers near Erwins; gage-height record either missing or doubtful. Discharge Oct. 1 to Dec. 5 and June 6 to Sept. 30 determined from gage heights corrected for weed effect by means of four discharge measurements and comparison with records of Chemung and Tioga rivers. Discharge Dec. 6 to March 4 determined from gage heights corrected for ice effect by means of two discharge measurements; study of observer's notes, gage-height graph and weather records, and comparison with records of Chemung and Tioga rivers.

Monthly discharge of Cohocton River near Campbell, N. Y., for the year ending Sept. 30, 1923

[Drainage area, 480 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	300	85	133	0.277	0.32
November	170	90	112	.233	.26
December	220	60	113	.235	.27
January	460	110	251	.523	.60
February	600	95	274	.571	.59
March	6,000	380	1,730	3.60	4.15
April	3,030	326	765	1.59	1.77
May	645	175	315	.656	.76
June	280	75	145	.302	.34
July	190	46	74.6	.155	.18
August	65	34	46.3	.096	.11
September	65	34	45.7	.095	.11
The year	6,000	34	335	.698	9.46

PATUXENT RIVER BASIN

PATUXENT RIVER NEAR BURTONSVILLE, MD.

LOCATION.—At Columbia Turnpike bridge, 1½ miles northeast of Burtonsville, Montgomery County, and 4 miles northwest of Laurel.

DRAINAGE AREA.—127 square miles.

RECORDS AVAILABLE.—July 21, 1911, to June 15, 1912 (records furnished by United States Engineer Office); July 21, 1913, to September 30, 1923.

GAGE.—Au water-stage recorder installed August 8, 1922, referred to a staff gage in three sections on left bank about 80 feet below highway bridge; Stevens water-stage recorder, referred to same staff gage as Au recorder July 23, 1914, to August 8, 1922; prior to July 23, 1914, a vertical staff fastened to left side of bridge pier; datum of records of present staff gage and recorders is 1.29 feet below that of gage formerly on pier. Recorder inspected by Arthur Beall.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Banks are lined with trees and brush and are overflowed at stage of about 10 feet. Control poorly defined.

EXTREMES OF DISCHARGE.—Maximum stage during year probably occurred July 31 when recorder was out of order. Minimum stage from record of water-stage recorder, 1.79 feet at 6 a. m. October 5 (discharge, 14 second-feet).

1911–1923: Maximum stage recorded, 14.6 feet about 9 a. m. January 12; 1915 (discharge, from poorly defined rating curve, about 5,100 second-feet); minimum stage, 0.18 foot August 25, 1911 (discharge, 6 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Fluctuation at low stage has been noted and is probably caused by operation of a power plant above gage.

ACCURACY.—Stage-discharge relation remained practically permanent during year; affected by ice January 17–20, February 6–9, and 16–25. Rating curve well defined between 35 and 1,700 second-feet. Operation of water-stage recorder satisfactory except December 20 and 21 and July 30 and 31. Daily discharge ascertained by applying to rating table mean daily gage by inspecting recorder graph and by averaging discharge heights obtained for intervals of day. Records good.

Discharge measurements of Patuxent River near Burtonsville, Md., during the year ending Sept. 30, 1923

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 22	J. J. Dirzulaitis	*2.45	65.0	Jan. 25	Dirzulaitis and Horton	2.99	159
28	do	2.50	80.1	May 9	J. J. Dirzulaitis	3.10	174
Jan. 18	Dirzulaitis and Au	*2.56	42.7				

*Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Patuxent River near Burtonsville, Md., for the year ending Sept. 30, 1923

Day	Oct	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	26	38	40	125	133	96	100	117	70	53	106	43
2	31	42	34	109	176	90	103	108	67	53	86	41
3	25	41	38	77	149	96	103	103	67	50	166	41
4	25	38	40	74	133	100	108	102	176	51	220	41
5	24	39	70	68	109	98	173	98	76	47	108	55
6	25	41	61	61		91	303	97	109	108	141	311
7	26	40	48	57	50	133	141	94	158	141	74	125
8	24	41	51	141		158	133	98	133	98	65	349
9	33	42	53	125		141	125	176	76	59	65	167
10	449	35	48	109	97	149	117	117	70	51	59	91
11	102	42	47	80	97	158	109	102	83	55	57	76
12	60	38	44	74	91	167	108	98	103	74	56	74
13	48	43	48	67	708	195	117	98	93	66	59	88
14	43	40	48	65	275	275	354	94	88	56	51	66
15	41	39	47	63	149	158	275	93	87	48	48	59
16	45	46	48	61		167	254	106	109	47	47	56
17	41	45	80			387	185	94	75	43	50	54
18	42	39	103	40		185	158	87	67	39	77	54
19	40	41	77			214	149	88	63	38	60	56
20	36	45	74		65	176	133	93	60	36	54	55
21	39	40	67	62		158	133	361	60	34	44	144
22	36	39	61	80		149	125	125	55	33	46	145
23	44	40	54	79		158	117	100	124	37	46	346
24	43	39	46	83		149	117	94	551	37	45	149
25	44	39	44	141		133	109	87	96	48	42	93
26	40	33	45	117	117	125	108	83	75	41	40	83
27	41	41	43	104	117	117	108	79	65	33	41	79
28	41	38	118	141	100	117	109	77	61	38	52	75
29	36	39	133	149	-------	109	185	76	60	56	76	71
30	37	38	77	133	-------	109	125	71	55	280	66	70
31	39	-------	62	106	-------	109	-------	72	-------	620	51	-------

NOTE.—Discharge estimated Jan. 17–20, Feb. 6–9, and 16–25 because of ice, by study of recorder graph, discharge measurement Jan. 18, and weather records. Discharge for Dec. 20 and 21 interpolated because of no record, probably affected by ice. Discharge July 30 and 31 estimated because recorder not operating. Discharge determined by hourly, bihourly and four-hour periods Oct. 10, Dec. 28, Feb. 13, Apr. 5, 6, and 14, May 21, June 23 and 24, Aug. 3–6, and Sept. 6, 8, and 21–23.

Monthly discharge of Patuxent River near Burtonsville, Md., for the year ending Sept. 30, 1923

[Drainage area, 127 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	449	24	52.5	0.413	0.48
November	46	33	40.0	.315	.35
December	133	34	59.6	.469	.54
January	149	----------	87.5	.689	.79
February	708	----------	118	.929	.97
March	387	90	151	1.19	1.37
April	354	100	149	1.17	1.30
May	361	71	106	.835	.96
June	551	55	101	.795	.89
July	----------	33	79.7	.628	.72
August	220	40	70.9	.558	.64
September	349	41	105	.827	.92
The year	----------	24	93.1	.733	9.93

POTOMAC RIVER BASIN

POTOMAC RIVER AT POINT OF ROCKS, MD.

LOCATION.—At steel highway bridge at Point of Rocks, Frederick County, one-third mile below Catoctin Creek and 6 miles above Monocacy River.

DRAINAGE AREA.—9,650 square miles.

RECORDS AVAILABLE.—February 17, 1895, to September 30, 1923.

GAGE.—Chain gage attached to downstream side of left span of bridge; read by W. W. Compher. Datum constant since September 2, 1902; prior to this date datum was 0.45 foot higher than at present. Sea-level elevation of gage datum, 200.54 feet.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Practically permanent. Control is a rock ledge a few hundred feet below station, the ledge extending completely across the river except for one small channel.

EXTREMES OF DISCHARGE.—Maximum stage recorded for year ending September 30, 1921, 13.6 feet at 10 a. m. May 6 (discharge, 85,500 second-feet); minimum stage 0.84 foot at 10 a. m. September 1 (discharge, 1,270 second-feet).

Maximum stage recorded for year ending September 30, 1922, 10.82 feet at 2 p. m. March 17 (discharge, 55,200 second-feet); minimum stage, 0.60 foot at 2 p. m. September 30 (discharge, 780 second-feet).

Maximum stage recorded for year ending September 30, 1923, 8.10 feet at 2 p. m. on April 16 (discharge, 36,100 second-feet); minimum stage, 0.60 foot at 2 p. m. November 4 and December 4 (discharge, 780 second-feet).

1895–1923: Maximum stage recorded, 29 feet on March 2, 1902 (discharge, 219,000 second-feet); minimum stage, 0.38 foot on September 10, 1914 (discharge, 540 second-feet).

Crest of flood of June 2, 1889, as determined by the United States Army Engineers from high-water marks, reached a stage of 40.2 feet (discharge, 325,000 second-feet).

ICE.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—The Chesapeake & Ohio canal parallels the Potomac on the Maryland side. Average discharge of canal is 75 to 100 second-feet. Discharge of canal is not included in records for this station.

REGULATION.—Fluctuation at extreme low stages has been noted and is probably caused by operation of power plants or storage reservoirs on the upper Potomac and tributaries.

ACCURACY.—Stage-discharge relation practically permanent. Gage read to hundredths once daily, during high water read oftener. Records good, except those for extreme low stages, which are fair.

Daily discharge, in second-feet, of Potomac River at Point of Rocks, Md., for the years ending Sept. 30, 1921–1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1920–21												
1	4,010	1,890	10,000	6,520	7,330	9,530	5,020	7,750	9,070	4,840	2,120	1,270
2	4,840	1,940	10,500	6,520	8,620	19,800	5,020	8,180	8,620	5,020	2,250	1,320
3	6,920	1,990	19,800	6,130	8,180	22,900	5,750	8,180	6,920	6,130	2,520	1,320
4	6,130	1,940	19,200	5,750	7,750	28,800	5,380	8,620	6,520	5,750	3,090	1,590
5	4,670	1,890	11,500	5,750	6,520	36,300	5,380	22,900	5,380	5,020	16,800	4,270
6	4,170	1,790	10,500	5,380	6,130	32,100	4,670	85,500	5,020	4,170	7,750	3,920
7	3,700	1,940	10,000	5,380	6,520	20,400	4,010	68,000	4,670	3,390	7,330	3,920
8	3,390	1,990	9,070	5,020	6,520	19,200	4,170	40,000	4,330	2,940	6,920	4,450
9	2,800	2,250	8,180	5,020	6,130	14,600	4,170	28,800	4,010	2,940	7,750	3,920
10	2,520	1,990	7,330	5,380	6,130	11,000	4,010	18,600	4,010	2,940	5,020	3,410
11	2,520	1,940	6,520	6,130	6,130	11,000	4,170	16,300	3,700	2,520	4,670	2,290
12	2,380	1,890	6,130	5,750	5,750	11,000	4,170	15,700	4,010	3,390	4,330	2,290
13	2,250	1,790	5,750	5,380	7,330	10,500	4,330	30,800	3,860	5,750	4,010	3,920
14	2,120	1,480	6,130	5,020	6,920	9,530	4,500	46,800	3,090	9,530	3,860	3,920
15	2,120	1,540	12,500	5,020	6,520	8,620	4,330	27,500	2,800	6,130	3,700	4,270
16	2,120	1,740	12,000	11,500	6,130	8,180	4,170	22,300	2,520	5,750	3,540	3,920
17	1,990	1,990	11,500	9,070	5,750	9,070	4,010	18,000	2,800	6,520	3,090	3,250
18	1,990	12,000	11,000	7,750	5,020	13,000	4,010	14,100	2,940	7,330	2,800	2,290
19	1,890	15,700	10,500		4,330	12,500	4,500	12,500	3,700	6,130	3,700	1,990
20	1,890	9,530	9,070		4,019	11,500	4,330	10,500	3,390	4,840	4,010	2,440
21	1,890	6,920	7,330		5,380	10,500	4,330	9,530	3,090	4,010	3,390	1,990
22	1,840	6,520	6,520		5,020	8,620	4,170	8,180	3,390	3,700	2,940	2,920
23	1,790	7,750	7,330		5,020	8,180	4,330	7,750	3,240	3,240	2,520	10,700
24	1,540	7,750	6,920	6,400	5,380	7,750	5,020	8,180	3,090	3,090	2,250	8,550
25	1,480	7,750	6,520		5,750	6,920	8,620	8,180	2,940	2,800	1,990	6,510
26	1,740	7,330	9,070		5,750	6,920	8,180	8,620	2,800	2,660	1,700	4,630
27	1,790	7,330	10,500		6,130	6,920	7,330	21,700	2,520	2,520	1,640	3,920
28	1,840	7,330	9,530		6,520	6,520	5,750	16,800	3,090	2,250	1,420	3,580
29	1,890	7,750	8,620	6,920		6,130	5,380	17,400	4,670	1,990	1,420	3,250
30	1,990	7,750	7,750	6,920		5,750	5,020	13,500	4,170	2,660	1,420	2,920
31	1,940		7,330	6,920		5,380		10,500		1,990	1,370	
1921–22												
1	2,600	1,820	19,100	7,300	6,510	17,600	11,600	4,630	6,130	7,710	3,250	2,290
2	2,290	1,820	18,600	6,510	6,510	15,500	12,100	4,270	7,300	7,710	2,600	3,580
3	2,290	1,820	17,600	6,130	6,130	17,600	13,500	3,920	8,130	8,130	2,440	2,920
4	2,140	6,900	13,500	5,370	7,300	22,800	8,980	3,580	8,980	7,710	2,440	2,600
5	2,140	6,130	13,100	5,000	8,130	29,400	10,700	3,250	15,500	7,300	2,440	2,600
6	1,990	4,810	12,100	4,630	8,980	26,600	10,300	5,750	15,500	6,900	2,440	2,290
7	1,990	3,920	9,850	5,370	9,850	26,100	9,410	7,710	16,500	5,750	2,440	2,600
8	1,700	3,580	9,410	4,630	11,600	32,300	8,980	8,130	13,500	5,370	2,600	2,920
9	1,990	3,250	8,980	4,270	10,300	30,600	7,710	7,300	11,200	4,270	2,600	2,140
10	2,290	2,940	8,550	4,630	10,700	23,900	7,300	6,900	10,300	4,270	2,290	2,140
11	1,990	2,290	7,300	3,920	8,130	19,600	7,300	6,900	5,000	3,750	2,290	2,290
12	1,700	2,600	7,300	3,580	8,980	23,900	6,900	6,510	6,900	3,250	1,990	1,700
13	1,420	2,290	6,900	3,250	27,700	25,500	6,900	6,130	6,130	2,920	1,990	1,700
14	1,370	2,290	6,510	2,920	31,100	20,700	6,510	5,750	5,750	3,080	1,990	1,990
15	1,420	1,990	6,510	3,580	25,000	21,800	7,300	5,370	5,000	3,580	1,990	1,700
16	1,420	1,700	6,510	4,450	19,100	47,000	8,980	5,370	4,630	3,580	1,990	1,760
17	1,170	1,420	5,750	4,270	15,000	55,200	17,600	5,750	4,090	3,920	1,820	1,700
18	1,270	1,320	5,750	4,270	13,500	34,200	19,600	13,500	4,270	3,250	1,760	1,640
19	1,320	1,170	9,410	4,090	15,000	23,900	13,500	26,100	4,450	5,750	1,700	1,270
20	1,420	1,700	11,200	6,900	16,000	20,700	9,410	38,100	4,090	3,750	1,700	1,270
21	1,530	3,250	16,000	7,710	32,300	18,100	8,980	23,900	3,750	3,750	1,590	1,170
22	1,590	5,000	11,200	26,100	46,300	17,000	8,550	19,100	3,410	3,920	1,420	1,080
23	1,990	5,000	10,700	27,200	42,800	14,000	8,550	14,500	3,750	3,580	1,320	994
24	2,290	5,000	8,550	23,900	30,000	12,600	7,300	11,600	2,920	3,250	1,370	950
25	2,140	4,270	13,500	18,600	23,400	11,600	6,510	9,410	3,080	3,410	1,370	916
26	1,990	3,920	25,500	16,000	18,600	11,200	6,510	8,980	3,250	2,600	2,140	950
27	1,700	4,270	18,600	7,710	16,000	10,300	6,130	8,550	2,920	2,600	2,140	950
28	1,590	5,000	14,000	7,300	15,500	9,850	5,750	8,130	2,920	2,290	2,290	950
29	1,420	15,000	12,100	7,300		9,410	5,750	7,710	3,250	2,600	2,140	950
30	1,170	25,500	8,980	7,710		10,700	5,000	7,300	7,300	2,920	1,930	780
31	1,040		7,710	6,900		11,200		6,900		3,410	1,990	

Daily discharge, in second-feet, of Potomac River at Point of Rocks, Md., for the years ending Sept. 30, 1921–1923—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922–23												
1	950	950	1,080	3,250	19,100	4,630	6,130	8,980	3,250	1,700	6,130	1,370
2	916	950	88[illegible]	5,750	13,500	4,270	5,750	8,550	2,920	1,400	5,750	1,640
3	916	916	814	8,550	23,900	3,920	5,370	8,130	2,600	1,320	4,630	1,930
4	882	780	780	8,980	23,400	5,370	5,000	7,300	2,290	1,170	4,270	2,290
5	882	950	848	8,980	22,800	5,750	4,630	6,900	1,990	1,420	3,920	2,600
6	950	1,040	950	11,600	13,500	5,750	4,270	5,000	3,250	1,990	4,270	5,000
7	882	1,170	1,370	10,700	16,500	6,130	3,920	4,630	3,580	1,700	3,920	10,700
8	1,700	1,040	1,590	8,980	15,500	6,130	3,580	4,270	3,250	1,700	3,580	5,750
9	1,990	950	1,820	8,130	8,980	5,750	3,250	3,920	2,920	1,990	3,250	6,510
10	1,820	916	1,930	7,300	8,550	7,300	5,370	3,580	2,600	1,700	2,920	6,900
11	1,640	848	1,990	5,750	8,980	8,980	5,750	3,250	2,600	1,420	2,600	5,000
12	1,420	950	1,990	5,000	9,410	10,700	6,130	2,920	2,440	1,320	2,600	4,270
13	1,320	1,040	2,290	4,270	10,700	13,500	6,510	3,250	2,290	1,270	2,600	3,250
14	1,270	1,270	2,290	3,580	18,600	22,300	6,900	4,270	2,290	1,170	2,290	2,600
15	2,290	1,170	2,600	3,750	21,200	20,200	29,400	5,000	1,990	1,420	1,930	2,290
16	1,990	1,040	2,600	3,250	18,600	19,600	36,100	4,810	1,700	1,530	1,640	1,930
17	1,700	994	2,920	4,270	13,500	18,600	35,500	4,810	1,990	1,420	2,290	1,640
18	1,640	950	3,250	5,000	13,100	19,100	29,400	4,630	2,290	1,320	2,600	1,370
19	1,420	950	3,580	5,370	12,100	18,600	19,100	4,270	2,600	2,290	3,920	1,130
20	1,320	950	3,920	5,370	8,980	17,600	13,500	4,450	2,920	1,420	3,580	916
21	1,080	1,040	4,270	5,000	7,710	16,500	8,980	4,630	2,600	1,320	3,250	1,640
22	1,130	1,040	4,630	4,630	6,900	12,600	8,550	8,980	2,290	1,320	2,920	1,990
23	1,080	950	4,630	4,270	6,510	10,700	7,710	8,130	1,990	1,270	2,600	6,130
24	950	950	3,250	3,920	6,130	10,300	7,300	7,710	3,250	1,700	1,640	6,510
25	1,040	1,040	2,920	6,900	5,750	9,850	6,900	7,300	2,920	1,420	1,370	6,130
26	1,080	950	2,600	6,510	5,370	9,410	6,900	6,900	2,600	1,700	1,370	5,370
27	1,040	950	2,140	6,130	5,370	8,980	6,510	6,130	2,290	950	1,480	5,000
28	950	950	1,990	6,900	5,000	8,130	6,130	4,270	1,990	950	1,480	4,630
29	950	950	1,990	7,710	-------	7,300	6,900	3,920	1,990	1,420	1,370	4,270
30	994	1,040	1,700	10,700	-------	6,900	8,130	3,580	1,700	1,700	1,220	2,290
31	1,040	-------	2,920	19,600	-------	6,510	-------	3,410	-------	3,920	1,130	-------

NOTE.—Discharge estimated Jan. 19–28, 1921, because of ice from study of weather records and record for Monocacy River at Frederick, Md. Gage height increased 1 foot July 1, 1922, by study of weather records. Gage height increased 1 foot Apr. 28 to May 1, 1923, by study of weather records and records for Rappahannock River at Fredericksburg, Va. Gage height decreased 1 foot July 25, 1923.

Monthly discharge of Potomac River at Point of Rocks, Md., for the years ending Sept. 30, 1921–1923

[Drainage area, 9,650 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per. square mile	
1920–21					
October	6,920	1,480	2,720	0.282	0.33
November	15,700	1,480	4,780	.495	.55
December	19,800	5,750	9,500	.984	1.13
January	11,500	5,020	6,360	.659	.76
February	8,620	4,010	6,170	.639	.67
March	36,300	5,380	12,900	1.34	1.54
April	8,620	4,010	4,940	.512	.57
May	85,500	7,750	20,700	2.15	2.48
June	9,070	2,520	4,150	.430	.48
July	9,530	1,990	4,260	.442	.51
August	16,800	1,370	3,910	.405	.47
September	10,700	1,270	3,650	.378	.42
The year	85,500	1,270	7,040	.730	9.91

Monthly discharge, of Potomac River at Point of Rocks, Md., for the years ending Sept. 30, 1921–1923—Continued

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1921–22					
October	2,600	1,040	1,750	0.181	0.21
November	25,500	1,170	4,400	.456	.51
December	25,500	5,750	11,300	1.17	1.35
January	27,200	2,920	8,110	.840	.97
February	46,300	6,130	17,500	1.81	1.88
March	55,200	9,410	21,600	2.24	2.58
April	19,600	5,000	9,120	.945	1.05
May	38,100	3,250	9,710	1.01	1.16
June	16,500	2,920	6,660	.690	.77
July	8,130	2,290	4,400	.456	.53
August	3,250	1,320	2,080	.216	.25
September	3,580	780	1,760	.182	.20
The year	55,200	780	8,160	.846	11.46
1922–23					
October	2,290	882	1,270	.132	.15
November	1,270	780	989	.103	.11
December	4,630	780	2,340	.243	.28
January	19,600	3,250	6,780	.703	.81
February	23,900	5,000	12,500	1.30	1.35
March	22,300	3,920	10,700	1.11	1.28
April	36,100	3,250	10,300	1.07	1.19
May	8,980	2,920	5,420	.562	.65
June	3,580	1,700	2,510	.260	.29
July	3,920	950	1,560	.162	.19
August	6,130	1,130	2,860	.296	.34
September	10,700	916	3,770	.391	.44
The year	36,100	780	5,030	.521	7.08

CACAPON RIVER NEAR GREAT CACAPON, W. VA.

LOCATION.—At Rock Ford, 4 miles above Great Cacapon.

DRAINAGE AREA.—670 square miles.

RECORDS AVAILABLE.—December 12, 1922, to September 30, 1923.

GAGE.—Vertical staff nailed to tree on left bank about 150 feet above suspension footbridge at Rock Ford; read by Adrian and L. H. Youngblood.

DISCHARGE MEASUREMENTS.—Made from footbridge or by wading.

CHANNEL AND CONTROL.—Stream bed composed of bedrock and boulders; banks subject to overflow; control at low stages is a rock ledge about 100 feet below footbridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period December 12, 1922, to September 30, 1923, 6.30 feet at 9 a. m. April 15 (discharge, 3,860 second-feet); minimum stage, 0.38 foot at 3.30 p. m. July 28 (discharge, 38 second-feet).

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation practically permanent, no appreciable ice effect. Rating curve fairly well defined between 0 and 30,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Cacapon River near Great Cacapon, W. Va., during the period Nov. 14, 1922, to Sept. 30, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Nov. 14	Stevens and Horton	0.53	54.4
Aug. 23	Dirzulaitis and Humm	.67	76

Daily discharge, in second-feet, of Cacapon River near Great Cacapon, W. Va., for the period Dec. 12, 1922, to Sept. 30, 1923

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		307	656	204	324	397	92	113	204	61
2		324	1,280	191	291	307	97	109	217	70
3		332	1,490	204	245	307	95	99	155	67
4		341	1,140	204	204	260	92	99	144	64
5		275	753	191	191	231	89	102	119	56
6		245	542	179	191	217	90	99	102	144
7		204	803	179	204	217	89	95	92	191
8		191	906	179	260	191	85	89	89	341
9		167	359	179	245	179	70	82	85	179
10		155	307	179	231	191	64	72	82	191
11		123	307	341	204	191	54	64	92	104
12	81	155	275	906	179	179	79	58	115	97
13	92	144	753	1,280	179	179	89	64	106	76
14	79	144	1,890	1,140	179	179	97	64	129	68
15	76	167	1,420	1,210	3,860	155	109	68	85	64
16	73	125	704	960	2,620	155	144	70	74	56
17	79	167	656	906	1,970	144	155	100	84	52
18	95	191	656	906	1,810	129	167	85	79	49
19	144	167	609	854	1,020	119	155	73	108	49
20	231	155	260	803	906	133	144	58	100	66
21	291	144		803	704	359	129	50	106	260
22	307	155	240	753	609	397	125	47	81	324
23	307	90		609	520	291	129	44	74	260
24	129	123		520	457	260	129	43	64	291
25	117	155	217	564	417	245	131	42	56	437
26	123	179	245	854	397	260	155	40	54	341
27	144	191	204	609	307	144	144	40	67	179
28	191	191	204	397	307	113	129	38	64	119
29	217	499	-------	307	307	106	117	42	59	100
30	231	1,420	-------	291	397	113	117	50	54	84
31	307	854	-------	260	-------	111	-------	70	51	-------

NOTE.—Discharge interpolated Jan. 3 and Feb. 21–24; gage not read. Mean gage height increased 1 foot Apr. 20; gage reading in error.

Monthly discharge of Cacapon River near Great Cacapon, W. Va., for the period Dec. 12, 1922, to Sept. 30, 1923

[Drainage area, 670 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
December 12–31	307	73	166	0.248	0.18
January	1,420	90	261	.390	.45
February	1,890	204	628	.937	.98
March	1,280	179	554	.827	.95
April	3,860	179	658	.982	1.10
May	397	106	208	.310	.36
June	167	54	112	.167	.19
July	113	38	70.0	.104	.12
August	217	51	96.5	.144	.17
September	437	49	148	.221	.25
The period	3,860	38	291	.434	4.75

MONOCACY RIVER NEAR FREDERICK, MD.

LOCATION.—At Ceresville Bridge, 3 miles northeast of Frederick, Frederick County, on road from Frederick to Mount Pleasant. Tuscarora Creek enters on right 3,000 feet above station.

DRAINAGE AREA.—660 square miles.

RECORDS AVAILABLE.—August 4, 1896, to September 30, 1923.

GAGE.—Chain attached to downstream handrail of right span of bridge; read by Edward D. Shriner, jr.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; shifting during very high floods. Control not well defined. Banks lined with trees and brush; subject to overflow at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.67 feet at 7.45 a. m. July 31 (discharge, 13,000 second-feet); minimum stage recorded, 3.69 feet July 21–24 (discharge, 23 second-feet).

1896–1923: Maximum stage recorded, 27.2 feet at 11 a. m. January 13, 1915 (discharge, determined from rating curve used for 1916, 19,000 second-feet); minimum stage, 3.54 feet several days in October, 1910 (discharge, 15 second-feet).

ICE.—Stage-discharge relation affected by ice during severe winters only.

ACCURACY.—Stage-discharge relation affected by ice January 11–22 and February 17 to March 9; discharge estimated from study of flow of Potomac River, observer's notes, and weather records. Rating curve well defined between 50 and 15,000 second-feet. Gage read to hundredths once daily Daily discharge ascertained by applying gage height to rating table Records good.

Daily discharge, in second-feet, of Monocacy River near Frederick, Md., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb	Mar.	Apr.	May	June	July	Aug.	Sept.
1	50	78	78	352	405		425	485	240	76	750	388
2	46	68	78	1,820	950		405	425	212	76	405	168
3	50	68	61	505	1,820		405	388	212	76	405	120
4	59	78	61	352	2,990		405	352	212	76	352	198
5	59	78	78	184	1,170	480	592	302	212	86	335	108
6	46	68	158	240	1,170		1,170	302	168	255	505	156
7	46	78	158	212	1,170		800	302	168	198	405	2,172
8	50	82	127	184	850		548	286	168	132	226	950
9	59	92	110	146	705		485	286	168	97	212	460
10	122	88	110	134	425	800	465	302	168	92	168	355
11	425	78	110		352	2,690	388	302	181	92	132	270
12	445	78	88		302	3,140	405	286	168	88	108	198
13	485	68	78		3,520	5,580	352	302	198	88	108	156
14	445	68	78		5,240	3,520	682	335	198	86	95	156
15	171	82	88		1,540	950	2,990	286	181	80	76	156
16	156	78	88		1,170	950	1,420	302	198	76	108	76
17	68	78	158	80		4,980	1,170	286	156	76	97	86
18	59	63	158			2,840	850	286	144	49	108	97
19	55	78	158			1,820	728	318	148	49	108	97
20	43	78	158			1,170	705	318	132	29	108	108
21	50	78	158			950	660	548	120	23	120	465
22	59	78	146		550	750	548	682	120	23	97	352
23	59	78	141	122		950	485	465	120	23	108	1,170
24	68	74	99	255		4,230	388	445	198	23	76	1,290
25	78	78	88	370		2,990	352	425	144	42	54	1,110
26	78	78	95	352		1,820	318	352	124	35	49	352
27	68	78	106	388		800	335	318	108	42	57	240
28	74	78	122	370		705	318	286	101	35	66	240
29	68	82	850	425	-------	615	1,540	270	97	255	108	198
30	72	78	750	485	-------	548	728	255	86	198	900	179
31	78	-------	184	425	-------	525	-------	240	-------	13,000	465	-------

NOTE.—Observed gage height decreased 1 foot May 13 and increased 1 foot May 22 and 23. Discharge Jan. 11–22 and Feb. 17 to Mar. 9 estimated because of ice by comparison with records of flow of Potomac River, and study of observer's notes and weather records.

Monthly discharge of Monocacy River near Frederick, Md., for the year ending Sept. 30, 1923

[Drainage area, 660 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	485	43	119	0.180	0.21
November	92	63	76.9	.117	.13
December	850	61	159	.241	.28
January	1,8.0		267	.405	.47
February	5,240		1,080	1.64	1.71
March	5,580		1,540	2.33	2.69
April	2,990	318	702	1.06	1.18
May	682	240	346	.520	.60
June	240	86	162	.245	.27
July	13,000	23	502	.761	.88
August	900	49	223	.338	.39
September	2,170	76	402	.609	.68
The year	13,000	23	461	.698	9.49

OCCOQUAN CREEK NEAR OCCOQUAN, VA.

LOCATION.—At Frank Davis farm, 1 mile above Beaverdam Creek and 4½ miles northwest of Occoquan, on county line between Fairfax and Prince William counties.

DRAINAGE AREA.—546 square miles.

RECORDS AVAILABLE.—February 14, 1913, to May 3, 1916, and December 16 1920, to October 10, 1923, when station was discontinued.

GAGE.—Stevens water-stage recorder installed December 23, 1920, referred to an inclined staff gage on left bank, about 150 feet upstream from gage house. Observer, P. S. Davis. Friez water-stage recorder used April 27, 1913, to May 3, 1916, referred to same staff gage. From February 14 to April 26, 1913, a temporary vertical staff gage on opposite bank was used.

DISCHARGE MEASUREMENTS.—Made from cable about 75 feet below recorder or by wading.

CHANNEL AND CONTROL.—Gravel and large rocks; control practically permanent. Stage of zero flow at gage height 0.4 foot (determined July 14, 1913).

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder for period October 1, 1922, to October 10, 1923, 11.46 feet at noon March 17 (discharge, 6,520 second-feet); minimum stage, 1.72 feet at 8 p. m. November 1 (discharge, 22 second-feet).

1913–1916; 1921–1923: Maximum stage, 21.2 feet on afternoon of January 13, 1915, determined from flood marks on recorder shelter (discharge determined from extension of rating curve, 20,900 second-feet); minimum stage, 1.39 feet September 13–18, 1913 (discharge, 9.7 second-feet).

ICE.—Stage-discharge relation affected by ice for short periods.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice February 7–9 and 16–24. Rating curve well defined between 12 and 9,800 second-feet and extended beyond these limits. Water-stage recorder operated satisfactorily; daily discharge obtained principally by discharge integrator. Records excellent.

Discharge measurements of Occoquan Creek near Occoquan, Va., during the period Oct. 1, 1922, to Nov. 10, 1923

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
1922 Nov. 9	Dirzulaitis and Au	1.90	37.1
1923 Nov. 10	Dirzulaitis and Wiggins	2.37	91.0

Daily discharge, in second-feet, of Occoquan Creek near Occoquan, Va., for the period Oct. 1, 1922, to Oct. 10, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
1	27	23	33	655	885	450	217	362	81	36	990	140	105
2	27	25	34	1,190	1,540	398	194	276	85	34	2,090	88	85
3	26	26	35	485	983	318	192	223	166	30	585	74	75
4	26	26	36	463	733	273	194	199	308	35	629	57	69
5	25	26	41	443	520	234	227	182	176	32	563	642	59
6	25	26	51	306	410	210	1,240	168	115	28	301	4,680	55
7	25	27	60	244	}	2,900	602	158	122	27	192	1,050	50
8	25	26	89	703	210	4,380	380	148	161	32	131	967	46
9	26	33	69	1,320	}	1,650	363	170	131	28	96	1,030	43
10	61	33	63	694	508	1,140	341	240	79	25	196	470	44
11	380	33	63	441	589	926	267	204	79	26	341	306	------
12	227	33	53	312	457	1,030	230	160	91	47	337	211	------
13	166	34	53	267	1,440	1,510	238	150	73	339	167	280	------
14	70	33	56	217	1,470	4,410	3,220	140	92	340	119	205	------
15	48	32	48	185	650	1,530	4,140	136	120	126	89	142	------
16	38	37	47	177	}	1,070	2,890	318	103	67	66	112	------
17	33	41	58	157	}	5,270	1,370	295	87	58	60	96	------
18	32	41	233	104	}	2,120	883	190	75	40	417	81	------
19	33	44	270	114	}	1,620	639	149	69	34	527	75	------
20	27	46	135	108	140	1,740	527	130	61	30	278	71	------
21	26	40	94	109	}	862	449	}	49	27	166	115	------
22	26	35	82	120	}	692	384	}	42	30	113	813	------
23	25	36	72	138	}	620	319	}	37	434	80	533	------
24	25	36	63	202	}	831	283	}	120	292	71	548	------
25	25	33	59	807	157	640	245	280	285	109	56	350	------
26	26	32	50	1,280	146	464	225	}	137	78	49	210	------
27	26	32	52	1,090	206	389	207	}	79	65	41	249	------
28	26	33	132	3,190	494	352	251	}	61	48	39	268	------
29	24	30	1,840	2,600	------	305	1,020	99	49	275	50	167	------
30	25	31	690	1,050	------	262	599	84	43	296	316	125	------
31	26	------	350	707	------	252	------	85	------	402	320	------	------

NOTE.—Daily discharge estimated by study of weather records and record of flow of Rappahannock River at Fredericksburg, Va., for Feb. 7–9 and 16–24 because of ice and May 21–28 when recorder was not operating. Discharge obtained by applying mean daily gage height to rating table Oct. 1–10, Oct. 15 to Dec. 6, 1922, and June 30 to July 12, July 18–22, Aug. 27, 28, and Oct. 1–10, 1923. Discharge determined by hourly, bihourly, and four-hour period methods Dec. 24, 1922, Jan. 3, 28, 29, Mar. 7, 8, 11, 13, 14, 17, 18, 26, Apr. 10, 14, 15, 16, 23, Aug. 2, Sept. 2, 5, 6, and 7. Discharge for remainder of record determined by use of discharge integrator.

Monthly discharge of Occoquan Creek near Occoquan, Va., for the year ending Sept. 30, 1923

[Drainage area, 546 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile.	
October	380	24	50.5	0.092	0.11
November	46	23	32.8	.060	.07
December	1,840	33	162	.297	.34
January	3,190	104	641	1.17	1.35
February	1,540		467	.855	.89
March	5,270	210	1,250	2.29	2.64
April	4,140	192	745	1.36	1.52
May		84	210	.385	.44
June	308	37	106	.194	.22
July	902	25	128	.234	.27
August	2,090	39	306	.560	.65
September	4,680	57	472	.864	.96
The year	5,270	23	381	.698	9.46

RAPPAHANNOCK RIVER BASIN

RAPPAHANNOCK RIVER NEAR FREDERICKSBURG, VA.

LOCATION.—At rear of McWhirt farm, 1½ miles above dam of Spottsylvania Power Co. and 3½ miles above Fredericksburg, Spottsylvania County.

DRAINAGE AREA.—1,590 square miles.

RECORDS AVAILABLE.—September 19, 1907, to September 30, 1923.

GAGE.—Friez water-stage recorder installed January 6, 1922, referred to a staff gage in two sections on right bank. Vertical staff installed November 4, 1913, to replace chain gage destroyed October 31, 1913. Original gage was a vertical staff which was destroyed February 14, 1908, and replaced February 20, 1908, by a chain gage under cable. All three gages at practically same location and referred to same datum. Recorder inspected by Charles Perry.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading 1 mile above gage.

CHANNEL AND CONTROL.—Bed composed of boulders, somewhat rough. One channel. Banks wooded; water overflows right bank at stage about 15 feet and left bank at about 12 feet. Current sluggish at extremely low water. Control is a rocky section a few hundred feet below the gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.50 feet at 11 a. m. August 1 (discharge, 13,700 second-feet); minimum stage, 0.58 foot at 8 p. m. July 21 (discharge, 136 second-feet).

1907–1923: Maximum stage recorded, 11.45 feet at noon April 11, 1918 (discharge, 38,500 second-feet); minimum stage, 0.30 foot at 3 p. m. August 21, 1914 (discharge, 72 second-feet).

ICE.—Ice forms near gage but seldom in sufficient quantity at control to affect stage-discharge relation.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice February 17–25. Rating curve well defined between 100 and 27,000 second-feet; extended beyond these limits. Discharge determined by applying mean daily gage height to rating table and by use of discharge integrator, by four-hour periods and bihourly method, except for period affected by ice and July 8 to 14 when record slipped and August 2 to 4 when pencil caught. Discharge estimated for these two periods from daily gage readings, weather records, and examination of recorder graph. Operation of water-stage recorder satisfactory. Records excellent.

Daily discharge, in second-feet, of Rappahannock River near Fredericksburg, Va., for the year ending Sept. 30, 1923

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	172	282	264	1,320	2,250	1,400	1,030	1,540	705	310	8,890	1,010
2	171	269	268	2,320	3,170	1,200	951	1,320	697	256	7,980	740
3	163	272	280	1,760	2,860	1,070	957	1,250	690	246	3,780	589
4	160	281	281	1,530	2,520	981	971	1,180	861	246	2,640	534
5	173	298	355	1,440	1,970	921	1,130	1,130	934	242	3,570	801
6	161	286	479	1,150	1,700	966	2,400	1,090	672	296	2,780	4,740
7	174	300	644	995	1,370	7,480	1,820	1,050	596	323	1,700	3,810
8	203	309	508	1,380	1,360	7,910	1,340	1,010	681	276	1,130	3,660
9	538	300	478	2,380	1,500	3,640	1,180	1,050	698	240	930	2,900
10	620	292	478	1,760	1,830	2,570	1,090	1,160	527	307	1,230	1,590
11	1,310	287	426	1,370	1,720	2,220	1,020	1,050	514	267	816	1,110
12	1,180	277	399	1,070	1,430	2,180	978	952	622	196	753	905
13	580	274	382	1,000	2,030	2,680	1,130	962	838	245	864	929
14	438	287	366	845	2,430	6,040	4,630	936	950	380	706	946
15	378	304	364	782	1,720	3,580	6,240	905	1,090	336	606	729
16	354	320	401	762	1,210	3,630	4,360	1,040	890	259	514	634
17	347	330	465	693		10,400	3,170	1,100	766	235	490	606
18	331	331	1,100	567		5,740	2,590	1,060	672	204	730	586
19	307	333	1,210	595		5,040	2,240	877	597	180	1,640	571
20	290	305	731	677		4,330	1,980	834	565	178	1,070	548
21	268	301	496	595	730	2,720	1,790	1,180	503	157	790	595
22	271	303	574	636		2,280	1,650	1,850	490	178	638	2,260
23	279	276	511	651		2,060	1,510	1,220	434	452	562	2,920
24	293	260	520	862		2,340	1,380	1,040	1,840	343	516	1,810
25	304	265	446	1,240		1,980	1,280	1,010	2,060	303	470	1,440
26	311	263	461	1,970	969	1,660	1,210	952	844	202	431	1,040
27	301	254	455	1,950	1,150	1,520	1,170	895	510	200	404	2,480
28	296	255	755	4,270	1,590	1,400	1,260	838	398	448	402	1,740
29	282	264	2,860	4,480	-------	1,280	3,340	793	347	4,350	3,070	1,200
30	280	273	2,130	2,770	-------	1,160	2,150	736	364	2,010	3,400	992
31	285	-------	1,340	2,070	-------	1,110	-------	718	-------	3,960	1,830	-------

NOTE.—Stage-discharge relation affected by ice Feb. 17–25, discharge estimated from study of weather records and recorder graph. The record slipped on the drum July 8–14, discharge estimated from daily gage heights and recorder graph. Pencil caught in paper August 2–4, discharge estimated by study of recorder graph.

Monthly discharge of Rappahannock River near Fredericksburg, Va., for the year ending Sept. 30, 1923

[Drainage area, 1,590 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,310	160	362	0.228	0.26
November	333	254	288	.181	.20
December	2,860	264	659	.414	.48
January	4,480	567	1,480	.931	1.07
February	3,170	-------	1,480	.931	.97
March	10,400	921	3,020	1.90	2.19
April	6,240	951	1,930	1.21	1.35
May	1,850	718	1,060	.667	.77
June	2,060	347	745	.469	.52
July	4,350	157	575	.362	.42
August	8,890	402	1,780	1.12	1.29
September	4,740	534	1,480	.931	1.04
The year	10,400	157	1,240	.780	10.56

MISCELLANEOUS DISCHARGE MEASUREMENTS

Miscellaneous discharge measurements in North Atlantic Coast drainage basin during the year ending Sept. 30, 1923

Date	Stream	Tributary to—	Locality	Gage height	Discharge
				Feet	*Sec.-ft.*
Mar. 13	Pemigewasset River	Merrimack River	Bristol, N. H	[a] 3.36	397
13	do	do	do	[a] 3.43	381
Oct. 7	Diversion canal	Packard Pond	Athol, Mass		.7
Nov. 3	Wall Kill	Hudson River	Franklin, N. J	.35	20.3
Mar. 9	do	do	do	.90	108
Apr. 19	do	do	do	.64	52
19	do	do	do	.64	52
June 6	Airmount Brook	Ramapo River	Mahwah, N. J		.15
16	do	do	do		.19
Apr. 20	Morris Canal	Diverts from Musconetcong River and discharges into Passaic River.	Wharton, N. J		3.6
May 21	do	do	do		4.0
June 16	do	do	do		7.4
July 25	do	do	do		7.0
Aug. 20	do	do	do		1.7
Sept. 22	do	do	do		2.2
Apr. 16	do	do	Towaco, N. J		5.4
16	do	Diverts from Passaic River.	Paterson, N. J		5.8
May 26	do	do	do		0
June 16	do	do	do		0
July 21	do	do	do		3.4
Aug. 18	do	do	do		4.2
Sept. 22	do	do	do		6.6
May 26	do	do	Bloomfield, N. J		1.8
9	Delaware and Raritan Canal.	Diverts from Delaware River and discharges into Raritan River.	Port Mercer, N. J		94
June 21	do	do	do		88
22	do	do	do		126
July 14	do	do	Blackwells Mills, N. J		40.7
24	Deep Run	South River	Spring Valley, N. J		2.4
Aug. 10	do	do	do		1.5
Sept. 11	do	do	do		1.4
27	do	do	do		2.8
July 24	do	do	Browntown, N. J		2.5
Aug. 10	do	do	do		1.5
Sept. 11	do	do	do		1.5
27	do	do	do		5.8
July 24	do	do	Old Bridge N. J		4.2
Aug. 10	do	do	do		2.0
Sept. 11	do	do	do		1.9
27	do	do	do		6.5
July 24	Tennant Brook	do	Runyon, N. J		.05
Aug. 10	do	do	do		.03
Sept. 11	do	do	do		.06
29	do	do	do		.14
July 24	Pumpage into Tennant Brook Pond.	do	do		8.3
Aug. 10	do	do	do		6.2
Sept. 11	do	do	do		7.0
29	do	do	do		8.6
July 24	Flow from large pond into small pond on Tennant Brook.	do	do		1.5
24	do	do	do		1.5
Aug. 9	do	do	do		.88
10	do	do	do		.49
Sept. 11	do	do	do		1.30
29	do	do	do		.52

[a] Distance down from reference point.

INDEX

STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

PART I. NORTH ATLANTIC SLOPE BASINS

STREAM-GAGING STATIONS AND PUBLICATIONS RELATING TO WATER RESOURCES

PART I. NORTH ATLANTIC SLOPE BASINS

INTRODUCTION

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, underground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the bulletins, professional papers, monographs, and annual reports.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below.

PART I. North Atlantic slope basins (St. John River to York River).
II. South Atlantic slope and eastern Gulf of Mexico basins (James River to the Mississippi).
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.
IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins, in three volumes:
A, Pacific slope basins in Washington and upper Columbia River basin.
B, Snake River basin.
C, Lower Columbia River basin and Pacific slope basins in Oregon.

HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED

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

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

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

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

Boston, Mass., 2500 Customhouse.
Albany, N. Y., 704 Journal Building.
Trenton, N. J., Statehouse.
Asheville, N. C., 316 Jackson Building.
Chattanooga, Tenn., 37 Municipal Building.
Columbus, Ohio, Brown Hall, Ohio State University.
Madison, Wis., c/o Railroad Commission of Wisconsin.
Chicago, Ill., 940 Transportation Building.
Ames, Iowa, State Highway Commission Building.
Rolla, Mo., Rolla Building, School of Mines and Metallurgy.
Topeka, Kans., 23 Federal Building.
Helena, Mont., 45–46 Federal Building.
Denver, Colo., 403 Post Office Building.
Tucson, Ariz., 210 Agricultural Building, University of Arizona.
Salt Lake City, Utah, 313 Federal Building.
Boise, Idaho, Federal Building.
Idaho Falls, Idaho, 228 Federal Building.
Tacoma, Wash., 406 Federal Building.
Portland, Oreg., 606 Post Office Building.
San Francisco, Calif., 328 Customhouse.
Los Angeles, Calif., 600 Federal Building.
Austin, Tex., Capitol Building.
Honolulu, Hawaii, 25 Capitol Building.

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

STREAM-FLOW REPORTS

Stream-flow records have been obtained at about 5,600 points in the United States, and the data obtained have been published in the reports tabulated below:

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

[A=Annual Report; B=Bulletin; W=Water-Supply Paper]

Report	Character of data	Year
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River, and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	1906.
W 201 to 214	do	1906.
W 241 to 252	do	1907–8.
W 261 to 272	do	1909.
W 281 to 292	do	1910.
W 301 to 312	do	1911.
W 321 to 332	do	1912.
W 351 to 362	do	1913.
W 381 to 394	do	1914.
W 401 to 414	do	1915.
W 431 to 444	do	1916.
W 451 to 464	do	1917.
W 471 to 484	do	1918.
W 501 to 514	do	1919–20.
W 521 to 534	do	1921.
W 541 to 554	do	1922.
W 561 to 574	do	1923.

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

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

The following table gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1923. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Maine, 1903 to 1921, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, 401, 431, 451, 471, 501, and 521, which contain records for the New England streams from 1903 to 1921. Results of miscellaneous measurements are published by drainage basins.

Numbers of water-supply papers containing results of stream measurements, 1899–1923

[For basins included see p. 265]

Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
												A	B	C
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[b] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[k] 98, 99, [m] 100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125 [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166 [p] 167	[p] 167, 168	169	170	171	172	[k] 169, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202 [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	251	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414
1916	431	432	433	434	435	436	437	438	439	440	441	442	443	444
1917	451	452	453	454	455	456	457	458	459	460	461	462	463	464
1918	471	472	473	474	475	476	477	478	479	480	481	482	483	484
1919–20	501	502	503	504	505	506	507	508	509	510	511	512	513	514
1921	521	522	523	524	525	526	527	528	529	530	531	532	533	534
1922	541	542	543	544	545	546	547	548	549	550	551	552	553	554
1923	561	562	563	564	565	566	567	568	569	570	571	572	573	574

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

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

In exception to this rule the records for Mississippi River are given in four parts, as indicated on page 265, and the records for large lakes are taken up in order of streams around the rim of the lake.

PRINCIPAL STREAMS

The principal streams flowing into the Atlantic Ocean between St. John River, Maine-New Brunswick, and York River, Virginia, are the St. Croix, Machias, Union, Penobscot, Kennebec, Androscoggin, Saco, Merrimack, Mystic, Blackstone, Connecticut, Hudson, Delaware, Susquehanna, Potomac, and Rappahannock. The streams drain wholly or in part the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.

GAGING STATIONS

NOTE.—Dash after a date indicates that station was being maintained September 30, 1923. Period after a date indicates discontinuance.

ST. JOHN RIVER BASIN

St. John River near Dickey, Maine, 1910–11.
St. John River at Fort Kent, Maine, 1905–1915.
St. John River at Van Buren, Maine, 1908–
Allagash River near Allagash, Maine, 1910–11.
St. Francis River at St. Francis, Maine, 1910–11.
Fish River at Wallagrass, Maine, 1903–1908; 1911.
Madawaska River at St. Rose du Degele, Quebec, 1910–11.
Aroostook River at Fort Fairfield, Maine, 1903–10.

ST. CROIX RIVER BASIN

St. Croix River near Baileyville, Maine, 1919–
St. Croix River near Woodland (Spragues Falls), Maine, 1902–1911.
St. Croix River at Baring, Maine, 1914.
West Branch of St. Croix River at Baileyville, Maine, 1910–1912.

MACHIAS RIVER BASIN

Machias River at Whitneyville, Maine, 1903–1921.

UNION RIVER BASIN

Union River, West Branch (head of Union River), at Amherst, Maine, 1909–1919.
Union River, West Branch, near Mariaville, Maine, 1909.
Union River at Ellsworth, Maine, 1909.
East Branch of Union River near Waltham, Maine, 1909.
Webb Brook at Waltham, Maine, 1909.
Green Lake (head of Reeds Brook) at Green Lake, Maine, 1909–1912.
Reeds Brook (Green Lake Stream) at Lakewood, Maine, 1909–1913.
Branch Lake (head of Branch Lake Stream) near Ellsworth, Maine, 1909–1915.
Branch Lake Stream near Ellsworth, Maine, 1909–1914.

PENOBSCOT RIVER BASIN

Penobscot River, West Branch (head of Penobscot River), at Millinocket, Maine, 1901–
Penobscot River, West Branch, near Medway, Maine, 1916–
Penobscot River at West Enfield,[1] Maine, 1901–
Penobscot River at Sunkhaze rips, near Costigan, Maine, 1899–1900.
East Branch of Penobscot River at Grand Lake dam, Maine, 1912.
East Branch of Penobscot River at Grindstone, Maine, 1902–
Mattawamkeag River at Mattawamkeag, Maine, 1902–
Piscataquis River near Foxcroft, Maine, 1902–
Pleasant River at Milo, Maine, 1920–
Passadumkeag River at Lowell, Maine, 1915–
Cold Stream Pond (head of Cold Stream), Maine, 1900–1911 (record of opening and closing of pond).
Cold Stream at Enfield, Maine, 1904–1906.
Kenduskeag Stream near Bangor, Maine, 1908–1919.
Orland River:
Phillips Lake and outlets in Holden and Dedham, Maine, 1904–1908.

ST. GEORGE RIVER BASIN

St. George River at Union, Maine, 1913–14.

KENNEBEC RIVER BASIN

Moose River (head of Kennebec River) near Rockwood, Maine, 1902–1908; 1910–1912; 1919–
Moosehead Lake at Greenville, Maine, 1903–1906 (stage only).
Moosehead Lake at east outlet, Maine (stage only), 1895–
Kennebec River at Moosehead, Maine, 1919–
Kennebec River at The Forks, Maine, 1901–
Kennebec River at Bingham, Maine, 1907–1910.
Kennebec River at North Anson, Maine, 1901–1907.
Kennebec River at Waterville, Maine, 1892–
Kennebec River at Gardiner, Maine, 1785–1911 (record of opening and closing of navigation).
Roach River at Roach River, Maine, 1901–1908.
Dead River at The Forks, Maine, 1901–1907; 1910–
Carabassett River at North Anson, Maine, 1901–1907.
Sandy River near Farmington, Maine, 1910–1915.
Sandy River near Madison, Maine, 1904–1908.

[1] Known as Montague prior to 1904.

Kennebec River tributaries—Continued.
Sebasticook River at Pittsfield, Maine, 1908–1918.
Messalonskee Stream at Waterville, Maine, 1903–1905.
Cobbosseecontee Lake (on Cobbosseecontee Stream), Maine, 1839–1911 (dates of opening and closing).
Cobbosseecontee Stream at Gardiner, Maine, 1890–

ANDROSCOGGIN RIVER BASIN

Rangeley Lake (head of Androscoggin River), Maine, 1880–1911 (dates of opening and closing).
Androscoggin River at Errol dam, N. H., 1905–1922.
Androscoggin River at Berlin, N. H., 1913–1922.
Androscoggin River at Gorham, N. H., 1903 (fragmentary).
Androscoggin River at Shelburne, N. H., 1903–1907; 1910.
Androscoggin River at Rumford, Maine, 1892–1903; 1905–
Androscoggin River at Dixfield, Maine, 1902–1908.
Magalloway River at Aziscohos dam, Maine, 1912–
Auburn Lake, Maine, 1890–1911 (date of opening).
Little Androscoggin River at Bisco Falls, near South Paris, Maine, 1913–

PRESUMPSCOT RIVER BASIN

Presumpscot River at outlet of Sebago Lake, Maine, 1887–

SACO RIVER BASIN

Saco River near Center Conway, N. H., 1903–1912.
Saco River at Cornish, Maine, 1916–
Saco River at West Buxton, Maine, 1907–1916; 1919–
Ossipee River at Cornish, Maine, 1916–

MERRIMACK RIVER BASIN

Pemigewasset River (head of Merrimack River) at Plymouth, N. H., 1886–
Merrimack River at Franklin Junction, N. H., 1903–
Merrimack River at Garvins Falls, N. H., 1904–1915.
Merrimack River at Lowell, Mass., 1848–1861; 1866–1916.
Merrimack River at Lawrence, Mass., 1880–
Middle Branch of Pemigewasset River at North Woodstock, N. H., 1911–12.
Smith River near Bristol, N. H., 1918–
Lake Winnepesaukee at Lakeport, N. H., 1860–1911 (stage only).
Contoocook River near Elmwood, N. H., 1917–
Contoocook River at West Hopkinton, N. H., 1903–1907.
Nubanusit Brook near Peterboro, N. H., 1920–
Blackwater River near Contoocook, N. H., 1918–1920
Suncook River at North Chichester, N. H., 1918–
Suncook River at East Pembroke, N. H., 1904–5.
Souhegan River at Merrimack, N. H., 1909–
Nashua River—
South Branch of Nashua River, Clinton, Mass., 1896–
Concord River at Lowell, Mass., 1901–1916.
Sudbury River at Framingham, Mass., 1875–
Lake Cochituate at Cochituate, Mass., 1863–

MYSTIC RIVER BASIN

Mystic Lake (on Mystic River) near Boston, Mass., 1878–1897.

CHARLES RIVER BASIN

Charles River at Waltham, Mass., 1903–1909.

TAUNTON RIVER BASIN

Matfield River (head of Taunton River) at Elmwood, Mass., 1909–10.
Taunton River at Titicut near Bridgewater, Mass., 1920–
Satucket River near Elmwood, Mass., 1909–10.

PROVIDENCE RIVER BASIN

Providence River:
Seekonk River—
Blackstone River at Worcester, Mass., 1923–
Blackstone River at Woonsocket, R. I., 1904–5.
Blackstone River at Albion, R. I., 1914–1916.
Blackstone River at Berkeley, R. I., 1901–2.
Branch River at Branch Village, R. I., 1909–10; 1912–13.
Tenmile River near Rumford, R. I., 1909.
Woonasquatucket River at Olneyville, R. I., 1910.
Pawtuxet River at Fiskeville, R. I., 1916–
Pawtuxet River at Harris, R. I., 1909.

PAWCATUCK RIVER BASIN

Pawcatuck River:
Wood River at Hope Valley, R. I., 1909-10

THAMES RIVER BASIN

Thames River:
Quinebaug River at Jewett City, Conn., 1918–
Shetucket River at Willimantic, Conn., 1904–5
Shetucket River at South Windham, Conn., 1919–1921.

CONNECTICUT RIVER BASIN

Second Connecticut Lake near Pittsburg, N. H., 1922–
First Connecticut Lake near Pittsburg, N. H., 1916–
Connecticut River at First Lake, near Pittsburg, N. H., 1917–
Connecticut River at South Newbury, Vt., 1918–1921; 1922–
Connecticut River at Orford, N. H., 1900–1921.
Connecticut River at White River Junction, Vt., 1911–
Connecticut River at Sunderland, Mass., 1904–
Connecticut River at Holyoke, Mass., 1880–1899.
Connecticut River at Hartford, Conn., 1896–1908.
Israel River above South Branch, near Jefferson Highlands, N. H., 1903–1906.
Israel River below South Branch, at Jefferson Highlands, N. H., 1903–1907.
Passumpsic River at Pierce's mills, near St. Johnsbury, Vt., 1909–1919.
Passumpsic River at St. Johnsbury Center, Vt., 1903.
Ammonoosuc River at Bretton Woods, N. H., 1903–1907.
Zealand River near Twin Mountain, N. H., 1903–1907.
Little River at Twin Mountain, N. H., 1904–5.
White River at Sharon, Vt., 1903–1904; 1909–1913.

Connecticut River tributaries—Continued.
White River at West Hartford, Vt., 1915–
Second Branch of White River at North Randolph, Vt., 1920–21.
Mascoma River at Mascoma, N. H., 1923–
West River at Newfane, Vt., 1919–1923.
Ashuelot River near Gilsum, N. H., 1922–
Ashuelot River at Winchester, N. H., 1903–4.
Ashuelot River at Hinsdale, N. H., 1907–1909; 1914–
East Branch Ashuelot River—
Minnewawa Brook at Marlboro, N. H., 1919–1922.
Pratt Brook at Chesham, N. H., 1919–1921.
South Branch Ashuelot River at Webb, near Marlboro, N. H., 1920–
Millers River near Winchenden, Mass., 1916–
Millers River at Wendell Depot, Mass., 1909–1913.
Millers River at Erving, Mass., 1914–
Sip Pond Brook near Winchenden, Mass., 1916–
Priest Brook near Winchenden, Mass., 1916–
Otter River near Gardner, Mass., 1916–17.
East Branch of Tully River near Athol, Mass., 1916–
Moss Brook at Wendell Depot, Mass., 1909–10; 1916–
Deerfield River at Hoosac Tunnel, Mass., 1909–1913.
Deerfield River at Charlemont, Mass., 1913–
Deerfield River at Shelburne Falls, Mass., 1907–1913.
Deerfield River at Deerfield, Mass., 1904–5.
Ware River (head of Chicopee River) at Ware, Mass., 1904–1911.
Ware River at Gibbs Crossing, Mass., 1912–
Burnshirt River near Templeton, Mass., 1909.
Swift River at West Ware, Mass., 1910–
Quaboag River at West Warren, Mass., 1903–1907.
Quaboag River at West Brimfield, Mass., 1909–
Westfield River at Knightville, Mass., 1909–
Westfield River at Russell, Mass., 1904–5.
Westfield River near Westfield, Mass., 1914–
Middle Branch of Westfield River at Goss Heights, Mass., 1910–
West Branch of Westfield River at Chester, Mass., 1915.
Westfield Little River near Westfield, Mass., 1905–1922.
Borden Brook near Westfield, Mass., 1910–1918.
Farmington River near New Boston, Mass., 1913–
Hockanum River near East Hartford, Conn., 1919–1921.
Salmon River at Leesville, Conn., 1905–6.

HOUSATONIC RIVER BASIN

Housatonic River near Great Barrington, Mass., 1913–
Housatonic River at Falls Village, Conn., 1912–
Housatonic River at Gaylordsville, Conn., 1900–1914.
Tenmile River at Dover Plains, N. Y., 1901–1903.
Pomperaug River at Bennetts Bridge, Conn., 1913–1916.
Naugatuck River near Naugatuck, Conn., 1918–

MIANUS RIVER BASIN

Mianus River at Bedford, N. Y., 1903.
Mianus River near Stamford, Conn., 1903.
Mianus River at North Mianus, Conn., 1920–1922.

BYRAM RIVER BASIN

Byram River, West Branch (head of Byram River), near Port Chester, N. Y., 1903.
Byram River at Pemberwick, Conn., 1903.
East Branch of Byram River near Greenwich, Conn., 1903.
Middle Branch of Byram River near Riverville, Conn., 1903.

HUDSON RIVER BASIN

Hudson River at Gooley near Indian Lake, N. Y., 1916–
Hudson River at North Creek, N. Y., 1907–
Hudson River at Thurman, N. Y., 1907–1920.
Hudson River at Hadley, N. Y., 1921–
Hudson River at Corinth, N. Y., 1904–1912.
Hudson River at Spier Falls, N. Y., 1912–1923.
Hudson River at Fort Edward, N. Y. 1899–1908.
Hudson River at Mechanicville, N. Y., 1887–
Opalescent River below Flowed Land near Tahawus, N. Y., 1920–1922.
Cedar River near Indian Lake, N. Y., 1911–1917.
Indian Lake reservoir near Indian Lake, N. Y., 1900–
Indian River near Indian Lake, N. Y., 1912–1914; 1915–
Schroon Lake (on Schroon River) at Pottersville, N. Y., 1908–1911.
Schroon River at Riverbank, N. Y., 1907–
Schroon River at Warrensburg, N. Y., 1895–1902.
Sacandaga River at Wells, N. Y., 1907–1911.
Sacandaga River near Hope, N. Y., 1911–
Sacandaga River at Northville, N. Y., 1907–1910.
Sacandaga River near Hadley, N. Y., 1907–1910.
Sacandaga River (at cable) at Hadley, N. Y., 1911–
Sacandaga River at Union Bag & Paper Co.'s mill at Hadley, N. Y., 1909–1911.
West Branch of Sacandaga River at Whitehouse, N. Y., 1910.
West Branch of Sacandaga River at Blackbridge, near Wells, N. Y., 1911–16.
Batten Kill at Battonville, N. Y., 1908; 1922–
Fish Creek at Burgoyne, N. Y., 1905; 1908.
Hoosic River near Eagle Bridge, N. Y., 1910–1922; 1923–
Hoosic River at Buskirk, N. Y., 1903–1908.
Mohawk River at Ridge Mills, near Rome, N. Y., 1898–1900.
Mohawk River at Utica, N. Y., 1901–1903.
Mohawk River at Little Falls, N. Y., 1898–1909; 1912.
Mohawk River at Rocky Rift dam, near Indian Castle, N. Y., 1901.
Mohawk River at Tribes Hill, N. Y., 1912.
Mohawk River at Schenectady, N. Y., 1899–1901.
Mohawk River at Rexford Flats, N. Y., 1898–1901.
Mohawk River at Vischer Ferry dam, N. Y., 1913–
Mohawk River at Dunsbach Ferry, N. Y., 1898–1909.
Mohawk River at Crescent Dam, N. Y., 1917–
Ninemile Creek at Stittville, N. Y., 1898–99.
Oriskany Creek at Coleman, N. Y., 1904–1906.
Oriskany Creek at Wood-road bridge, near Oriskany, N. Y., 1901–1904.
Oriskany Creek at State dam, near Oriskany, N. Y., 1898–1900.
Saquoit Creek at New York Mills, N. Y., 1898–1900.
Nail Creek at Utica, N. Y., 1904.
Reels Creek near Deerfield, N. Y., 1901–1904.
Reels Creek at Utica, N. Y., 1901–2.
Johnson Brook at Deerfield, N. Y., 1903–1905.

Hudson River tributaries—Continued.
Mohawk River tributaries—Continued.
Starch Factory Creek at New Hartford, N. Y., 1903-1906.
Graefenberg Creek at New Hartford, N. Y., 1903–1906.
Sylvan Glen Creek at New Hartford, N. Y., 1903–1906.
West Canada Creek at Wilmurt, N. Y., 1912–13.
West Canada Creek at Hinckley, N. Y., 1919–
West Canada Creek at Twin Rock bridge, near Trenton Falls, N. Y., 1900–1909.
West Canada Creek at Poland, N. Y., 1913.
West Canada Creek at Middleville, N. Y., 1898–1901.
West Canada Creek at Kast Bridge, N. Y., 1905–1910; 1912–13; 1920–
Ninemile feeder near Holland Patent, N. Y., 1919–
East Canada Creek at Dolgeville, N. Y., 1898–1909; 1912.
Caroga Creek 3 miles above junction with Mohawk River, N. Y., 1898–99.
Cayadutta Creek at Johnstown, N. Y., 1899–1900.
Schoharie Creek at Prattsville, N. Y., 1902–1913.
Schoharie Creek at Schoharie Falls, above Mill Point, N. Y., 1900–1901.
Schoharie Creek at Mill Point, N. Y., 1900–1903.
Schoharie Creek at Fort Hunter, N. Y., 1898–1901.
Schoharie Creek at Erie Canal aqueduct, below Fort Hunter, N. Y., 1900.
Alplaus Kill near Charlton, N. Y., 1913–1916.
Poesten Kill near Troy, N. Y., 1923–
Quacken Kill at Quacken Kill, N. Y., 1894.
Normans Kill at Frenchs Mill, N. Y., 1891.
Kinderhook Creek at Wilsons dam, near Garfield, N. Y., 1892–1894.
Kinderhook Creek at East Nassau, N. Y., 1892–1894.
Kinderhook Creek at Rossman, N. Y., 1906–1909; 1911–1914.
Catskill Creek at South Cairo, N. Y., 1901–1907.
Esopus Creek at Olivebridge, N. Y., 1903–4.
Esopus Creek near Olivebridge, N. Y., 1906–1913.
Esopus Creek at Kingston, N. Y., 1901–1909.
Esopus Creek at Mount Marion, N. Y., 1907–1913.
Roundout Creek at Rosendale, N. Y., 1901–1903; 1906–1913
Diversion to Delaware and Hudson canal at Rosendale, N. Y., 1901–1903; 1906.
Wallkill River at Pellets Island Mountain, N. Y., 1919-
Wallkill River at Newpaltz, N. Y., 1901–1903.
Wappinger Creek at Wappinger Falls, N. Y., 1903–1905.
Fishkill Creek at Glenham, N. Y., 1901–1903.
Foundry Brook at Cold Spring, N. Y., 1902–3.
Croton River at Croton dam, near Croton Lake, N. Y., 1870–1899.

HACKENSACK RIVER BASIN

Hackensack River at Oradell, N. J., 1908–1913.
Hackensack River at New Milford, N. J., 1921–

PASSAIC RIVER BASIN

Passaic River at Millington, N. J., 1903–1906; 1921–
Passaic River near Chatham, N. J., 1902–1911.
Passaic River at Two Bridges (Mountain View), N. J., 1901–1903.

Passaic River at Paterson, N. J., 1898–1920.
Rockaway River at Boonton, N. J., 1903–4; 1906–
Whippany River at Morriston, N. J., 1921–
Pompton River at Pompton Plains, N. J., 1903–4.
Pompton River at Two Bridges (Mountain View), N. J., 1901–1903.
Ramapo River near Mahwah, N. J., 1903–1906; 1908; 1922–
Ramapo River at Pompton Lakes, N. J., 1921–
Greenwood Lake at The Glens, N. J., 1898–1904; 1907–
Wanaque River at Greenwood Lake, N. J., 1919–
Wanaque River at Wanaque, N. J., 1903–1905; 1912–1915; 1919–
Pequannock River at Macopin intake dam, N. J., 1892–

ELIZABETH RIVER BASIN

Elizabeth River at Elizabeth, N. J., 1921–

RAHWAY RIVER BASIN

Rahway River at Rahway, N. J., 1908–1915; 1921–
Robinsons Branch of Rahway River at Goodmans, N. J., 1921–

RARITAN RIVER BASIN

Raritan River, South Branch (head of Raritan River), near High Bridge, N. J., 1919–
Raritan River, South Branch, at Stanton, N. J., 1903–1906; 1919–
Raritan River at Manville,[2] N. J., 1903–1907; 1908–1915; 1921–
Raritan River at Boundbrook, N. J., 1903–1909.
North Branch of Raritan River near Far Hills, N. J., 1922–
North Branch of Raritan River at Pluckemin, N. J., 1903–1906.
North Branch of Raritan River at Milltown, N. J., 1923–
Black River (head of Lamington River) near Porterville, N. J., 1921–
Millstone River at Blackwells Mills, N. J., 1921–
Millstone River at Millstone, N. J., 1903–4.
Bound Brook:
Green Brook at Bound Brook, N. J., 1923–
Lawrence Brook at Patrick Corner, N. J., 1922–

NAVESINK RIVER BASIN

Navesink River:
Swimming River near Red Bank, N. J., 1922–

DELAWARE RIVER BASIN

Delaware River, East Branch (head of Delaware River), at Fishs Eddy, N. Y., 1912–
Delaware River, East Branch, at Hancock, N. Y., 1902–1912.
Delaware River at Port Jervis, N. Y., 1904–
Delaware River at Belvidere, N. J., 1922–
Delaware River at Riegelsville, N. J., 1906–
Delaware River at Lambertville, N. J., 1897–1908.
Delaware River at Trenton, N. J., 1913–
Beaver Kill at Cooks Falls, N. Y., 1913–
West Branch of Delaware River at Hale Eddy, N. Y., 1912–
West Branch of Delaware River at Hancock, N. Y., 1902–1912.

[2] Records for 1903–1907 published as Finderne.

Delaware River tributaries—Continued.
Lackawaxen River:
Wallenpaupack Creek at Wilsonville, Pa., 1918–1921.
Mongaup River near Rio, N. Y., 1909–1913.
Neversink River at Godeffroy, N. Y., 1903; 1909–10; 1911–1914.
Neversink River at Port Jervis, N. Y., 1902–3.
Bushkill Creek near Shoemakers, Pa., 1920–1921.
Flat Brook near Flatbrookville, N. J., 1923–
Brodhead Creek:
McMichaels Creek near Stroudsburg, Pa., 1920–1921.
Paulins Kill at Blairston, N. J., 1921–
Paulins Kill at Columbia, N. J., 1908–9.
Pequest River at Pequest, N. J., 1921–
Beaver Brook near Belvidere, N. J., 1922–
Lehigh River at Tannery, Pa., 1919–1921.
Lehigh River at Bethlehem, Pa., 1902–1905; 1909–1913; 1918–1921.
Lehigh River at Easton, Pa., 1909.
Musconetcong River near Hackettstown, N. J., 1921–
Musconetcong River at Asbury, N. J., 1903.
Musconetcong River near Bloomsbury, N. J., 1903–1907; 1921–
Tohickon Creek at Point Pleasant, Pa., 1883–1889; 1901–1913.
Assunpink Creek at Trenton, N. J., 1923–
Neshaminy Creek below Forks, Pa., 1884–1913.
Rancocas Creek:
North Branch of Rancocas Creek at Pemberton, N. J., 1921–
Little Schuylkill River at Tamaqua, Pa., 1919–1921.
Schuylkill River at Reading, Pa., 1919–1921.
Schuylkill River near Philadelphia, Pa., 1898–1912.
Perkiomen Creek near Frederick, Pa., 1884–1913.
Wissahickon Creek near Philadelphia, Pa., 1897–1902; 1905–6.
Brandywine Creek at Chadds Ford, Pa., 1918–1921.

SUSQUEHANNA RIVER BASIN

Susquehanna River at Colliersville, N. Y., 1907–8.
Susquehanna River at Conklin, N. Y., 1912–
Susquehanna River at Binghamton, N. Y., 1901–1912.
Susquehanna River at Towanda, Pa., 1918–1920.
Susquehanna River at Wysox, Pa., 1908–9
Susquehanna River at Wilkes-Barre, Pa., 1899–1913; 1918–1921.
Susquehanna River at Danville, Pa., 1899–1913; 1918–1921.
Susquehanna River at Harrisburg, Pa., 1891–1913; 1918–1921.
Susquehanna River at McCall Ferry, Pa., 1902–1909.
Chenango River at South Oxford, N. Y., 1903.
Chenango River near Greene, N. Y., 1908.
Chenango River near Chenango Forks, N. Y., 1912–
Chenango River at Binghamton, N. Y., 1901–1912.
Eaton Brook, Madison County, N. Y., 1835.
Madison Brook, Madison County, N. Y., 1835.
Tioughnioga River at Chenango Forks, N. Y., 1903.
Cayuta Creek at Waverly, N. Y., 1898–1902. (Data in Water-Supply Paper 109 only.)
Tioga River (head of Chemung River) near Erwins, N. Y., 1918–

Susquehanna River—Continued.
Chemung River at Chemung, N. Y., 1903– (Data for period prior to 1905, published in Water-Supply Paper 109.)
Cohocton River near Savona, N. Y., 1919.
Cohocton River near Campbell, N. Y., 1918–
Mud Creek at Savona, N. Y., 1918–1919.
Towanda Creek near Monroeton, Pa., 1920–21.
Tunkhannock Creek at Dixon, Pa., 1918–1921.
Lackawanna River at Moosic, Pa., 1919–1921.
Wapwallopen Creek near Wapwallopen, Pa., 1919–1921.
Nescopeck Creek near St. John, Pa., 1919–1921.
Fishing Creek at Bloomsburg, Pa., 1919–1921.
West Branch of Susquehanna River at Bower, Pa., 1918–1921.
West Branch of Susquehanna River at Renovo, Pa., 1919–1921.
West Branch of Susquehanna River at Williamsport, Pa., 1895–1913; 1918–1921.
West Branch of Susquehanna River at Allenwood, Pa., 1899–1902.
Clearfield Creek at Dimeling, Pa., 1918–1921.
Sinnemahoning Creek:
Driftwood Branch of Sinnemahoning Creek at Sterling Run, Pa., 1918–1921.
Bald Eagle Creek at Milesburg, Pa., 1918–1921.
Bald Eagle Creek at Beech Creek, Pa., 1918–1921.
Pine Creek at Ceder Run, Pa., 1918–1921.
Pine Creek near Waterville, Pa., 1918–1920.
Lycoming Creek near Trout Run, Pa., 1919–1921.
Juniata River at Newport, Pa., 1899–1913; 1918–1921.
Frankstown Branch of Juniata River at Williamsburg, Pa., 1919–1921.
Raystown Branch of Juniata River at Saxton, Pa., 1918–1921.
Tuscarora Creek near Port Royal, Pa., 1918–1921.
Yellow Breeches Creek at Olmsteds Mill, Pa., 1918–19.
Swatara Creek at Harper, Pa., 1919–1921.
Little Swatara Creek near Pine Grove, Pa., 1919–1921.
Broad Creek at Mill Green, Md., 1905–1909.
Octoraro Creek at Rowlandsville, Md., 1896–1899.
Deer Creek near Churchville, Md., 1905–1909.

GUNPOWDER RIVER BASIN

Gunpowder Falls at Glencoe, Md., 1905–1909.
Little Gunpowder Falls near Belair, Md., 1905–1909.

PATAPSCO RIVER BASIN

Patapsco River at Woodstock, Md., 1896–1909.

PATUXENT RIVER BASIN

Patuxent River near Burtonsville, Md., 1911–12; 1913–
Patuxent River at Laurel, Md., 1896–1898.

POTOMAC RIVER BASIN

Potomac River, North Branch (head of Potomac River), at Piedmont, W. Va., 1899–1906.
Potomac River, North Branch, at Cumberland, Md., 1894–1897.

Potomac River at Great Cacapon, W. Va., 1895.
Potomac River at Point of Rocks, Md., 1895–
Potomac River at Great Falls, Md., 1886–1891.
Potomac River at Chain Bridge, near Washington, D. C., 1892–1895.
Savage River at Bloomington, Md. 1905–6.
Georges Creek at Westernport, Md., 1905–6.
Wills Creek near Cumberland, Md., 1905–6.
South Branch of Potomac River near Springfield, W. Va., 1894–1896; 1899–1906.
Cacapon River near Great Cacapon, W. Va., 1922–
Opequan Creek near Martinsburg, W. Va., 1905–6.
Tuscarora Creek at Martinsburg, W. Va., 1905.
Antietam Creek near Sharpsburg, Md., 1897–1905.
North River (head of South Fork of Shenandoah River, which is continuation of main stream) at Port Republic, Va., 1895–1899.
South Fork of Shenandoah River near Front Royal, Va., 1899–1906.
Shenandoah River at Millville, W. Va., 1895–1909.
Cooks Creek at Mount Crawford, Va., 1905–6.
Middle River:
Lewis Creek near Staunton, Va., 1905–6.
South River at Basic City, Va., 1905–6.
South River at Port Republic, Va., 1895–1899.
Elk Run at Elkton, Va., 1905–6.
Hawksbill Creek near Luray, Va., 1905–6.
North Fork of Shenandoah River near Riverton, Va., 1899–1906.
Passage Creek at Buckton, Va., 1905–6.
Monocacy River near Frederick, Md., 1896–
Goose Creek near Leesburg, Va., 1909–1912.
Rock Creek at Zoological Park, D. C., 1897–1900.
Rock Creek at Lyons Mill, D. C., 1892–1894.
Occoquan Creek near Occoquan, Va., 1913–1916; 1920–1923.

RAPPAHANNOCK RIVER BASIN

Rappahannock River near Fredericksburg, Va., 1907–

REPORTS ON WATER RESOURCES OF NORTH ATLANTIC COAST[3]

PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY

WATER-SUPPLY PAPERS

Water-supply papers may be purchased (at price quoted below) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. An asterisk (*) indicates that the report is out of print. Water-Supply Papers are of octavo size.

24. Water resources of the State of New York, Part I, by G. W. Rafter. 1899. 99 pp., 13 pls. 15c.
Describes the principal rivers of New York and their more important tributaries, and gives data on temperature, precipitation, evaporation, and stream flow.

*25. Water resources of the State of New York, Part II, by G. W. Rafter. 1899. 100 pp., 12 pls.
Contains discussion of water storage projects on Genesee and Hudson rivers, power development at Niagara Falls, descriptions and early history of State canals, and a chapter on the use and value of the water power of the streams and canals; also brief discussion of the water yields of sand areas of Long Island.

[3] For stream-measurement reports see tables on pp. 267, 268

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

Gives elevations and distances along rivers of the United States, also brief descriptions of many of the streams, including St. Croix, Penobscot, Kennebec, Androscoggin, Saco, Merrimack, Connecticut, Housatonic, Hudson, Mohawk, Delaware, Lehigh, Schuylkill, Susquehanna, Juniata, Potomac, and James rivers.

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

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

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

69. Water powers of the State of Maine, by H. A. Pressey. 1902. 124 pp., 14 pls. 20c.

Discusses briefly the geology and forests of Maine and in somewhat greater detail the drainage areas, lake storage, and water powers of the St. Croix, Penobscot, Kennebec, Androscoggin-Presumpscot, Saco, and St. John rivers, and the minor coastal streams; mentions also developed tidal powers.

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

Defines "normal" and "polluted" waters and discusses the water of Raritan, Passaic, and Hudson rivers and their tributaries and the damage resulting from pollution.

76. Observations on the flow of rivers in the vicinity of New York City, by H. A. Pressey. 1903. 108 pp., 13 pls. 15c.

Describes methods of measuring stream flow in open channels and under ice, and the quality of the river water as determined by tests of turbidity, color, alkalinity, and permanent hardness. The streams considered are Catskill, Esopus, Rondout, and Fishkill creeks, and Wallkill, Tenmile, and Housatonic rivers.

*79. Normal and polluted waters in northeastern United States, by M. O. Leighton. 1903. 192 pp.

Defines essential qualities of water for various uses, the impurities in rain, surface, and underground waters, the meaning and importance of sanitary analyses, and the principal sources of pollution; chiefly "a review of the more readily available records" of examination of water supplies derived from streams in the Merrimack, Connecticut, Housatonic, Delaware, and Ohio River basins; contains many analyses.

*88. The Passaic flood of 1902, by G. B. Hollister and M. O. Leighton. 1903. 56 pp. 15 pls.

Describes the topography of the area drained by the Passaic and its principal tributaries; discusses flood flow and losses caused by the floods, and makes comparison with previous floods; suggests construction of dam at Mountain View to control flood flow. See also No. 92.

92. The Passaic flood of 1903, by M. O. Leighton. 1904. 48 pp., 7 pls. 5c.

Discusses flood damages and preventive measures. See No. 88.

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

Contains brief reports on the wells and springs of the New England States and New York The reports comprise tabulated well records giving information as to location, owner, depth, yield, head, etc., supplemented by notes as to elevation above sea, material penetrated, temperature, use, and quality; many miscellaneous analyses.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. Superseded by Water-Supply Paper 152.

Cites statutory restrictions of water pollution.

106. Water resources of the Philadelphia district, by Florence Bascom. 1904. 75 pp., 4 pls. 5c.

Describes the physiography, stratigraphic geology, rainfall, streams, ponds, springs, deep and artesian wells, and public water supplies of the area mapped on the Germantown, Norristown, Philadelphia, and Chester atlas sheets of the United States Geological Survey; compares quality of Delaware and Schuylkill River waters.

*108. Quality of water in the Susquehanna River drainage basin, by M. O. Leighton, with an introductory chapter on physiographic features, by G. B. Hollister. 1904. 76 pp., 4 pls.

109. Hydrography of the Susquehanna River drainage basin, by J. C. Hoyt and R. H. Anderson. 1905. 215 pp., 29 pls. 25c.

The scope of No. 108 is sufficently indicated by its title. No. 109 describes the physical features of the area drained by the Susquehanna and its tributaries, contains the results of measurements of flow at the gaging stations, and discusses precipitation, floods, low water, and water power.

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

Contains brief reports on water resources, surface and underground, of districts in the North Atlantic slope drainage basins, as shown by the following lists:

Drilled wells of the Triassic area of the Connecticut Valley, by W. H. C. Pynchon.

Triassic rocks of the Connecticut Valley as a source of water supply, by M. L. Fuller. Scope indicated by title.

Water resources of the Taconic quadrangle, New York, Massachusetts, and Vermont, by F. B. Taylor. Discusses rainfall, drainage, water powers, lakes and ponds, underground waters, and mineral springs; also quality of spring water as indicated by chemical and sanitary analyses of Sand Spring, near Williamstown.

Water resources of the Watkins Glen quadrangle, New York, by Ralph S. Tarr. Discusses the use of the surface and underground waters for municipal supplies and their quality as indicated by examination of Sixmile and Fall creeks, and sanitary analyses of well water at Ithaca.

Water resources of the central and southwestern highlands of New Jersey, by Laurence La Forge. Treats of population, industries, climate, and soils, lakes, ponds, swamps and rivers, mineral springs (with analyses), water power, and the Morris canal; present and prospective sources and quality of muncipal supplies.

Water resources of the Chambersburg and Mercersburg quadrangles, Pennsylvania, by George W. Stose. Describes streams and springs.

Water resources of the Curwensville, Patton, Ebensburg, and Barnesboro quadrangles, Pennsylvania, by F. G. Clapp. Treats briefly of surface and underground waters and their use for muncipal supplies; gives analyses of waters at Cresson Springs.

Water resources of the Accident and Grantsville quadrangles, Maryland, by G. C. Martin.

Water resources of the Frostburg and Flintstone quadrangles, Maryland and West Virginia, by G. C. Martin.

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

Contains brief reports on water supplies of the North Atlantic States as follows:

Maine, by W. S. Bayley.
New Hampshire, by M. L. Fuller.
Vermont, by G. H. Perkins.
Massachusetts and Rhode Island, by W. O Crosby.
Connecticut, by H. E. Gregory.
New York, by F. B. Weeks
New Jersey, by G. N. Knapp.
Pennsylvania, by M. L. Fuller.
Delaware, by N. H. Darton.
Maryland, by N. H. Darton and M. L. Fuller.
District of Columbia, by N. H. Darton and M. L. Fuller.
Virginia, by N. H. Darton and M. L. Fuller.

Each of these reports discusses the resources of the public and private water supplies and related subjects, and gives list of pertinent publications; mineral springs are listed and sales of mineral water are reported.

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

Cites legislative acts relating to ground waters in New Jersey.

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

Contains chapter on measurement of rate of underflow on Long Island, N. Y.

144. The normal distribution of chlorine in the natural waters of New York and New England, by D. D. Jackson. 1905. 31 pp., 5 pls. 10c.

Discusses common salt in coast and inland waters, salt as an index to pollution of streams and wells, the solutions and methods used in chlorine determinations, and the use of the normal chlorine map; gives charts and tables for chlorine in the New England States and New York.

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

Contains several brief reports relating chiefly to areas in the North Atlantic slope drainage basin as follows:

Water resources of the Portsmouth-York region, New Hampshire and Maine, by George Otis Smith. Gives results of investigations made for the War Department to determine water supplies available for forts at mouth of harbor.

Water supply from glacial gravels near Augusta, Maine, by George Otis Smith. Describes the Silver Lake system of ponds near Augusta and the series of springs at the head of Spring Brook.

Water resources of the Pawpaw and Hancock quadrangles, West Virginia, Maryland, and Pennsylvania, by George W. Stose and George C. Martin. Describes rocks, springs, and streams in the areas at the northernmost bend of the Potomac; discusses history of development, character of water (with analysis), flow, and origin of Berkeley Springs.

Water of a gravel-filled valley near Tully, N. Y., by George B. Hollister. Describes character of the sands and gravels, the volume of the springs issuing from them, deposits of tufa, the waters of the lakes, and the composition of the spring and lake waters; analyses.

147. Destructive floods in United States in 1904, by E. C. Murphy and others. 206 pp., 18 pls. 15c.

Describes floods on Susquehanna and Mohawk rivers and near Johnstown, Pa.

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

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

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

Cites statutory restrictions of water pollution.

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

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

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

Contains accounts of floods in North Atlantic slope drainage basins as follows: Flood on Poquonnock River, Connecticut, by T. W. Norcross; flood on the Unadilla and Chenango rivers, New York, by R. E. Horton and C. C. Covert; also estimates of flood discharge and frequency on Kennebec, Androscoggin, Merrimack, Connecticut, Hudson, Passaic, Raritan, Delaware, Susquehanna, and Potomac rivers; gives index to literature on floods on American streams.

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

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

*192. The Potomac River basin: Geographic history; rainfall and stream flow; pollution, typhoid fever, and character of water; relation of soils and forest cover to quality and quantity of surface water; effect of industrial waste on fishes; by H. N. Parker, Bailey Willis, R. H. Bolster, W. W. Ashe, and M. C. Marsh. 1907. 364 pp., 10 pls.

Scope indicated by title.

198. Water resources of the Kennebec River basin, Maine, by H. K. Barrows, with a section on the quality of Kennebec River water, by G. C. Whipple. 1907. 235 pp., 7 pls. 30c.

Describes physical characteristics and geology of the basin, the flow of the streams, evaporation, floods, developed and undeveloped water powers, water storage, log driving, and lumbering; under quality of water discusses effect of tides, pollution, and the epidemic of typhoid fever in 1902–3; contains gazetteer of rivers, lakes, and ponds.

223. Underground waters of southern Maine, by F. G. Clapp, with records of deep wells, by W. S. Bayley. 1909. 268 pp., 24 pls. 55c.

Describes physiography, rivers, water-bearing rocks, amount, source, and temperature of the ground waters, recovery of water by springs, collecting galleries and tunnels, and wells; discusses well-drilling methods, municipal water supplies, and the chemical composition of ground water; gives details for each county.

*232. Underground water resources of Connecticut, by H. E. Gregory, with a study of the occurrence of water in crystalline rocks, by E. E. Ellis. 1909. 200 pp., 5 pls.

Describes physiographic features, drainage, forest, climate, population and industries, and rocks; circulation, amount, temperature, and contamination of ground water; discusses the ground waters of the crystalline rocks, the Triassic sandstones and traps, and the glacial drift; the quality of the ground waters (with analyses); well construction; temperature, volume, character, uses, and production of spring waters.

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

Describes collection of samples, methods of examination, preparation of solutions, accuracy of estimates, and expression of analytical results; gives results of analyses of waters of Androscoggin, Hudson, Raritan, Delaware, Susquehanna, Lehigh, Potomac, and Shenandoah rivers.

*258. Underground-water papers, 1910, by M. L. Fuller, F. G. Clapp, G. C. Matson, Samuel Sanford, and H. C. Wolff. 1911. 123 pp., 2 pls.

Contains four brief reports pertaining especially to districts in the North Atlantic slope drainage area:

Occurrence and composition of well waters in the slates of Maine, by F. G. Clapp. Analyses.
Occurrence and composition of well waters in the granites of New England, by F. G. Clapp.
Discusses proportion of successful wells and water supply and depth. Analyses.
Composition of mineral springs in Maine, by F. G. Clapp.
Saline artesian waters of the Atlantic Coastal Plain, by Samuel Sanford.
Underground waters near Manassas, Va., by F. G. Clapp.

279. Water resources of the Penobscot River basin, Maine, by H. K. Barrows and C. C. Babb. 1912. 285 pp., 19 pls. 65c.

Describes the topography, drainage, geology, forests, population, industries, transportation lines, and precipitation in the basin; gives results of investigations of stream flow at gaging stations; discusses relation of run-off to precipitation, evaporation, floods, low water developed and undeveloped water powers, storage, log driving, and lumbering; contains gazetteer of rivers, lakes, and ponds.

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

Contains analyses of spring and well waters in Maine, District of Columbia, and Virginia.

374. Ground water in the Hartford, Stamford, Salisbury, Willimantic, and Saybrook areas, Connecticut, by H. E. Gregory and A. J. Ellis. 1916. 150 pp., 13 pls. 30c.

Describes occurrence of ground water, methods of developing, and requirements for municipal use. Gives, by towns, a description of the surface and ground water and of the public water supply, and records of wells and springs.

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397. Ground water in the Waterbury area, Connecticut, by A. J. Ellis, under direction of H. E. Gregory. 1916. 73 pp., 4 pls. 15c.

Describes the geology of the area, the occurrence of ground water, its use for private and municipal supply, and methods of developing. Discusses, under towns, the population and industries, topography, water-bearing formations, surface and ground water, and public supplies, and gives records of wells and springs.

415. Surface waters of Massachusetts, by C. H. Pierce and H. J. Dean. 1916. 433 pp., 12 pls. 45c.

A compilation of available stream-flow data, including the classic records collected on the Merrimack at Lowell and Lawrence, on the Connecticut at Holyoke, and on the Cochituate at Sudbury by the Metropolitan Water and Sewerage Board, as well as records covering shorter periods; prepared in cooperation with the Commonwealth of Massachusetts. Contains a gazetteer of streams, lakes, and ponds.

424. Surface waters of Vermont, by C. H. Pierce. 1917. 218 pp., 14 pls. 25c.

A compilation of available stream-flow data; prepared in cooperation with the Commonwealth of Vermont. Contains a gazetteer of streams, lakes, and ponds.

449. Ground water in the Meriden area, Conn., by G. A. Waring. 1920. 83 pp., 7 pls. 25c.

Describes the geography and geology of the region. Discusses availability of ground water and its occurrence in stratified drift, till, Triassic rocks, trap rock, and crystalline rocks; well construction; and quality of ground water (with analyses). Discusses, under towns, the history, population and industries, surface features, streams, geology, water supplies, and records of wells and springs.

466. Ground water in the Southington-Granby area, Connecticut, by H. S. Palmer. 1921. 219 pp., 7 pls. 50c.

Describes the topography, climate, surface waters, forests, geology, area, and population of the region. Discusses artesian conditions, springs, occurrence of ground water and methods of recovery, and quality of ground water (with analyses). Gives, by towns, a description of the surface features, water-bearing formations, public supplies, and records of wells and springs.

470. Ground water in the Norwalk, Suffield, and Glastonbury areas, Connecticut by H. S. Palmer. 1920. 171 pp., 12 pls. 65c.

Describes the general features of the region and gives its geologic history. Discusses the different water-bearing formations found in this region and the occurrence of ground water in these formations, discusses artesian conditions, springs, recovery of ground water and its use for public supply, and quality of ground water. Gives, by towns, the area, population, and industries; surface features; water-bearing formations; quality of ground water; public water supplies; and records of wells.

537. A study of coastal ground water, with special reference to Connecticut, by John S. Brown. 1925. 101 pp., 7 pls. 20c.

Describes the rock formations and the shore features of the New Haven coast. Discusses sources and movement of ground water, its occurrence in different rocks, and its development and use. Discusses coastal ground water problems such as contamination of wells, effects of pumping, and influence of tides. Gives detailed descriptions of wells, springs, and pumping plants on New Haven coast. Includes a bibliography of coastal ground water.

ANNUAL REPORTS

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

Annual reports may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C., at the price noted below. An asterisk (*) indicates that the report is out of print.

Sixth Annual Report of the United States Geological Survey, 1884-85, J. W. Powell, Director. 1885. xxix, 570 pp., 65 pls. Cloth $2.00. Contains:

* Seaccast swamps of the eastern United States, by N. S. Shaler. pp. 353-398. Describes the coast swamps of New England; discusses economic problems connected with marine swamps; gives a detailed account of selected areas of salt marsh lands, and a list of the principal areas of salt marshes between Hudson River and Portland, Maine.

Tenth Annual Report of the United States Geological Survey, 1888–89, J. W. Powell, Director. 1890. 2 parts. Pt. I—Geology, xv, 774 pp., 98 pls. Cloth $2.35. Contains:

* General account of the fresh-water morasses of the United States, with a description of the Dismal Swamp district of Virginia and North Carolina, by N. S. Shaler, pp. 255–339, pls. 6 to 19. Scope indicated by title.

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

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

PROFESSIONAL PAPERS

Professional papers may be purchased (at price quoted below) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. An asterisk (*) indicates that the report is out of print. Professional papers are of quarto size.

*44. Underground-water resources of Long Island, N. Y., by A. C. Veatch, C. S. Slichter, Isaiah Bowman, W. O. Crosby, and R. E. Horton. 1906. 394 pp., 34 pls.

Describes the geological formations, the source of the ground waters, and requisite conditions for flowing wells; the springs, streams, ponds, and lakes; artesian and deep wells; fluctuation of ground-water table; blowing wells; waterworks; discusses measurements of velocity of underflow, the results of sizing and filtration tests, and the utilization of stream waters; gives well records and notes (with chemical analyses) concerning representative wells.

123. A superpower system for the region between Boston and Washington, by W. S. Murray and others, 1921. 261 pp, 11 pls. 50c.

Report discusses the electric utilities in independent operation in superpower zone in 1919, proposed electrification of heavy-traction railroads and industry in superpower zone, performance and cost of superpower system, steam-electric and hydroelectric plants, superpower transmission system, reliability of service, and use and cost of coal. The superpower zone includes parts of Maine, New Hampshire, Vermont, New York, Pennsylvania, Delaware, and Maryland and all of Massachusetts, Rhode Island, Connecticut, and New Jersey.

BULLETINS

Bulletins may be purchased (at price quoted below) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. An asterisk (*) indicates that the report is out of print.

*138. Artesian well prospects in the Atlantic Coastal Plain region, by N. H. Darton. 1896. 232 pp., 19 pls.

Describes the general geologic structure of the Atlantic Coastal Plain region and summarizes the conditions affecting subterranean water in the Coastal Plain; discusses the General geologic relations in New York, southern New Jersey, Delaware, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, and eastern Georgia; gives for each of the States a list of the deep wells and discusses well prospects. The notes on the wells that follow the tabulated lists contain many well sections and analyses of the water.

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

Discusses the importance of accurate well records to the driller, to owners of oil, gas, and water wells, and to the geologist; describes the general methods of work; gives tabulated records of wells in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Virginia, and detailed records of wells at Pleasantville and Atlantic Highlands, N. J., and Tully, N. Y. These wells were selected because they give definite stratigraphic information.

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

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in Connecticut, Delaware, Maine, Maryland, Massachussetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia, and detailed records of wells in Newcastle County, Del.; Cumberland County, Maine; Anne Arundel, St. Mary, and Talbot counties, Md.; Hampshire County, Mass.; Monmouth County, N J.; Saratoga County, N. Y.; and Lycoming and Somerset counties, Pa. The wells of which detailed sections are given were selected because they afford valuable stratigraphic information.

*531. Contributions to economic geology, 1911, Part II, Mineral fuels; M. R. Campbell, geologist in charge. 1913. 361 pp. 24 pls.

Issued also in separate chapters. The following papers contain information on ground water:

*(d) Geologic structure of the Punxsutawney, Curwensville, Houtzdale, Barnesboro, and Patton quadrangles, central Pennsylvania, by G. H. Ashley and M. R Campbell (pp. 69–89, Pls. VII–VIII). Discusses the geologic structure of the five quadrangles named and includes a map showing structure contours. It contains a brief statement in regard to shallow and deep wells and artesian prospects (pp. 88–89). The ground water in the Barnesboro and Patton quadrangles is also briefly described in Geologic Folio 189, and the ground water in these two quadrangles and in the Curwensville quadrangle is briefly described in Water-Supply Paper 110.

GEOLOGIC FOLIOS

Under the plan adopted for the preparation of a geologic map of the United States the entire area is divided into small quadrangles, bounded by certain meridians and parallels, and these quadrangles, which number several thousand, are separately surveyed and mapped.[4] The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute the Geologic Atlas of the United States.

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

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

All the folios contain descriptions of the drainage of the quadrangles. The folios in the following list contain also brief discussions of the underground

[4] Index maps showing areas in the North Atlantic slope basins covered by topographic maps and by geologic folios will be mailed on receipt of request addressed to the Director, U. S. Geological Survey, Washington, D. C.

waters in connection with the economic resources of the areas and more or less information concerning the utilization of the water resources.

An asterisk (*) indicates that the stock of the folio is exhausted.

*13. Fredericksburg, Virginia-Maryland. 1894.

*23. Nomini, Maryland-Virginia. 1896.

*70. Washington, District of Columbia-Maryland-Virginia. 1901.

*83. New York City (Paterson, Harlem, Staten Island, and Brooklyn quadrangles), New York-New Jersey. 1902.
Discusses the present and future water supply of New York City.

*136. St. Marys, Maryland-Virginia. 1906.
Discusses artesian wells.

*137. Dover, Delaware-Maryland-New Jersey. 1906.
Describes the shallow and deep wells used as sources of water supply; gives section of well at Middletown, Del.

*149. Penobscot Bay, Maine. 1907.
Describes the wells and springs; gives analysis of spring water from North Bluehill.

*152. Patuxent, Maryland-District of Columbia. 1907.
Discusses the springs, shallow wells, and artesian wells.

157. Passaic, New Jersey-New York. 1908.
Discusses the underground water of the quadrangle, including the cities of Newark, Hoboken, Jersey City, Paterson, Elizabeth, Passaic, Plainfield, Rahway, and Perth Amboy, and a portion of the city of New York; gives a list of the deep borings in the New Jersey portion of the quadrangle, and notes concerning wells on Staten Island, Long Island, Hoffman Island, and Governors Island.

*158. Rockland, Maine. 1908.
Describes the water supply in Knox County, Maine, of which Rockland is the principal city; discusses the water obtained from wells drilled in limestone and granite, and the city water supply of Camden, Rockport, Rockland, and Thomaston.

*160. Accident-Grantsville, Maryland-Pennsylvania-West Virginia. 1908.
Under "Mineral Resources" the folio describes Youghiogheny and Castleman rivers, Savage River, and Georges Creek, and the spring waters; notes possibility of obtaining artesian water.

*161. Franklin Furnace, New Jersey. 1908.
Describes the streams, water powers, and ground waters of a district in northwestern New Jersey, mainly in Sussex County but including also a small part of Morris County; gives tabulated list of water powers and of bored wells.

*162. Philadelphia (Norristown, Germantown, Chester, and Philadelphia quadrangles), Pennsylvania-New Jersey-Delaware. 1909.
Describes the underground waters of the Piedmont Plateau and the Coastal Plain and gives a tabulated list of wells; discusses the water supply of Philadelphia and Camden, also suburban towns; gives analysis of filtered water of Pickering Creek.

*167. Trenton, New Jersey-Pennsylvania. 1909.
Describes streams tributary to Raritan and Delaware rivers (including estimates of capacity with and without storage) and the springs and wells; discusses also the public water supply of Trenton and suburban towns.

*169. Watkins Glen-Catatonk, New York. 1909.
Describes the rivers, which include tributaries of the Susquehanna and the St. Lawerence, the lakes and swamps, and, under "Economic geology," springs and shallow and deep wells; discusses also water supply at Ithaca.

*170. Mercersburg-Chambersburg, Pennsylvania. 1909.
Describes the underground waters, including limestone springs, sandstone springs, and wells, and mentions briefly the sources of the water supplies of the principal towns.

182. Choptank, Maryland. 1912.[5] 5c.
The Choptank quadrangle includes the entire width of Chesapeake Bay and portions of many large estuaries.

[5] Issued in two editions—library (18 by 22 inches) and octavo (6 by 9 inches). Specify edition desired.

189. Barnesboro-Patton, Pennsylvania. 1913. 25c.
Discusses the water supply of various towns in the quadrangle.

191. Raritan, New Jersey.[6] 1914.
Discusses briefly the surface and ground waters of the quadrangle, the quality, and the utilization of streams for power; gives analysis of water from Raritan River and from Schooley Mountain Spring near Hackettstown.

192. Eastport, Maine. 1914. 25c.
Includes brief account of the water supply of the quadrangle and of the utilization of streams for power.

204. Tolchester, Maryland. 1917. 25c.
Discusses shallow and artesian wells.

211. Elkton-Wilmington, Maryland-Delaware-New Jersey-Pennsylvania. 1920. 25c.
Discusses briefly the surface water, springs, shallow wells, and deep wells.

MISCELLANEOUS REPORTS

Other Federal bureaus and State and other organizations have from time to time published reports relating to the water resources of various sections of the country. Notable among those pertaining to the North Atlantic States are the reports of the Maine State Water Storage Commission (Augusta), the New Hampshire Forestry Commission (Concord), the Metropolitan Water and Sewerage Board (Boston, Mass.), the New York State Water-Supply Commission (Albany), the New York State Conservation Commission (Albany), the New York State engineer and surveyor (Albany), the various commissions on water supply of New York City, the Geological Survey of New Jersey (Trenton), Water-Supply Commission of Pennsylvania (Harrisburg) State boards of health, and the Tenth Census (vol. 16).

The following reports deserve special mention:

Water power of Maine, by Walter Wells, Augusta, 1869.

Report of the Commission on Waterways and Public Lands on the water resources of the Commonwealth of Massachusetts, Boston, 1918.

Hydrology of the State of New York, By G. W. Rafter: New York State Museum Bull. 85, 1905.

Hydrography of Virginia, by N. C. Grover and R. H. Bolster: Virginia Geol. Survey Bull. 3, 1906.

Underground-water resources of the Coastal Plain province of Virginia, by Samuel Sanford: Virginia Geol. Survey Bull. 5, 1913.

Surface water supply of Virginia, by G. C. Stevens: Virginia Geol. Survey Bull. 10, 1916.

Many of these reports can be obtained by applying to the several commissions, and most of them can be consulted in the public libraries of the larger cities.

[6] Issued in two editions—library (18 by 22 inches), 25c, and octavo (6 by 9 inches), 50c. Specify edition desired.

INDEX BY AREAS AND SUBJECTS.

A=Annual Reports; M=Monograph; B=Bulletin; P=Professional Paper; W=Water-Supply Paper; GF=Geologic folio. For titles see preceding pages.]

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

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

INDEX OF STREAMS